G. P. ENOS.

Wood Pulp Machine.

No. 230,471. Patented July 27, 1880.

*Fig. 1.*

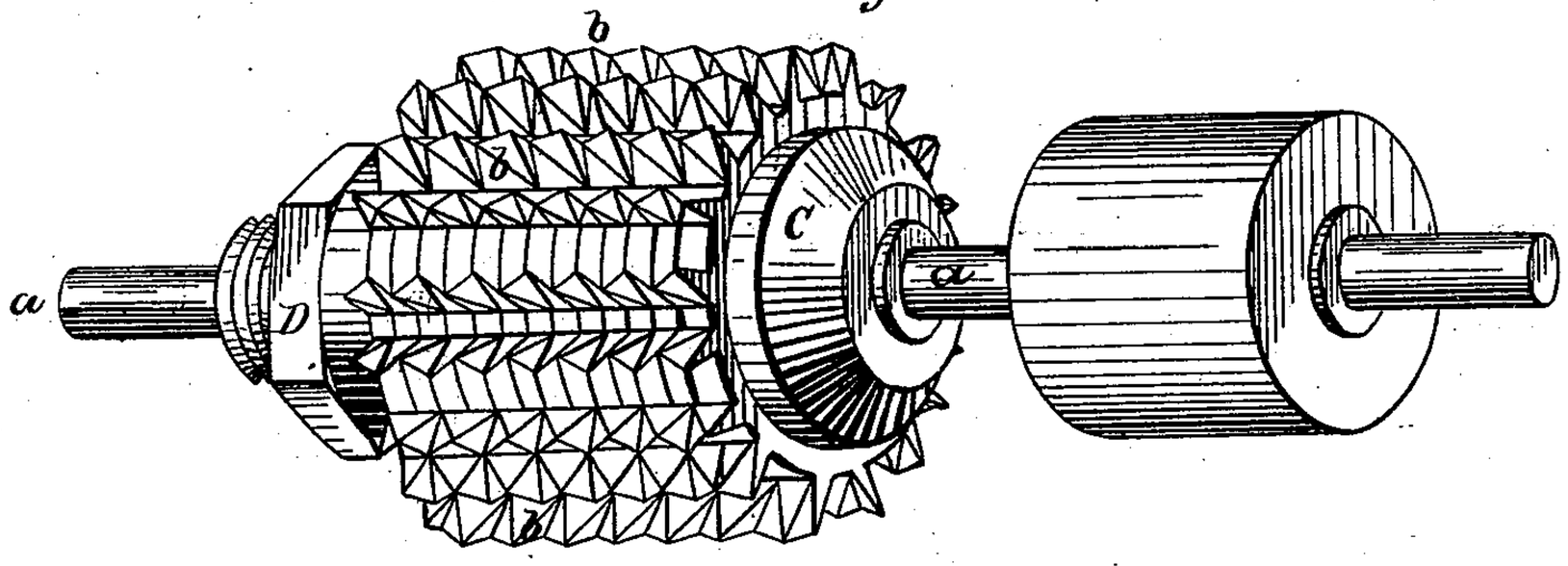



*Fig. 2.*

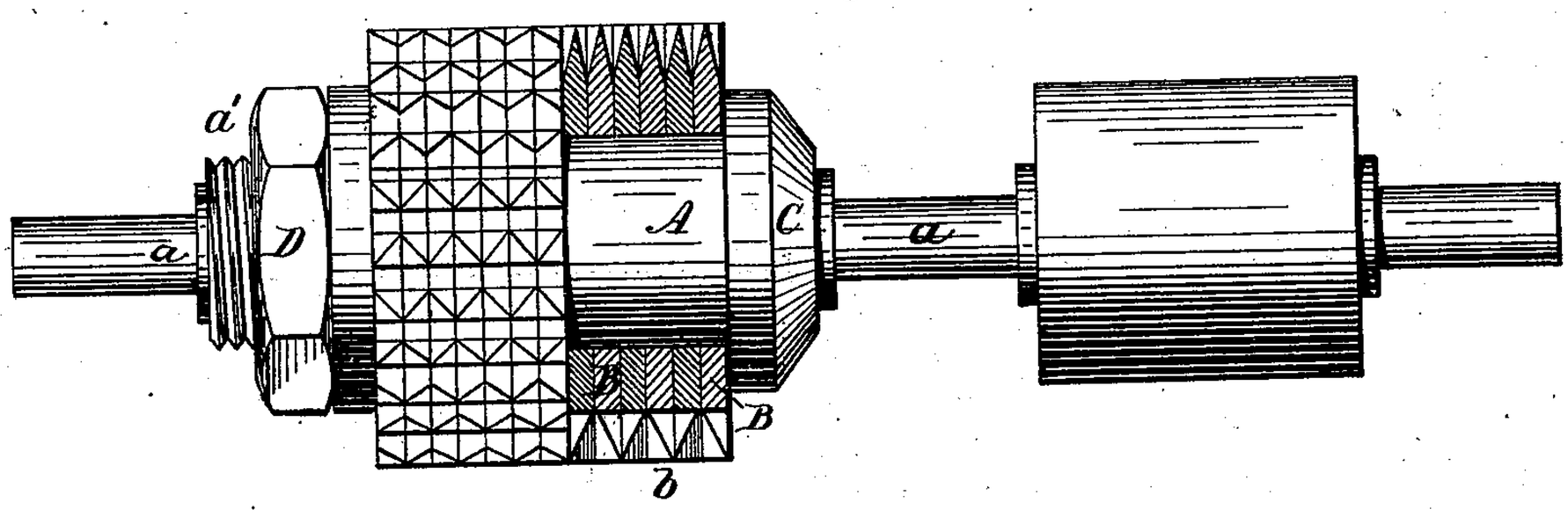



*Fig. 3.*

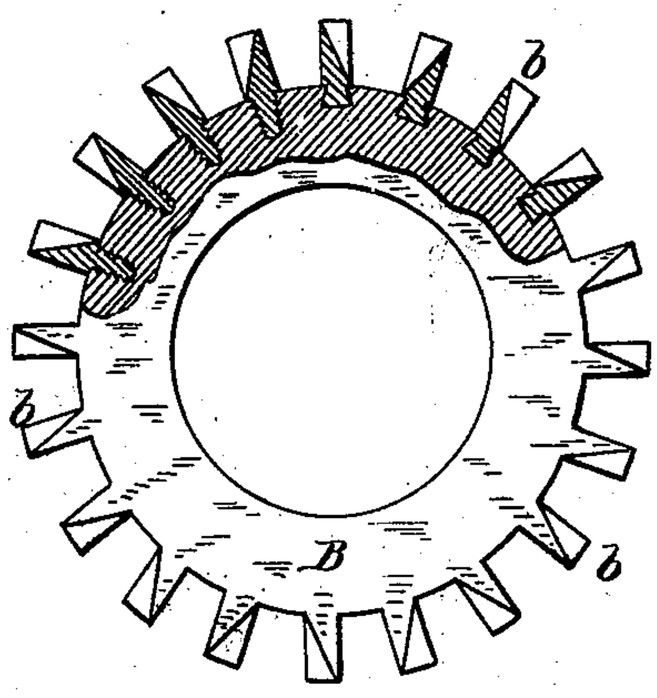
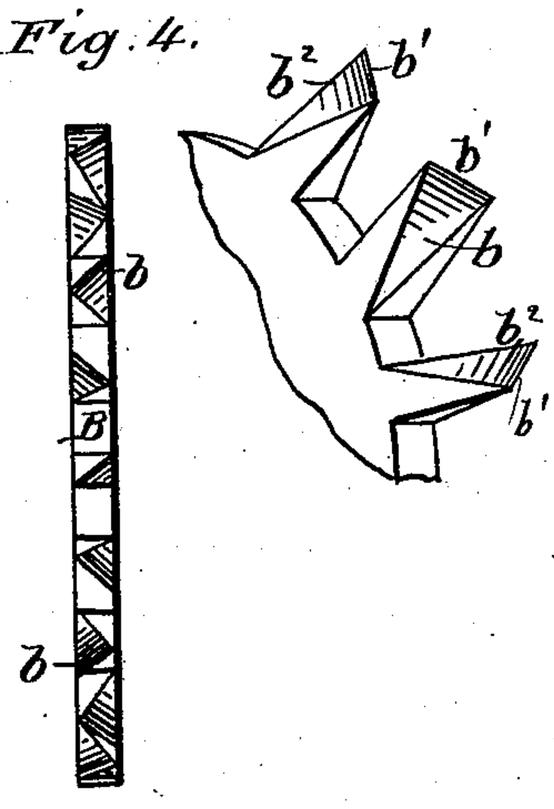



*Fig. 5.*

*Fig. 4.*




*Witnesses:*

W. B. Masson.

J. S. Barker.

*Inventor*

George P Enos

by H. H. Doubleday

atty

# UNITED STATES PATENT OFFICE.

GEORGE P. ENOS, OF GOUVERNEUR, NEW YORK, ASSIGNOR OF TWO-THIRDS OF HIS RIGHT TO NEWTON ALDRICH AND CHARLES ENOS, OF SAME PLACE, ONE-THIRD TO EACH.

## WOOD-PULP MACHINE.

SPECIFICATION forming part of Letters Patent No. 230,471, dated July 27, 1880.

Application filed February 27, 1880.

*To all whom it may concern:*

Be it known that I, GEORGE P. ENOS, of Gouverneur, in the county of St. Lawrence and State of New York, have invented certain new and useful Improvements in Wood-Pulp Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

Figure 1 is a perspective view of my improved wood-pulp machine. Fig. 2 is an elevation or side view thereof. Figs. 3 and 4 are detached views of one of the rings with its scrapers. Fig. 5 is a perspective view, showing the positions of the cutting-edges and the operative faces of the scrapers relative to each other, to the axis, and to the planes of rotation.

This invention consists, first, in so arranging the mechanism for disintegrating the wood that it scrapes the wood in a direction inclined both to the axis of rotation and to the grain or fiber of the wood by means of short blades with scraping-edges set diagonally to said grain; secondly, in so arranging the blades with reference to each other that they have their operative faces inclined both as above described, and also to each other; thirdly, in so arranging the cutting-blades that they can be placed in pairs parallel to the axis of rotation, which shall present consecutively a salient, convex, or projecting angle or point, and a recessed or concave angle between cutting-edges and operative faces.

In the accompanying drawings, A, Fig. 1 represents a cylinder, of any suitable length, mounted upon a shaft, *a a*.

B B B represent rings or collars mounted upon the cylinder A, to which rings the scrapers *b b b* are attached. These scrapers may be either fixed or movable with relation to the rings. The entire cylinder is filled with these rings, which are confined between the shoulder C and the clamping-nut D, as shown in Fig. 2.

Many of the features of my improved process depend upon having the blades so constructed and arranged that they can be held relatively to each other in certain fixed positions, and to successfully operate them the rings B must be clamped together (after once adjusted) in the securest manner possible. In order to hold the rings B thus tightly together, especially at the periphery, where they meet the greatest displacing strain, I mount them, not upon the central spindle, *a*, but upon the expanded cylinder A, considerably greater in diameter than the spindle, and form upon the expanded cylinder the screw-thread at *a'*, whereby I am enabled to bring the clamping-nut D and shoulder C to bear against the rings B nearer the peripheries than could be practically done were the screw-thread formed upon the central spindle, *a*.

Motion is communicated to the cylinder by means of a belt, or any usual device, the rings, with their scrapers, revolving with it.

It is evident that this construction may be varied in several ways—as, for instance, longitudinal or spiral grooves may be cut, dovetail in form, in the surface of the cylinder, and scrapers with corresponding dovetail tenons placed therein and secured by collars or set-screws; or the scrapers may be attached to a straight bar to which a reciprocating motion may be given, though I prefer the revolving motion above set forth, from its permitting a high rate of speed.

Two views of a detached ring and its scrapers are shown in Figs. 3 and 4. The scrapers may be of any suitable length—say one-half inch to one inch—and their edges are placed angularly with the axis of rotation.

I do not confine myself to any particular angle, but prefer it to be forty-five degrees, so that the edge of any given scraper forms a right angle with the edge of the adjoining scraper upon the next ring.

From an examination of the drawings it will be seen that the scrapers are so constructed

and arranged that each of the cutting-edges $b'$ is situated on a line substantially concentric with the cylinder, and at the same time transverse to the axis of rotation, the said cutting-edge $b'$ being substantially equidistant at all points from the axis, and therefore operating to cut throughout its whole length. The length of the fiber made from the wood by these scrapers is largely determined by the width of the scrapers. Therefore I prefer to make them from one-fourth to three-eighths of an inch in width.

I am aware that common saws have long been used in preparing wood pulp; but, so far as I have learned, the material produced by such saws requires to be ground between millstones to reduce it to pulp. In the two processes much of the wood is reduced to a dust or powder with no felting qualities, and thereby injured for paper-stock.

I am also aware that pulp has been made by grinding upon common grindstones or emery-wheels, but this process produces a very short fiber and a considerable proportion of dust; and also that scraping devices have been used in which the cutting or scraping edges and faces were arranged in planes at right angles to the plane of rotation and parallel with the axis of rotation; but I believe myself to be the first to employ scrapers arranged to have the cutting-edges situated on lines substantially concentric with the cylinder and at the same time transverse to the axis of rotation.

This construction places the operative face $b^2$, which comes in contact with the wood, in a plane that is transverse or inclined both to the horizontal axis of rotation and to the vertical planes of rotation, the result being that the fibers are removed by being scraped in a direction at an angle both to the axis and to the plane of rotation, the edge $b'$ operating by a shear-cut.

The fiber that is thus produced from the angular position of the operative-face $b^2$ I have found to be greatly superior to that produced by teeth or scrapers having the operative face substantially in the plane of the axis of rotation or parallel therewith. These scrapers produce a long slender fiber with excellent felting qualities, with little dust, and for some qualities of paper no regrinding is required.

The alternate presenting of the apexes and openings of the angle formed by the edges of two adjacent scrapers to the wood results practically in its being scraped in two directions alternately. I regard this as important in the production of a good fiber, and believe that I am the first to discover and reduce the same to practical use.

Parts of the machine, (not shown,) such as the feeding apparatus for holding the wood in contact with the disintegrating mechanism, are arranged in any usual or preferred form.

What I claim is—

1. In a wood-pulp machine, rotating scraping-blades arranged to have their operative faces situated in planes diagonal both to the axis and to the plane of rotation, substantially as and for the purposes set forth.

2. In a wood-pulp machine, scraping-blades having their operative faces situated in planes inclined both to the axis of rotation and to the planes of revolution and arranged in pairs to form converging angles between the contiguous operative faces, substantially as and for the purposes set forth.

3. In a wood-pulp machine, a rotating scraping-blade having a cutting-edge which is throughout equidistant from the center of rotation and is arranged in a plane inclined to the axis of rotation, substantially as and for the purposes set forth.

4. In a wood-pulp machine, scraping-blades situated in substantially the same planes of rotation and arranged to have the operative faces of each consecutive pair of blades in planes inclined to each other, and both faces inclined to the axis of rotation and to the planes of rotation, substantially as and for the purposes set forth.

5. In a wood-pulp machine, the combination, with a central spindle, $a$, and the detachable blade carrying rings B, provided with apertures of larger diameter than the spindle $a$, of the expanded cylinder A, attached to the shaft or spindle $a$, and having the same diameter as the openings in the rings B, and provided with a screw-thread of greater diameter than the shaft or spindle $a$, substantially as and for the purposes set forth.

In testimony that I claim the foregoing I have hereunto set my hand and seal this 23d day of February, 1880.

GEORGE P. ENOS. [L. S.]

Witnesses:
J. S. CORBIN,
A. G. HILL.