No. 773,479. PATENTED OCT. 25, 1904.

W. N. CORNELL.

APPARATUS FOR UTILIZING WASTE PRODUCT FROM THE MANUFACTURE OF PAPER.

NO MODEL. APPLICATION FILED FEB. 18, 1903.

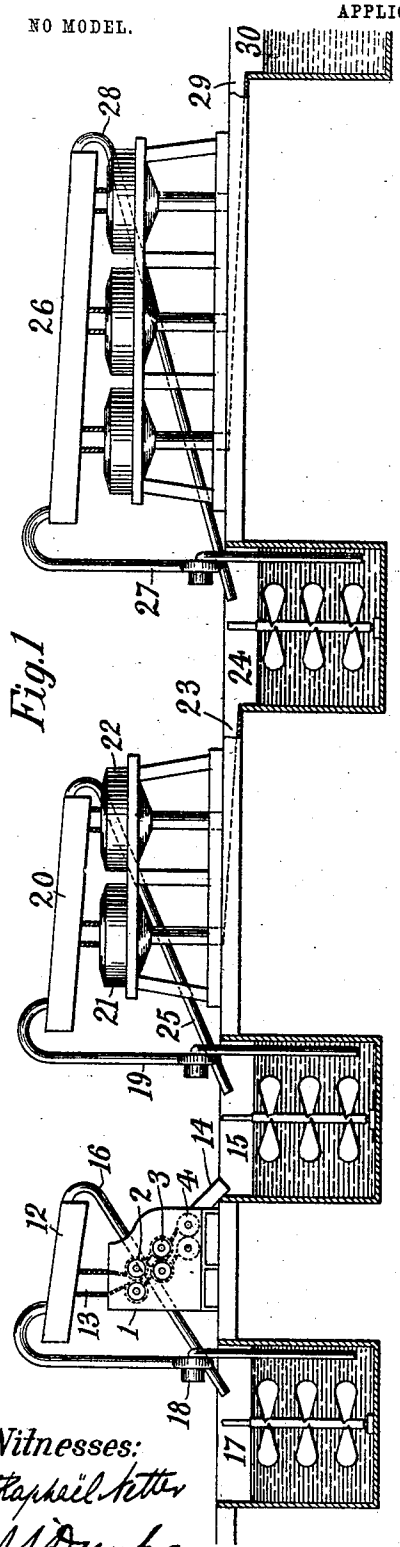

Fig. 1

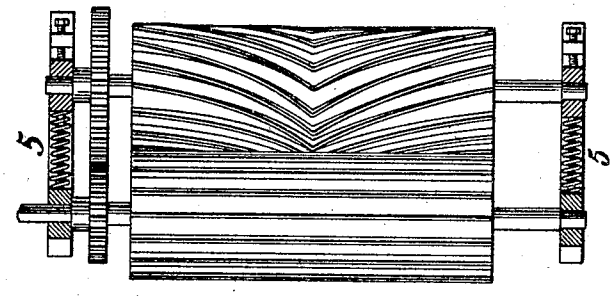

Fig. 4

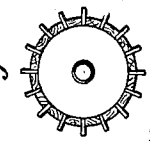

Fig. 4a

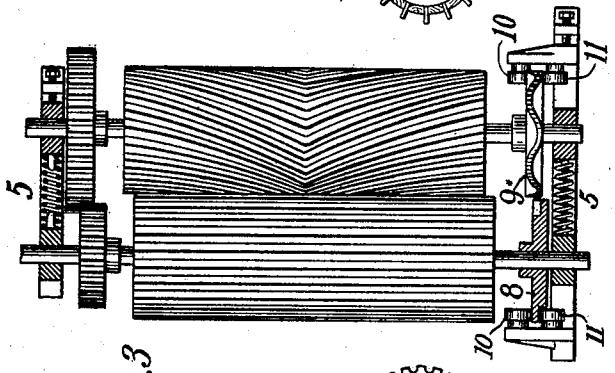

Fig. 3

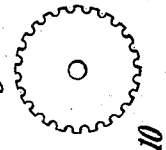

Fig. 3a

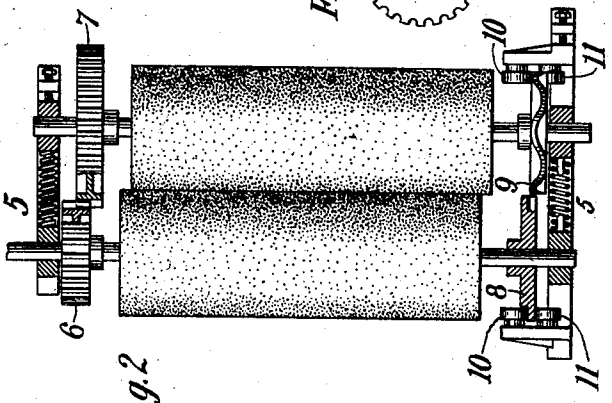

Fig. 2

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No. 773,479. Patented October 25, 1904.

UNITED STATES PATENT OFFICE.

WILLIAM NORRIS CORNELL, OF MASSENA, NEW YORK.

APPARATUS FOR UTILIZING WASTE PRODUCT FROM THE MANUFACTURE OF PAPER.

SPECIFICATION forming part of Letters Patent No. 773,479, dated October 25, 1904.

Application filed February 18, 1903. Serial No. 143,888. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM NORRIS CORNELL, a citizen of the United States, residing at Massena, county of St. Lawrence, State of New York, have invented certain new and useful Improvements in Apparatus for Utilizing Waste Product from the Manufacture of Paper, of which the following is a specification, reference being had to the drawings accompanying and forming part of the same.

My invention relates to apparatus for reducing coarse wood particles to a fibrous condition suitable for paper-stock, and is particularly designed to carry out the process of utilizing waste product from the manufacture of paper described, and claimed in my application for Letters Patent filed of even date herewith, Serial No. 143,887, now Patent No. 756,214, dated April 6, 1904.

The present invention consists of the novel features and combinations hereinafter described and more particularly pointed out in the claims.

Referring now to the drawings for a complete understanding of my invention, Figure 1 shows the entire apparatus diagrammatically, partly in section. Fig. 2 shows the first set of rolls in detail; Figs. 3 and 4, the succeeding rolls; and Figs. 3^a and 4^a are end views of rolls shown in Figs. 3 and 4.

The machine shown at 1, Fig. 1, has a number of rolls mounted in sets 2 3 4, preferably arranged in a diagonal line from top to bottom of the machine. The first set is preferably made of sandstone, dressed smooth. The surface of the rolls, however, being necessarily incapable of taking a polish, is slightly rough, on account of the grain of the stone. They are usually mounted in movable bearings—as, for example, 5—so constructed as to permit of the rolls being readily adjusted toward or from each other for the purpose of regulating accurately the extent of their crushing action. They may be rotated by any suitable means; but since they must revolve in opposite directions it is convenient to gear them together, as shown. In order to provide a simultaneous drawing action, one roll may be made to rotate at less speed than the other, as by making the gear 6 smaller than the other, 7. With this difference of speed may be combined also an endwise vibration of one or both rolls. Any suitable mechanism may be employed to effect this movement—as, for example, the face-cams 8 9, working between antifriction-rollers 10 11. By using cams of different size or curvature it is evident that the rapidity and extent of the endwise reciprocation may be varied at will to suit different conditions. The second set of rolls 3 is also preferably of sandstone, but instead of being smooth they are corrugated—as, for example, in the manner shown in Fig. 3. They also rotate in opposite directions at different speeds and are mounted in adjustable bearings, with means to cause them to vibrate as the former set. The corrugations are for the purpose of giving the rolls a more pronounced and positive drawing effect simultaneously with their crushing action. The third set of rolls are intended to effect the third and what under ordinary conditions would be the final step of reduction. The rolls themselves are preferably constructed in a manner similar to the well-known "Jordan" engine, but have a crushing and drawing action analogous to the other rolls, though preferably not to the same extent, since the material, by the time it has passed through the first two sets, is very nearly fine enough for the stones and needs only slight further reduction. The rolls themselves are made with blades or bars, as shown, projecting above the surface. The bars may be of iron with wooden slats or bars between them. The latter when soaked with water swell, and thus bind the blades and hold the same securely in position. These rolls should be mounted in adjustable bearings, like the others, and should of course be rotated at different speeds. They need not, however, be reciprocated like the others.

The upper part of the machine 1 is provided with a hopper 12, having a conduit 13, discharging between the rolls 2. A spout 14 discharges the material into a tank or vat 15 after it has been acted on by the crushing and drawing rollers. An escape-pipe 16 carries the overflow of the hopper back into the mixing-tank 17 in case the pump or other conveyer 18 supplies material to the hopper faster

than the machine can work it. From the mixing-vat 15 the crushed and drawn material is carried by a conveyer 19 to a second hopper 20, discharging into two pairs of millstones 21 22, in which the particles are ground or rubbed to a still finer condition, passing thence by a spout 23 into a third mixing-vat 24. An overflow-pipe 25 is provided to return any excess from the hopper to the vat. A second group of millstones 26, composed of three sets, is arranged to further reduce the size of the particle, provided with a conveyer 27 and overflow-pipe 28. The material, after being worked by this group of stones, is discharged through a spout 29 into a fourth vat, 30, from which it may be run out onto the screens, as in the usual process of paper-making.

The millstones just described may be dressed in the ordinary manner or specially, according to the needs of a particular case. It should not be understood that in the apparatus illustrated all the material is worked upon by each set of stones, making two grindings in the first group and three in the second. On the contrary, the mass is divided between the stones of the first group and again divided in the second, so that a single set grinds only a part of the whole material.

The apparatus described and shown herein I regard as the most satisfactory for the purpose, but I do not consider my invention limited thereto, since it is capable of many embodiments.

What I claim is—

1. In an apparatus for reducing to pulp the waste product known as screenings, in combination, a pair of sandstone rolls having the natural grain of the stone on their surfaces, and means for rotating the rolls at different speeds, as set forth.

2. In an apparatus for reducing to pulp the waste product known as screenings, in combination, a pair of sandstone rolls having the natural grain of the stone on their surfaces, means for rotating the rolls at different speeds, means for reciprocating the rolls endwise, a pair of corrugated rolls, means for rotating the last-mentioned pair of rolls at different speeds, a third pair of rolls for further reducing the material, and means for feeding the material through the pairs of rolls successively, as set forth.

WILLIAM NORRIS CORNELL.

Witnesses:

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