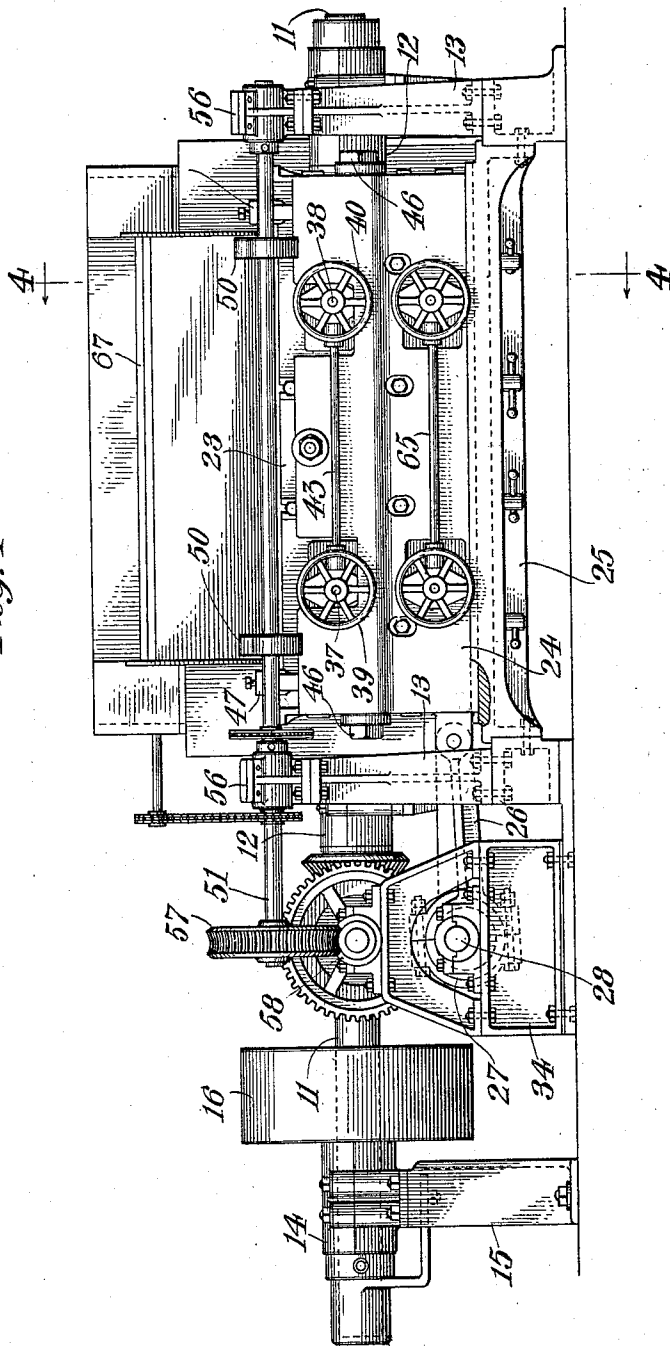


W. N. CORNELL.
 APPARATUS FOR REDUCING SCREENINGS TO PULP.
 APPLICATION FILED DEC. 3, 1913.

1,150,100.

Patented Aug. 17, 1915.
 3 SHEETS—SHEET 1.

Fig. 1



Witnesses:
W. P. Johnson
A. S. Dunham

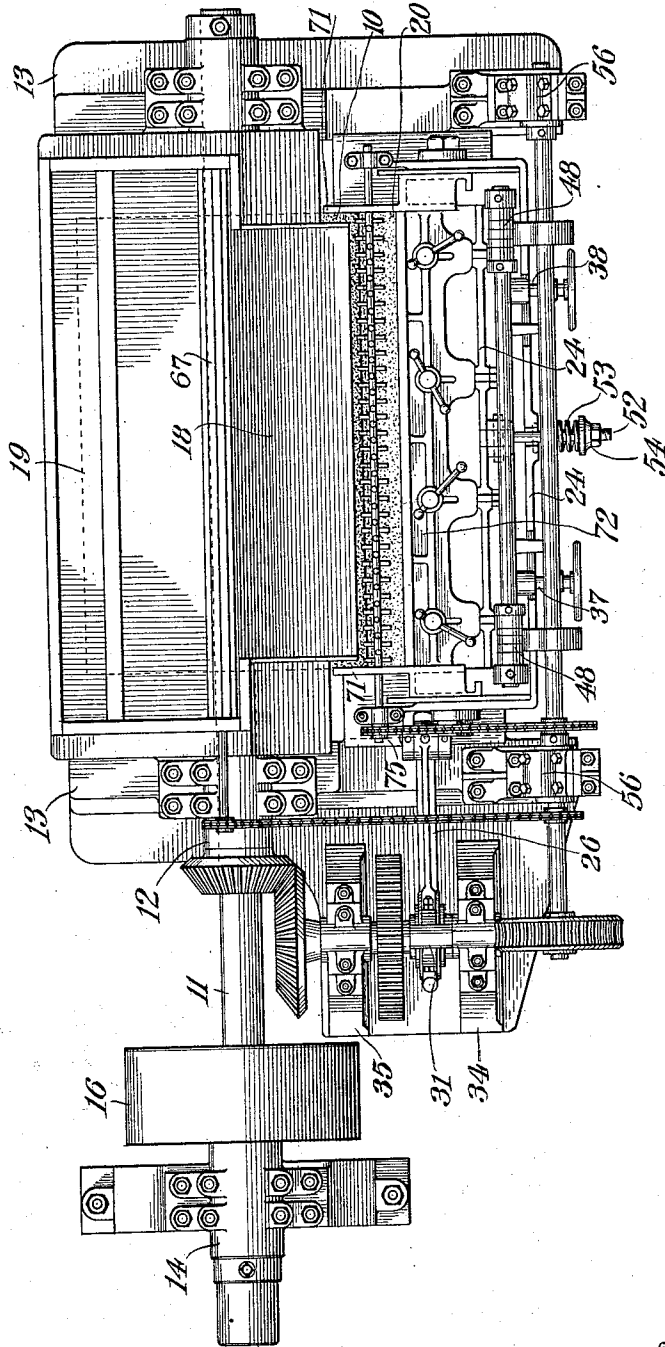
Inventor
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Fig. 2



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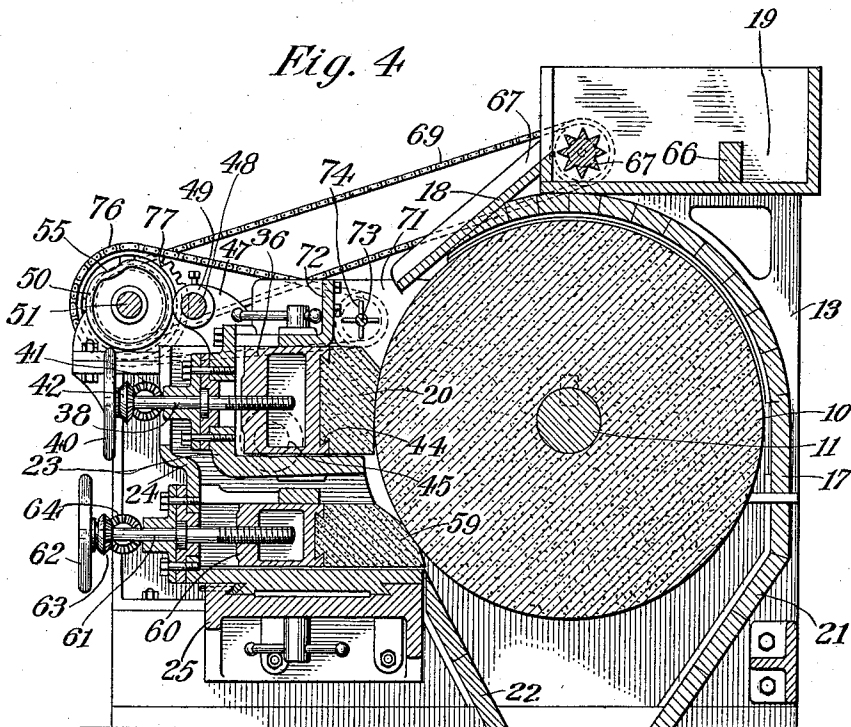
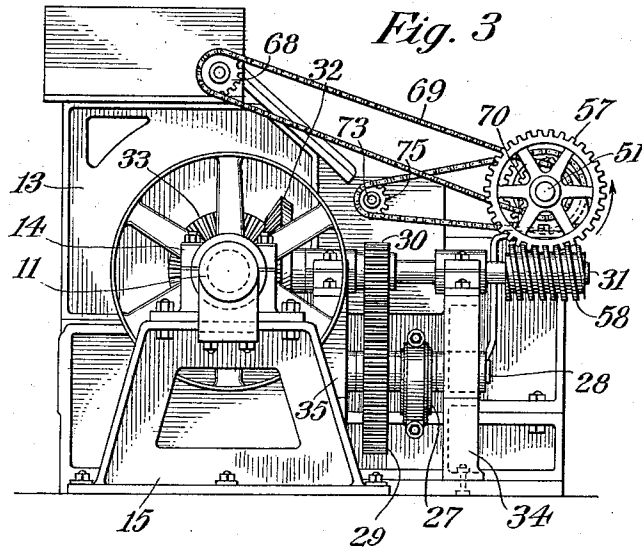
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UNITED STATES PATENT OFFICE.

WILLIAM NORRIS CORNELL, OF WATERTOWN, NEW YORK, ASSIGNOR OF ONE-HALF TO
JAMES K. PHILLIPS, OF MASSENA, NEW YORK.

APPARATUS FOR REDUCING SCREENINGS TO PULP.

1,150,100.

Specification of Letters Patent.

Patented Aug. 17, 1915.

Application filed December 3, 1913. Serial No. 804,368.

To all whom it may concern:

Be it known that I, WILLIAM NORRIS CORNELL, a citizen of the United States, residing at Watertown, county of Jefferson, and State of New York, have invented certain new and useful Improvements in Apparatus for Reducing Screenings to Pulp, of which the following is a full, clear, and exact description.

This invention relates to the treatment of "screenings," a waste product from the manufacture of wood pulp, and its chief object is to provide a simple and effective apparatus for reducing screenings to pulp which may be utilized for making paper, paper-board, or other products.

To this and other ends the invention consists in the novel features of construction and combinations of elements hereinafter described.

Upon reading the subjoined description and claims it will be seen, by those skilled in the art, that the invention can be embodied in a considerable variety of forms. It is therefore unnecessary to illustrate more than one of these many forms, and I have accordingly confined the present description to the embodiment which at the present time is believed to exhibit the invention in its most convenient and effective form. This form is shown in the accompanying drawings, in which:

Figure 1 is a front view of the complete machine. Fig. 2 is a plan view. Fig. 3 is a side view, from the left of Figs. 1 and 2. Fig. 4 is a vertical section, substantially on line 4-4 of Fig. 1.

In accordance with this invention, the coarse slivers, chips and other bits of wood composing the screenings, are subjected to a crushing and drawing action between suitable "reducing elements," one a rotating roller and the other a cooperating cylinder-concave member. At least one of these elements is reciprocated as the screenings pass between the two, so that the particles or bits of wood are not only crushed, but are also subjected to a drawing effect which materially aids the operation of reducing the bits or particles to fibers of sufficient fineness for felting. The cooperating surfaces of the reducing elements are rough, so as to effectively grip the bits of wood, and for this reason I prefer to make the reducing elements of sandstone. This material,

which is incapable of taking a polish, has a surface of the desired roughness, and as the element wears, the nature and quality of the surface is not affected materially, if at all. Other materials may be used, but if they are of such a nature as to take a polish it may be necessary to roughen their cooperating surfaces from time to time.

In the machine illustrated, the sandstone roll 10, Fig. 4, is rigidly mounted on a transverse shaft 11 journaled in bearings 12 in the strong side frames 13, and at one end the shaft extends beyond the side frame into a third bearing 14 on top of a standard 15. Between the latter and the adjacent frame 13 the shaft is equipped with a driving pulley 16 by which the shaft is driven from any convenient source of power, not shown. The roll is inclosed by a housing, the side walls of which are the aforesaid side frames 13. The rear wall 17 of the housing arches over the top of the roll to a point, well in front of the shaft 11, where it meets the downwardly inclined transverse apron 18, over which the screenings flow from the supply hopper 19 into the bight between the roll 10 and the upper inclined face of the sandstone cylindro-concave member or element 20. The lower part 21 of the wall 17 is inclined forwardly, as shown, and the front wall 22 is inclined rearwardly, the two being spaced apart at the bottom for the free and unimpeded discharge of comminuted screenings into a suitable receptacle not shown.

The cylindro-concave element 20 hugs the roll 10 closely, and is mounted in a carrier 23, which is in turn mounted (as more particularly described below) in a frame 24. The latter is mounted to slide endwise in a path parallel to the shaft 11, on a supporting base 25, and is reciprocated by a pitman 26 cooperating with an eccentric 27 on a short shaft 28 at right angles to the main shaft 11. The shaft 28 is rotated by a gear 29 meshing with a gear 30 on an upper parallel shaft 31, which, at its rear end, has a bevel gear 32 meshing with a bevel gear 33 on the aforesaid main shaft 11. Thus the shaft 11 not only rotates the roll 10, but also, through the agency of the mechanism just described, reciprocates the cooperating cylindro-concave member 20. The shafts 28 and 31 have bearings in vertical frames 34, 35.

Within the carrier 23 is a follower 36 by which the cylindro-concave member 20 can be adjusted with respect to the roll 10, to take up wear. For this purpose the follower is provided with adjusting screws 37, 38, mounted in the front wall of the carrier 23 so as to be axially stationary, as clearly indicated in Fig. 4, but capable of being rotated by hand wheels 39, 40. At their outer ends the screws are provided with bevel pinions 41, meshing with bevel pinions 42 at the ends of a transverse shaft 43, so that the follower can be shifted by turning either hand wheel. For the purpose of moving the member 20 away from as well as toward the roll 10, so that a new member can be readily substituted for the old, the said member and the follower are secured together in any convenient manner, as by means of the dove-tail joint shown at 44 in Fig. 4. The carrier 23 is provided at its ends with pivots 45 extending through the adjacent side walls of the frame 24 and covered on the outside by end caps 46. The carrier is also provided at its ends with upwardly and forwardly extending arms 47, in the upper ends of which a transverse shaft 48 is fixed. On this shaft are rotary collars 49 bearing against cams 50 fixed on a transverse shaft 51. Pivoted to the front of the carrier 23 is a rod 52 encircled by an expansive coil spring 53, one end of which bears against the adjacent front wall of frame 24 and the other against an adjustable nut 54 threaded on the rod. The spring therefore serves to urge the carrier outward or forward on its pivots, with the collars or rollers 49 bearing on the cams 50. Once in each rotation of the shaft 51 the drops 55 in the cams 50 come opposite the rollers 49 and permit the spring 53 to rock the carrier forward on its pivots. This opens a gap between the cylindro-concave member 20 and the roll 10, thereby allowing screenings accumulated above the former to fall down between the two. Inasmuch as the axis of the pivots on which the carrier rocks is below the line joining the axis of the roll and the center of the member 20, and is above the lower edge of the said member, the lower portion of the latter comes against the roll while the upper edge swings forward to produce the desired gap. It is therefore seen that the gap is open at the top but closed at the bottom, thereby permitting free entrance of the screenings but preventing their downward escape until they have been subjected to the desired crushing and drawing action between the two elements 10 and 20.

The shaft 51, on which the cams 50 are fixed, is mounted in bearings 56 on the frames 13, and is rotated at a suitable rate of speed from the main shaft 11, as for example, by a worm gear 57 meshing with a worm 58 on the shaft 31.

As the reduction produced by the roll 10 and member 20 may not be fine enough for the desired grade of pulp, particularly if the screenings are of more than average coarseness, provision is made for further reduction of the stock, whenever necessary or desirable, after it has escaped from the roll 10 and member 20. For this purpose a second cylindro-concave member 59, is provided, below the first and in the same frame 24. This second or lower member is fixed to a follower 60, as by the dove-tail joint shown in Fig. 4, which is adjustable by screws 61 having hand wheels 62 and connected by bevel pinions 63 to bevel pinions 64 on a transverse shaft 65. It has not been found necessary, in the practical operation of the machine to rock the member 59, and accordingly mechanism for that purpose is not shown herein.

The screenings to be treated are mixed with water and the mixture, preferably as free as possible from masses or lumps, is delivered continuously into the feed hopper 19, whence it flows over the dam 66 in the hopper to the feed roller 67. The latter is journaled in the side frames 13 and at one end is provided with a sprocket 68 connected by a chain 69 with a driving sprocket 70 on shaft 51, by which the roller is rotated clockwise (as seen in Fig. 4) at a suitable rate of speed to stir the material as it overflows upon the apron 18. Without this roller the screenings are apt to accumulate at the top of the apron and then slide down in a mass from time to time, thereby making the feed to the stones or reducing elements irregular; but when the roller is rotating it carries the screenings over and distributes them evenly upon the apron so that the flow is substantially uniform. From the apron 18 the mixture falls into the inclosure formed by the side walls 71 and front wall 72 in conjunction with the roll 10 and cylindro-concave member 20. The side walls mentioned are curved at their rear edges to fit the roll 10; and the front wall, adjustable toward and from the roll 10 on the follower 36, fits snugly but movably against the inner surfaces of the side walls. In the inclosure is a whipper consisting of a transverse shaft 73 journaled in the side walls 71 and provided with radial arms 74. On one end of the shaft is a sprocket 75, driven by a chain 76 passing over a sprocket 77, considerably larger than the other, on the shaft 51. Being thus rotated at a rather rapid rate, the whipper keeps the mixture in the inclosure thoroughly agitated, so that the feed into the space between the stones, as the stone 20 tips away from the roll, is substantially uniform.

Between the roll 10 and the members 20 and 59, one of which is adapted to be reciprocated relatively to the other, the slivers

and other bits of wood composing the screenings are subjected to a crushing and drawing action, by which they are reduced to the fibrous state necessary for pulp, and
 5 are discharged through the chute 21—22 into the receiving vat or other receptacle, not shown.

It is to be understood that the invention is not limited to the construction herein specifically illustrated and described, but can be embodied in other forms without departure from its proper spirit and scope.

I claim:

1. In an apparatus for the purpose described, the combination of a rotating roll, a cylindro-concave member cooperating with the roll, means for reciprocating the cylindro-concave member endwise, automatic mechanism for intermittently moving the
 20 cylindro-concave member outwardly from the roll to open a space between the two, and means for delivering screenings into the space thus formed.

2. In an apparatus for the purpose described, the combination of a rotating roll, a cooperating cylindro-concave member, automatic means for periodically rocking the cooperating member on the roll to open a gap between the two, means for reciprocating
 30 the cylindro-concave member endwise while in operative engagement with the roll, and means for supplying screenings to the gap between the roll and the member.

3. In an apparatus for the purpose described, the combination of a rotating roll, a cooperating cylindro-concave member pivotally mounted at its ends to rock toward and from the roll, means for rocking the member on its pivots, mechanism for reciprocating
 40 the member while in cooperative engagement with the roll, and means for supplying screenings to the roll and member.

4. In an apparatus for the purpose described, the combination of a rotating roll, a cooperating cylindro-concave member, a pivoted carrier for the member having end
 45 pivots, a cam cooperating with the carrier to rock the same and the member on said

pivots periodically, means for reciprocating the carrier endwise, and means for supplying screenings to the member and roll. 50

5. In an apparatus for the purpose described, the combination of a rotating roll, a reciprocating cylindro-concave member cooperating with the roll, a pivoted carrier for the member, having an arm to rock the same, a cam cooperating with the arm to actuate the same intermittently, means for reciprocating the carrier, and means for supplying screenings to the member and roll. 55 60

6. In an apparatus for the purpose described, the combination of a rotating roll, a frame adjacent to the roll and arranged to reciprocate in parallelism therewith, means for reciprocating the frame, a member in the frame having a cylindro-concave surface to cooperate with the roll, said member moving with the frame in the reciprocatory movement thereof and pivotally mounted in the frame to rock relatively to the roll, means for rocking the said member periodically, and means for supplying screenings to the member and roll. 65 70

7. In an apparatus for the purpose described, the combination of a transverse driving shaft, a roll rigidly mounted thereon, a cylindro-concave member cooperating with the roll, a support for the member, pivoted to rock toward and from the roll, a cam shaft parallel with the member, a connecting shaft between the cam shaft and the driving shaft to drive the former from the latter, a cam fixed on the cam shaft and associated with said pivoted support to rock the same, a reciprocatory frame in which the pivoted support is mounted, a countershaft parallel to and driven by the aforesaid connecting shaft, and an eccentric mounted on the countershaft and connected with the reciprocatory frame to actuate the same. 75 80 85 90

In testimony whereof I affix my signature in the presence of two subscribing witnesses.

WILLIAM NORRIS CORNELL.

Witnesses:

CHAS. E. HOLBROOK,
 D. S. MILLER.