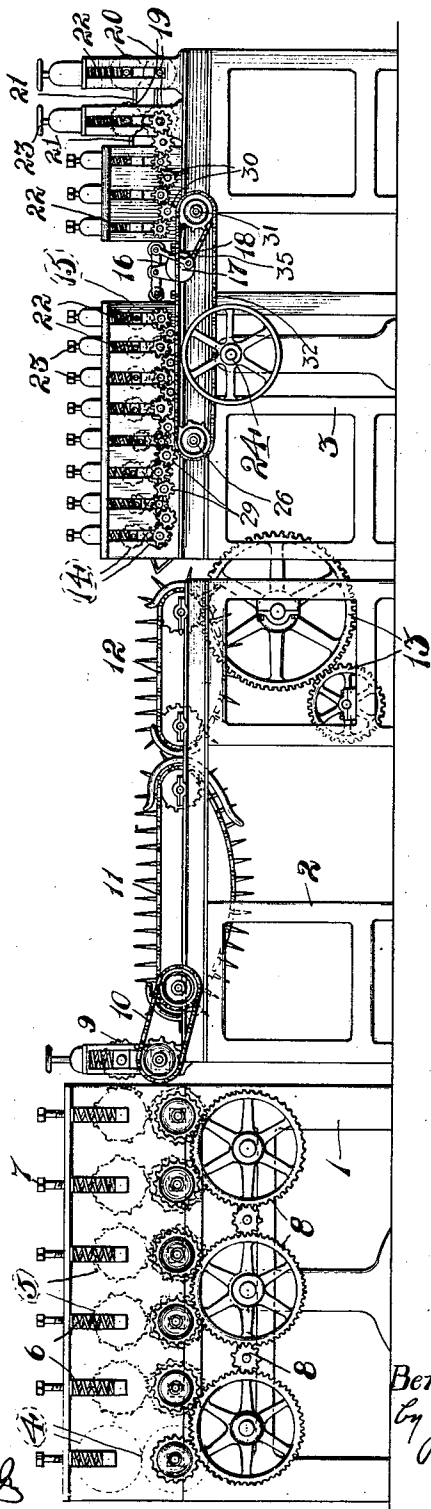


B. S. SUMMERS.
PROCESS FOR PREPARING FIBER FOR COMMERCIAL PURPOSES.
APPLICATION FILED OCT. 26, 1903.

988,151.

Patented Mar. 28, 1911.
2 SHEETS—SHEET 1.

Fig. 1.



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Inventor:

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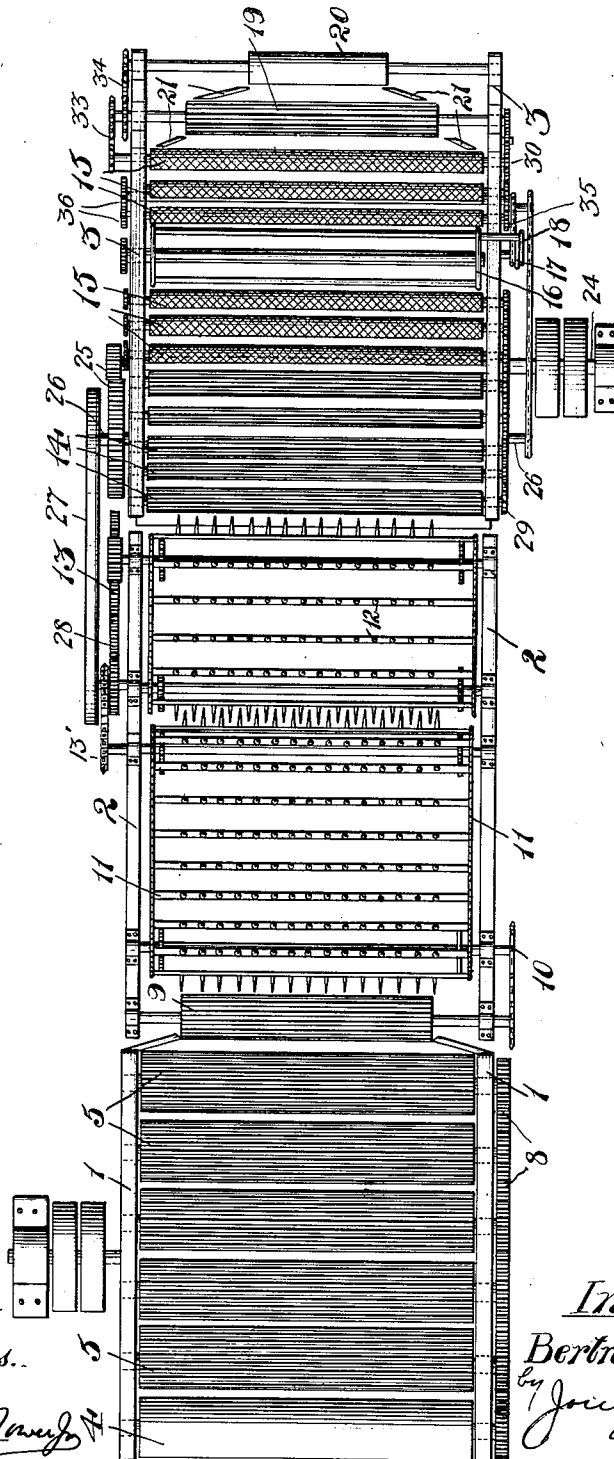
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2 SHEETS—SHEET 2.

Fig. 2.



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UNITED STATES PATENT OFFICE.

BERTRAND S. SUMMERS, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE SUMMERS FIBER COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF WEST VIRGINIA.

PROCESS FOR PREPARING FIBER FOR COMMERCIAL PURPOSES.

988,151.

Specification of Letters Patent.

Patented Mar. 28, 1911.

Application filed October 26, 1903. Serial No. 178,572.

To all whom it may concern:

Be it known that I, BERTRAND S. SUMMERS, citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Processes for Preparing Fiber for Commercial Purposes, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawing, forming a part of this specification.

My invention relates to a process of obtaining fibers for commercial purposes from fibrous plants, either with or without retting the stalks.

It is the object of my invention to facilitate the removal of the woody and cellular tissue from the fibers. As in performing my process, the pulp and the fibers of the stalks are gradually segregated, the fibers are not likely to be broken or shortened, regardless of whether the stalks have or have not been retted, and therefore the retting of the stalks, which entails expense, delay and labor, may be avoided without danger of rendering the fibers unfit for use or cheapening the market value thereof. Even the fibers of plants, which grow with long and heavy stalks, may be acted upon in accordance with my process without the fibers being shortened.

In performing my process in the preferred manner, I preferably slightly crush or mash the stalks preparatory to breaking the same, so as to partially loosen the fibers from the wood or pulp, without longitudinally stretching the fibers or placing the same under tension. This step of my process softens the stalks, and therefore the fibers are not likely to be severed and thereby shortened when the wood or pulp in the stalks is broken. After the stalks have been crushed, then the wood or pulp therein is coarsely broken. This places the stalks in condition to have the fibers straightened, which next follows, and in combing or drawing the stalks to straighten the fibers, a portion of the broken wood or pulp is eliminated. The stalks with the straightened fibers now have the wood or pulp therein finely broken, and then the fibers are drawn over one another under pressure to free the adhering wood therefrom, and

thoroughly clean the same. After this, the fibers are preferably shaken to dislodge any loose particles of wood or pulp, which may be hanging therein, and again drawn under pressure, so as to insure the thorough cleaning of the fibers. When the fibers have thus been acted upon, the same are preferably gathered together and formed into a ribbon or band to be used in spinning or for any other purpose in the art.

My process may be performed in many ways and by various mechanisms, but in this application I merely disclose one form of machine which may be used in connection with my process. This machine I have illustrated in the accompanying drawings forming a part of this application, and many parts thereof are disclosed in an application filed by me on the 20th day of December, 1902, Serial No. 136,054.

In said drawings, the several views are as follows: Figure 1 is a side view of the machine; and, Fig. 2 is a plan view thereof.

The machine, shown in the drawings, has three supporting frames, 1, 2 and 3. Upon the frame 1 at the forward end thereof is journaled a pair of crushing rolls 4, which have smooth cylindrical surfaces, and behind these crushing rolls is journaled a train of breaking rolls 5, which preferably have narrow faced teeth with wide and shallow grooves between the same. The stalks passing between these breaking rolls will be coarsely broken. The upper crushing and breaking rolls are each preferably pressed upon their respective lower rolls by springs 6, which may have their tension adjusted by screws 7. The lower breaking and crushing rolls are preferably driven by gears 8 and the upper rolls are driven by frictional contact with the lower rolls.

Immediately behind the train of breaking rolls is a pair of corrugated feeding rolls 9, which are journaled upon the frame 2, and driven at a slow speed, preferably by a chain 10. Following these feeding rolls and mounted upon the frame 2, are a slow moving gill chain 11, and a fast moving gill chain 12, the slow moving gill chain being driven from the fast moving gill chain by a chain or belt 13.

Upon the frame 3 is mounted a breaking and scutching mechanism which is similar

to that disclosed in the aforesaid application. This mechanism has a set of corrugated breaking rolls 14, and a set of knurled rolls 15. In the set of breaking rolls, pairs of coarsely corrugated rolls and pairs of finely corrugated rolls are preferably arranged alternately so as to insure thorough breaking of the wood in the stalks. The knurled rolls are for cleaning the wood from the fiber, and the upper roll of each pair is driven faster than the lower roll thereof, so that the stalks will be operated upon in the manner to be hereinafter explained. Immediately of the knurled rolls is a frame 16, which is rocked from the wheel 17 through the pitman 18, when the machine is in operation. Behind the last pair of knurled rolls is a pair of corrugated rolls 19 and a pair of smooth rolls 20, which have diverging guides 21 in front of the same to bring the fibers together after they have been cleaned. All the upper rolls of the breaking and scutching mechanism are pressed by springs 22 upon the lower rolls, and may have the pressure thereof upon the lower rolls regulated by adjusting the tension of said springs through the screws 23.

The breaking and scutching mechanism has the main driving shaft 24, which is driven from any suitable source of power, and from this shaft movement is imparted through gears 25 to the shaft 26 and thence by belt 27, to gears 28, which operate the fast moving gill chain. The lower breaking rolls 14 and a part of the lower knurled rolls 15 are driven by gearing 29 from the shaft 26, the upper breaking rolls 14 being operated by frictional contact with their corresponding lower rolls. The rest of the lower knurled rolls are driven by gearing 30 from the shaft 31, which is operated by a chain 32 from shaft 26, and a chain 33 drives the lower corrugated rolls 19 from the last lower knurled roll, and the lower smooth roll 20 is driven by chain 34 from the lower corrugated roll 19. The upper corrugated roll 19 and the upper smooth roll 20 are operated by frictional contact with their corresponding lower rolls. From the shaft 31 a chain 35 drives the shaft of wheel 18 to operate the rocking frame. All of the upper knurled rolls are operated from their corresponding lower rolls by gearing 36, this gearing being arranged to drive the upper knurled rolls faster than the lower knurled rolls.

The stalks of the fibrous plants, which are to be treated, are preferably fed to the crushing rolls in a continuous body, so that a continuous ribbon may be formed from the fibers when the same have been cleaned. In passing through the rolls 4, the stalks will be crushed or mashed, and the fibers thereby partially loosened from the wood, without being stretched or placed under ten-

sion. The softening of the stalks in crushing will also permit the wood or pulp to be broken without danger of the fibers being severed and shortened. As the stalks pass through the breaking rolls 5, the wood thereof will be coarsely broken and further softened. When the fibers pass on through the feeding rolls 9, the forward ends thereof will be caught by the pins of the slow moving gill chain 11. As the slow moving chain 11 moves faster than the stalks are fed thereto, the pins will be drawn through the stalks, thereby straightening the forward end of the stalks and at the same time carrying the stalks onward to the fast moving gill chain. When the pins of the fast moving gill chain receive the forward ends of the stalks, the trailing ends of the stalks will be drawn through the pins of the slow moving gill chain and thus straightened. The stalks in passing through these preliminary steps will be thoroughly softened and have a small portion of the wood removed therefrom. By gradually softening the stalks in the mashing and coarse breaking rolls to partially loosen the fibers and crush the wood, there will be no danger of the fiber being broken or snapped when the wood in the stalks is later finely broken. As the stalks pass in through the breaking rolls 14 of the breaking and scutching mechanism, the wood remaining in the stalks will be thoroughly broken. When the stream of the stalks being treated reaches the knurled rolls, the upper portion of the stream will be gripped by the upper rolls and drawn over the lower portion of the stream which rests upon the lower rolls. This will cause the upper fibers to move upon the lower fibers. As the fibers during their relative movement are pressed upon one another by the rolls under the action of the springs, the woody matter will all be rubbed from the fibers, and the fibers separated from each other. After the fibers have been cleaned the guides 21 will bring the fibers closer together, and the rolls 19 and 20 will press the same into a ribbon or band, which may be used for spinning or any other purpose in the art.

It is advantageous to have the cleaned fibers straight when the same are used in spinning or otherwise, and, therefore, in my process I, by preference, perform an act which will cause the fibers to be in a straightened condition after my process is completed. This I preferably accomplish in my process at the stage stated, so as to facilitate drawing one portion of the fibers over another portion, and prevent mussing the fibers. The drawing of the fibers upon one another may be effected in any way, but I prefer to employ the knurled rolls, as such rolls will readily grip the fibers to move the same and still not be likely to cut the fibers, owing to

the fact that the knurled surfaces of the rolls do not have any sharp edges.

Where my process is employed, it will be found that green material may be commercially cleaned without retting. The rubbing of the fibers upon one another under tension is an effective way of separating the fibers and cleaning the wood therefrom. As the woody matter in the stalks is gradually softened, and the fibers are partially loosened before the thorough breaking of the fibers commences, the fibers are not likely to be snapped or broken during the process of cleaning. This makes my process very desirable for cleaning hemp and other staples which grow with heavy and long stalks, as immediately breaking the woody substance in such material into fine particles, results in breaking the fibers.

It is not necessary that all the acts or steps of my process as herein described should be performed in exactly the way indicated. The acts which I have described are those which I performed in carrying out my process in the preferred way, but, of course, some of the steps, which I set forth, might be eliminated and still the essential features of my process remain. I, therefore, in the claims appended hereto, have grouped together the steps or acts in my process which I consider essential in preparing fiber for commercial purposes.

I do not deem it essential to perform the steps in my process one after another in a continuous machine. The different steps may be performed in separate machines, and many other machines than that which I have herein described, may be designed for carrying out my process.

Having described my invention what I

claim as new, and desire to secure by Letters Patent, is:

1. The herein described process of cleaning fibers consisting in crushing the stalks to loosen the fibers, coarsely breaking the wood of the stalks, straightening the fibers, finely breaking said wood, rubbing the fibers upon one another to remove the wood therefrom, and forming the fibers into a ribbon or band, all of said steps being performed in the order stated.

2. The herein described process of cleaning fibers consisting in crushing the stalks, coarsely breaking the wood of the stalks, straightening the fibers, finely breaking said wood, rubbing the fibers upon one another to remove the wood therefrom, shaking the fibers to dislodge the loosened wood therefrom, and forming the fibers into a ribbon or band, all of said steps being performed in the order stated.

3. The herein described process of cleaning fibers consisting in crushing the stalks, coarsely breaking the wood of the stalks, straightening the fibers, finely breaking said wood, rubbing the fibers upon one another to remove the wood therefrom, shaking the fibers to sift the loosened wood therefrom, again rubbing said fibers upon one another, and forming the fibers into a ribbon or band, all of said steps being performed in the order stated.

In witness whereof, I have hereunto subscribed my name in the presence of two witnesses.

BERTRAND S. SUMMERS.

Witnesses:

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EDWIN B. H. TOWER, Jr.