N. LOMBARD.

MACHINE FOR BABKING WOOD.

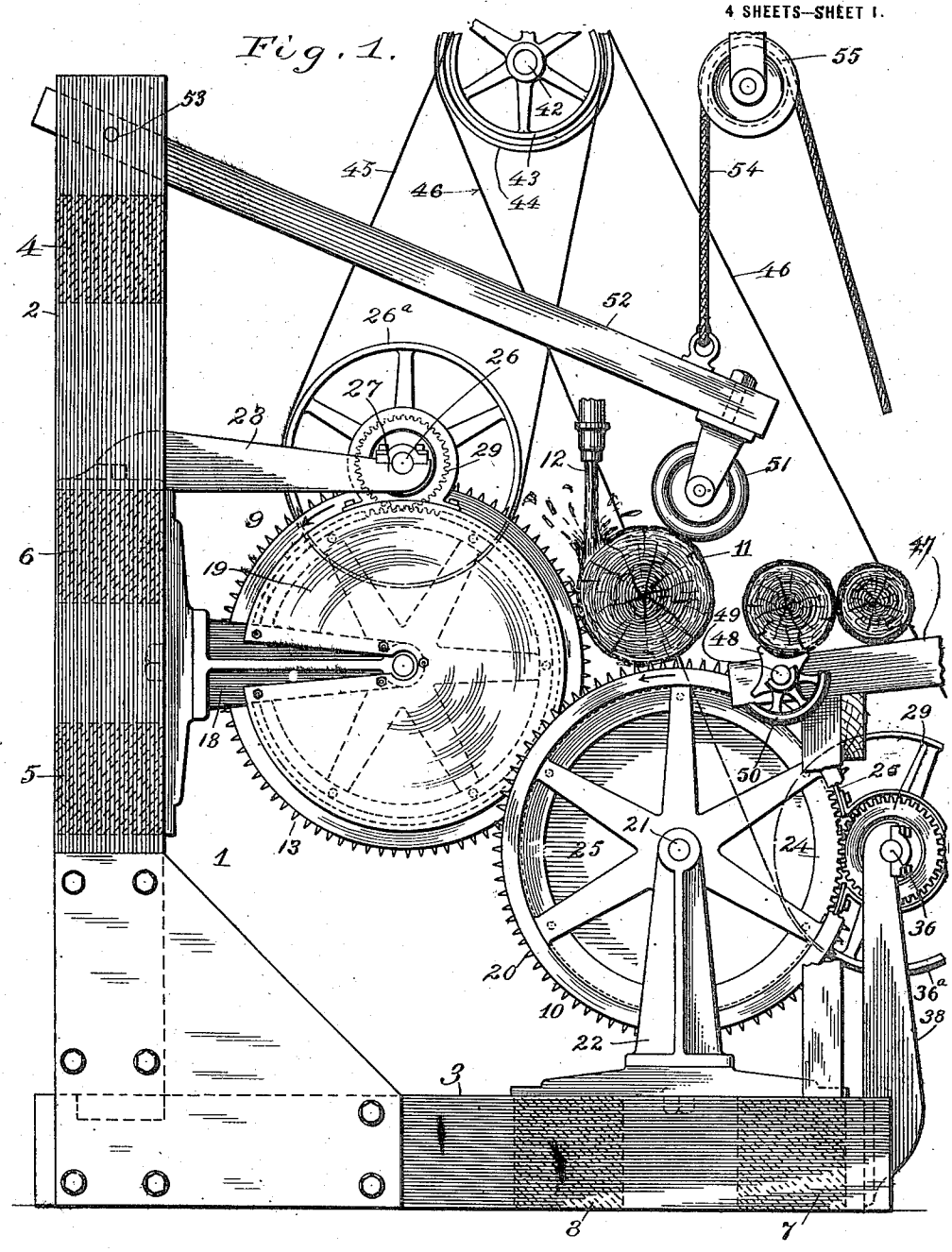
APPLICATION FILED MAY 6, 1915.

1,300,748.

Patented Apr. 15, 1919.

4 SHEETS—SHEET 1.

Fig. 1.



Witnesses:

Inventor
Nathaniel Lombard
By his Attorneys
Rogers, Kennedy & Campbell

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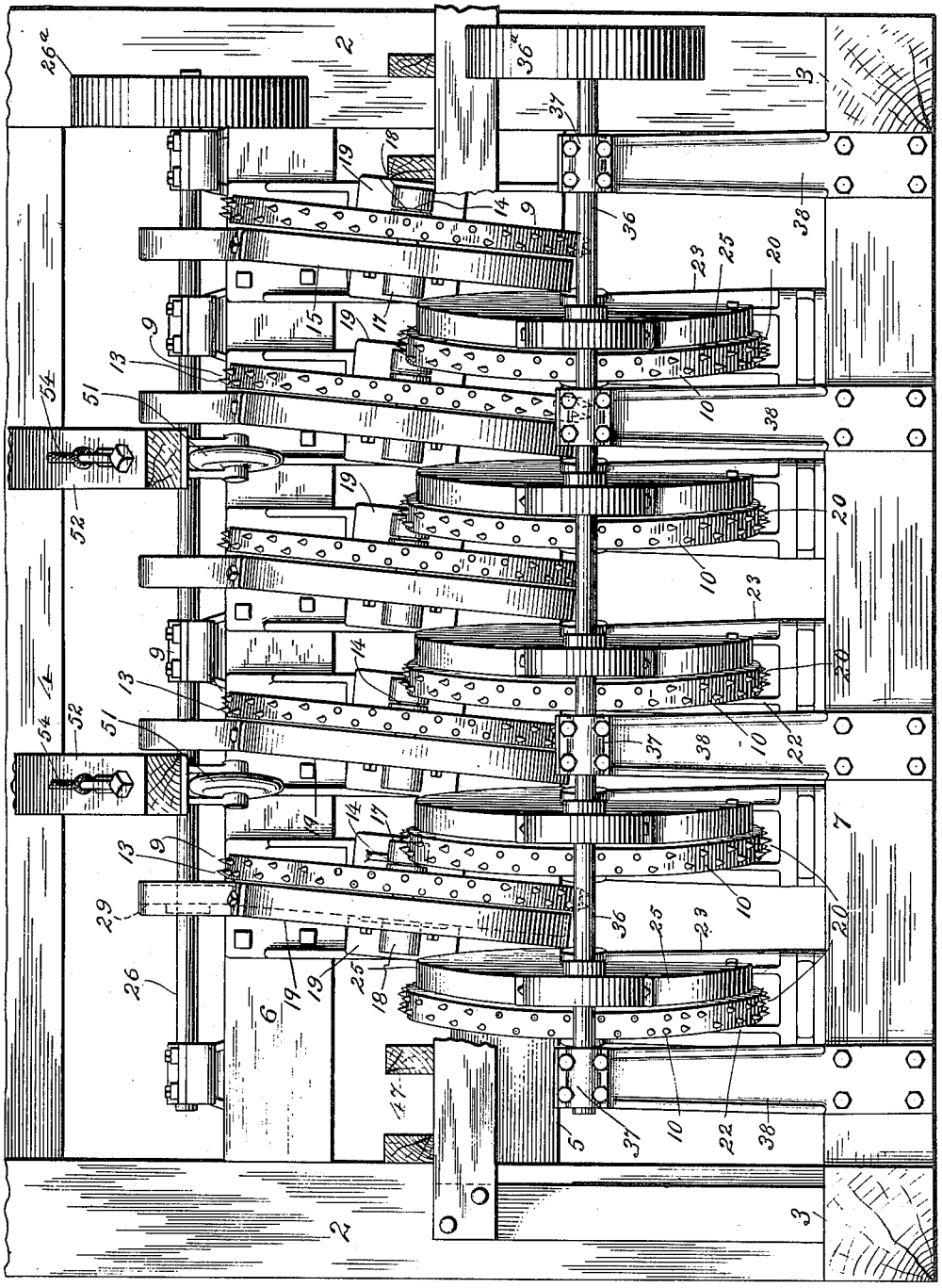
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4 SHEETS—SHEET 2.



Witnesses:

Fig. 2.

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4 SHEETS—SHEET 3.

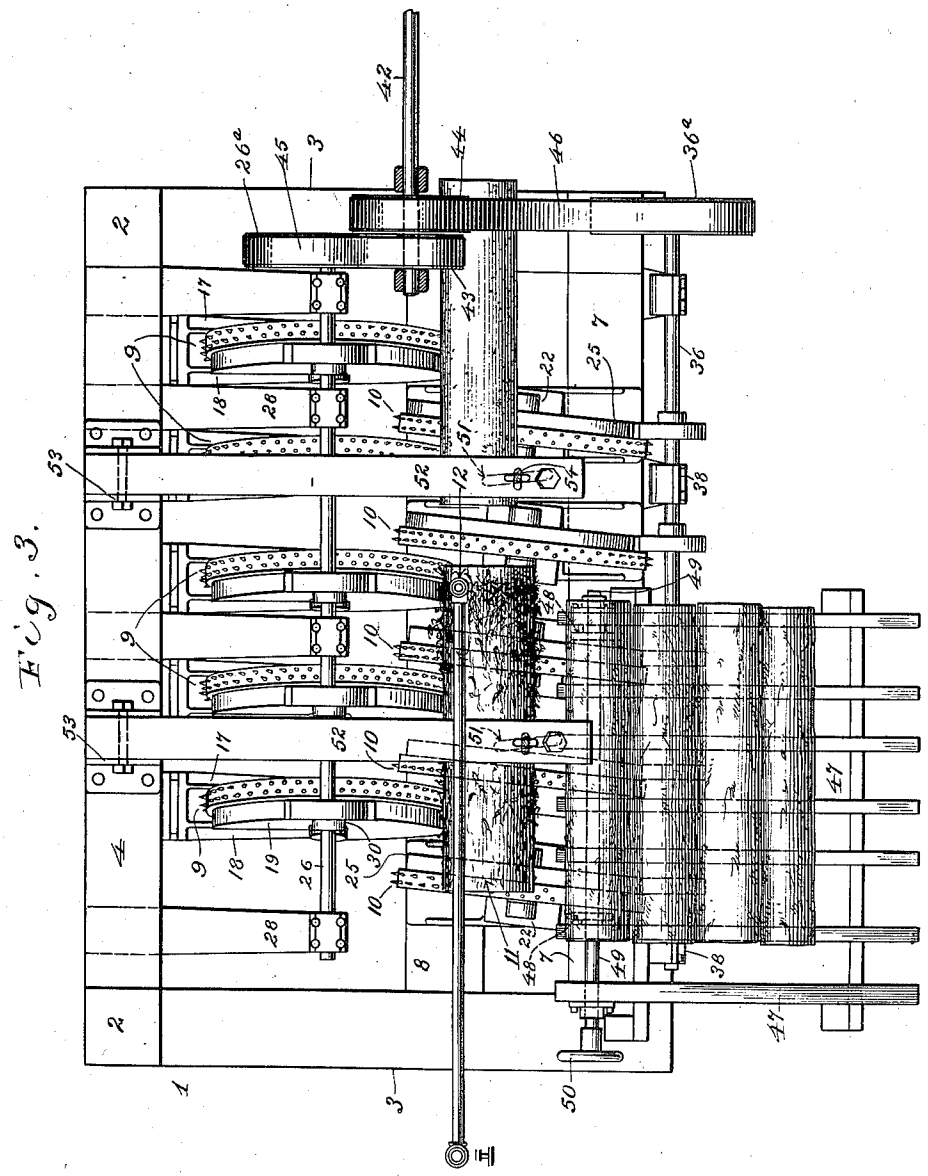


Fig. 3.

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4 SHEETS—SHEET 4.

Fig. 4.

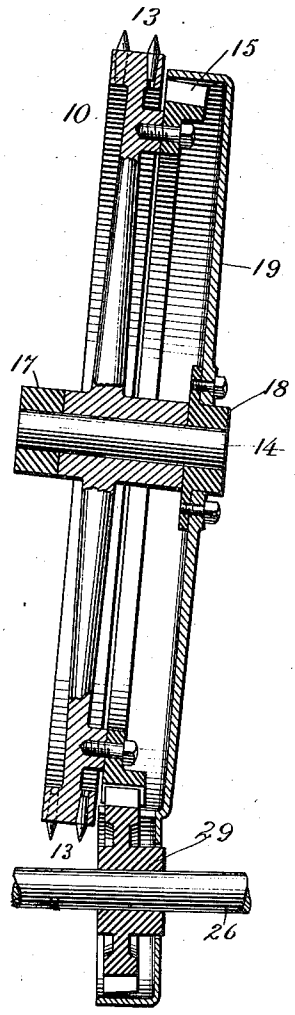


Fig. 5

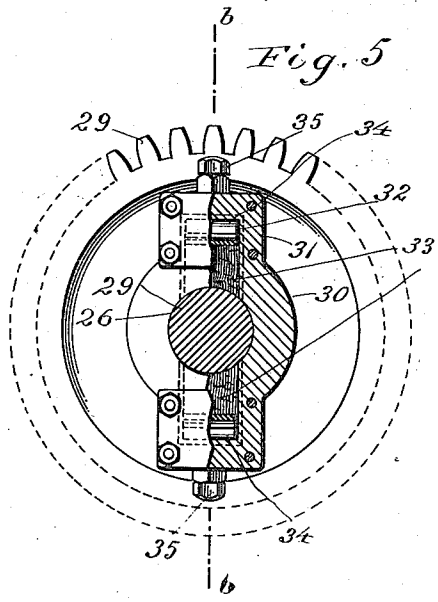
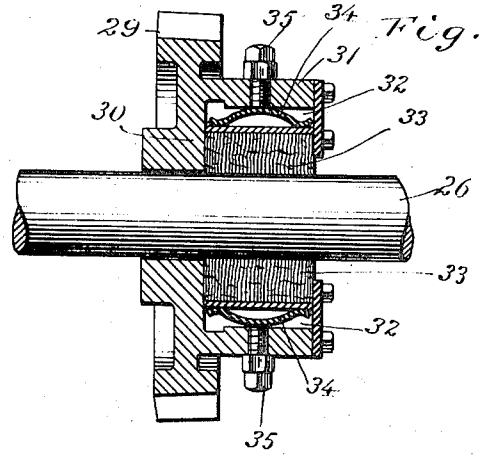


Fig. 6.



Witnesses:

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UNITED STATES PATENT OFFICE.

NATHANIEL LOMBARD, OF WORCESTER, MASSACHUSETTS, ASSIGNOR TO INTERNATIONAL PAPER COMPANY, A CORPORATION OF NEW YORK.

MACHINE FOR BARKING WOOD.

1,300,748. Specification of Letters Patent. Patented Apr. 15, 1919.

Application filed May 6, 1915. Serial No. 26,205.

To all whom it may concern:

Be it known that I, NATHANIEL LOMBARD, a citizen of the United States, residing at Worcester, in the county of Worcester and State of Massachusetts, have invented certain new and useful Improvements in Machines for Barking Wood, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to machines for removing the bark from logs to adapt the latter to be used, more particularly for the production of pulp for the manufacture of paper; and the invention consists of mechanism of improved form, characterized by the use of two coöperating series of rotary feeding wheels, which conjointly give support to the log, and which act in their rotation to impart a rotary feeding movement to the same in an endwise direction, to the end that all portions of the enveloping bark may be presented to the action of a bark removing element.

The invention is designed with special reference to a bark removing element in the form of a fluid jet, and feeding wheels and their adjunctive parts being formed and arranged to present the log in the most favorable position for effective action by the fluid jet, which latter is of such size and under such pressure that its impingement on the enveloping bark will act to completely remove the same.

It will be understood however, that my invention is not necessarily limited in its application in connection with a bark removing element of this particular character, but may be employed also with other forms of bark removing means, such as blades, cutters, and the like. Further, it will be understood that various changes in the detailed form and construction of the mechanism may be made by the skilled mechanic, without departing from the limits of my invention; and it will be understood that the invention is not limited to any particular form or construction of the parts except in so far as such limitations are specified in the claims.

In the accompanying drawings:

Figure 1 is an end elevation of my improved machine certain parts being broken away to expose other parts to view.

Fig. 2 is a side elevation of the same with certain parts omitted.

Fig. 3 is a top plan view of my improved machine.

Fig. 4 is a longitudinal section through one of the feeding wheels and its driving pinion.

Fig. 5 is an elevation partly in section of the driving pinion for one of the feeding wheels.

Fig. 6 is a longitudinal section through the same on the line *b*—*b* of Fig. 5.

Referring to the drawings:

The operative parts of my machine are mounted in and sustained by a frame 1 of appropriate and suitable form and material. In the present instance this frame consists of two end uprights 2, connected fixedly at their lower ends to the ends of two horizontal transverse sills 3, and connected together between their ends by upper and lower longitudinally extending beams 4 and 5 and an intermediate beam 6, the two horizontal sills 3 being likewise connected together between their ends by means of two longitudinally extending sills 7 and 8, this construction producing a rigid and strong frame structure well adapted to give support to the operative parts of the mechanism now to be described.

Sustained by the frame in the specific manner more particularly described hereinafter, is an upper series of rotary feeding wheels 9 which are arranged side by side, there being in the present instance five wheels in the series. Also sustained by said frame as more specifically described later is a lower series of feeding wheels 10, corresponding in number to that of the upper series, and arranged side by side so as to coöperate with the wheels of the upper series in conjointly giving support to the log 11 which is to be barked. The two series of wheels are so disposed relatively that on being rotated in the same direction, the supported log will be rotated about its axis and will at the same time be fed endwise, and in this manner will be presented to the action of the bark removing element, in the present instance in the form of a fluid jet 12 of sufficient size and under such pressure that it will act to loosen, break up, and remove the bark progressively from one end of the log to the other.

The said feeding wheels, in order that they will impart the described feeding movement to the log, are constructed, mounted

and operated in the manner now to be described, and as the individual wheels are of the same detailed construction, a description of one will suffice. As shown more particularly in Fig. 4, the rim of the feeding wheel is provided with two rows of pointed pins or spurs 13, adapted in the rotation of the wheel, to take a hold on the log and turn the same about its longitudinal axis, the hub of the wheel being mounted loosely on a short axle 14, so as to rotate thereon, and a gear ring 15 being fixed to the side of the wheel by means of which rotary motion is imparted thereto as presently described. The axle 14 is sustained in the inner ends of two horizontal bracket arms 17 and 18, which extend on opposite sides of the wheel and are firmly fixed at their outer ends to the two frame beams 5 and 6, as shown more particularly in Fig. 1. The bracket arms for the several wheels of the upper series are so positioned that the sustaining axles 14 will all be disposed in a common vertical plane, but will be inclined downwardly from the horizontal, with the result that the planes of the wheels will be disposed at a like inclination, the purpose of which arrangement is to cause the wheels in their rotation, to impart a feeding movement to the log endwise. The gear rings 15 are inclosed in gear casings 19, which latter are connected at their centers to and sustained by the respective bracket arms 18.

The feeding wheels of the lower series are likewise provided on their rims with pointed pins or spurs 20 to grip the log, and the wheels are mounted respectively on short axles 21 sustained in the upper ends of bracket arms 22 and 23, extending on opposite sides of the wheels and fixed at their lower ends to the longitudinal frame sills 7 and 8, gear rings 24 being fixed respectively to the sides of the wheels for driving them, and the said gear rings being inclosed by gear casings 25 connected to and sustained at their centers by the respective bracket arms 23. The bracket arms are so positioned that the sustaining axles 21 will all be disposed in a common horizontal plane, but will be inclined laterally relative to the direction of feed. Their axles 21 are disposed at a lower level than the axles of the upper series of wheels and the diameters of the wheels of the two series, and the horizontal distance between their axes, is such that the wheels of the two series will overlap slightly. In other words, the paths of the movement of the wheels of one series will intersect the paths of the movement of the wheels of the other series. By reason of this relation of the two series of wheels to each other, they will conjointly support the log as shown in Fig. 1, and on motion being imparted to the wheels in the direction of the arrows, that is, with the wheels traveling in the same direction, the adjacent sides of the wheels where they engage the log, will travel in opposite directions, with the result that the log will be given a motion of rotation about its longitudinal axis, and due to the relative inclination of the axes of the two series of wheels, the log will have imparted to it an endwise movement, these combined movements resulting in a spiral rotary movement of the log in an endwise direction. Due to the fact that both series of wheels are inclined relatively to the direction of feed, their coöperative action on the log in imparting an endwise movement to the same, is more pronounced, uniform and certain than if but one set of wheels was inclined.

Rotary motion is imparted to the upper series of wheels by means of a horizontal driving shaft 26 extending above the wheels and mounted for rotation in bearings 27 on the inner ends of horizontal arms 28 which extend outwardly and are fixed to the frame beam 6, there being in the present instance four of these bearings supporting the shaft at intervals. This shaft gives support and imparts its rotary motion to a series of pinions 29 which are located on the shaft at intervals corresponding to the location of the respective feeding wheels, in position to mesh with the respective gear rings 15. The pinions 29 are frictionally attached to the shaft so that they will yield or slip independently of each other when subjected to undue strain, the purpose of this construction being to provide for an independent give or yielding of the feeding wheels in their action on the log, so that the surface speed of the wheels will accommodate themselves to the surface speed of that particular portion of the log on which they may for the time being be acting. In other words, as the logs vary in diameter in respect to different points in their length, the surface speeds at these different points are necessarily different, and if the feeding wheels were all driven positively and unvaryingly at the same surface speed, certain of the wheels would be subjected to dangerous strains. Or if the endwise movement of the log were checked, the continued rotation of the wheels would subject them to severe strain. By mounting the wheels so that a given degree of resistance to their rotation will cause them to yield relatively to the driving shaft, all of the wheels will engage the log without motion relative thereto, and without being subjected to injurious strains. In Figs. 5 and 6, I have shown one form of means for thus mounting the pinions frictionally on their carrying shaft, which will answer the purposes in view. It will be manifest, however, that other forms of connection between these parts may be adopted without departing from the spirit of the invention. On reference to these figures it will be seen that the

hub 30 of the pinion loosely encircles the shaft and is provided with an axially extending casing 31 forming chambers or spaces 32 at diametrically opposite sides of the shaft. In these chambers are mounted pressure blocks 33 preferably of fibrous material such as wood, which blocks are concaved at their inner adjacent ends so as to embrace the shaft, and are mounted to slide radially relatively to the shaft. These blocks are acted on by springs 34 mounted between the outer ends of the blocks and the walls of the casing, the action of the springs being to urge the blocks inwardly with sufficient pressure to set up the requisite amount of friction between them and the shaft to cause the latter to drive the pinions with sufficient force to rotate the log. The tension of the springs, however, is such that when the feeding wheel is subjected to undue strain, the pinions will slip on the shaft and will cease to impart motion to the feeding wheel. The tension of the springs may be adjusted by means of set screws 35 threaded in the walls of the casing, and having their inner ends in position to engage the leaf spring.

The feeding wheels of the lower series 10 are driven from a horizontal driving shaft 36 extending at the front of the feeding wheels and mounted in bearings 37 on the upper ends of vertical standards 38, whose lower ends are fixed to the frame sill 7, there being in the present instance four of these bearings giving support to the shaft at intervals in its length. This shaft gives support and imparts its rotary motion to a series of pinions 39 which are located on the shaft at intervals corresponding to the location of the respective feeding wheels of the lower series and in position to mesh with the respective gear rings 24. These pinions are frictionally connected with their carrying shaft in the same manner described in connection with the pinions for the upper series of wheels, the pinions 39 loosely encircling the shaft 26 and being provided with casings 40 containing pressure blocks 41 acted on by leaf springs 42 controlled as to their tension by set screws 43.

The driving shafts 26 and 36 are provided at their ends with driving pulleys 26^a and 36^a respectively, by means of which rotary motion is imparted to the shafts from an overhead main driving shaft 42 extending horizontally above the feeding wheels and mounted in suitable bearings (not shown), the said shaft 42 having fixed to it, pulleys 43 and 44, the latter being of greater diameter than the former. A driving belt 45 is passed around pulley 26^a and pulley 43, and a driving belt 46 is passed around pulley 36^a and pulley 44, whereby the rotary motion of the main driving shaft 42 will be imparted to the two shafts 26 and 36 but at relatively different speeds, the shaft 36 at a higher rate of speed than the shaft 26, with the result that the lower series of feeding wheels will be rotated faster than the other series. The purpose of thus driving the two series of feeding wheels at different speeds is to maintain the log in its proper position against the upper series of wheels, the action of the faster moving lower wheels being in effect to push the log back against the other wheels.

The logs to be operated on are supported side by side on a feeding table 47 situated at the front of the machine and inclining downwardly in such position that the logs will successively roll by gravity from the feeding table and enter within the grip of the two series of wheels as shown in Fig. 1. The discharge end of the table is equipped with a stop device in the form of a pair of rotary star wheels 48 fixed to a horizontal shaft 49 mounted in bearings on the table and adapted to be partially rotated intermittently by means of a hand wheel 50 fixed to the shaft. The form of the star wheel and its relation to the sustaining surface of the table is such that it will successively form a seat or rest for the lowermost logs as the latter advance in succession to the delivery end of the table. After the log being acted on by the feeding wheels has been advanced endwise out of the path of the next log to be entered within the wheels, the hand wheel 50 is turned a partial revolution so as to release the next log to allow it to pass to the action of the feeding wheels, this motion of the hand wheel causing the star wheels to take a position where they will arrest the next log. By this means, the logs may be successively fed to the action of the machine, without danger of their colliding or interfering with each other.

In order that the logs supported by the feeding wheels may be maintained in engagement with the spurs or teeth so as to insure the hold of the wheels on the log and the proper feed of the latter, I provide one or more pressure devices, in the form of vertical rollers 51 carried on the ends of vertically movable arms 52 pivoted at their outer ends as at 53 to the upper frame beam 4. These rollers are in position to rest upon the upper surface of the log, as the latter is supported by the feeding wheels, and the weight of the arms and attached parts is such that the log will be held with sufficient pressure against the wheels to insure the proper engagement of the teeth therewith. These pressure devices are arranged at such intervals in the length of the machine, that after a log has been advanced sufficiently to be free from the pressure of the first pressure device, it may be acted on by the second, this arrangement insuring that the logs be maintained in proper engagement with the

wheels, notwithstanding the fact that two or more logs may be supported by the wheels and be advancing at the same time. The pressure devices are mounted for independent movement into and out of engagement with the logs and are adapted to be manually controlled in the present instance by means of cords or ropes 54 attached at one end to the respective arms, and passing upwardly over guide pulleys 55 suitably sustained, and then downwardly within reach of the attendant.

The operation of the machine is as follows: Motion being imparted to the feeding wheels as described, the attendant, by the operation of the hand wheel 50, releases the logs in succession, and they roll successively within the grip of the wheels. The rotation of the wheels turns the logs about their longitudinal axes and at the same time advances them endwise one after another, the pressure devices bearing on the logs and maintaining them in proper engagement with the wheels. All portions of the surface of the logs thus fed, are presented to the action of the bark removing element 12, resulting in the effectual removal of the bark progressively from one end of the logs to the other, the logs finally leaving the machine cleanly stripped of bark.

Having thus described my invention, what I claim is:

1. In a machine for barking wood, the combination of two coöperating series of feeding wheels to advance the log endwise, the wheels of one series being mounted for rotation on axes inclined from the horizontal, and the wheels of the other series being mounted on horizontal axes inclined relatively to the direction of feed.

2. In a machine for barking wood, the combination of two coöperating series of feeding wheels to advance the log endwise, the wheels of one series being mounted for rotation on axes disposed in a vertical plane but inclined from the horizontal, and the wheels of the other series being mounted for rotation on axes disposed in a horizontal plane but inclined at an angle relatively to the direction of feed.

3. In a machine for barking wood, the combination of an upper series of rotary feeding wheels, a lower coöperating series of rotary feeding wheels, said two series of wheels adapted to conjointly support the log and acting in their rotation to feed the same endwise, and means for rotating the lower series of wheels at a higher rate of speed than the upper series to cause the log to be pushed back and maintained against the upper series of feeding wheels.

4. In a machine for barking wood, the combination of a series of rotary feeding wheels adapted to engage the log at intervals in its length and acting to both rotate the log and feed the same endwise, and means for rotating the wheels, the said wheels being yieldable independently in the direction of rotation.

5. In a machine for barking wood, the combination of a series of rotary feeding wheels arranged side by side and adapted to engage the log at intervals in its length and acting in their rotation to both rotate the log and feed the same endwise, driving means common to all of said wheels, and independently yielding driving connections between the driving means and the individual wheels.

6. In a machine for barking wood, the combination of a rotary feeding wheel adapted to engage the log and acting by its rotation to impart a feeding movement to the same, gear teeth on said wheel, a driving shaft, and a pinion frictionally engaged with the driving shaft and meshing with said gear teeth.

7. In a machine for barking wood, the combination of a series of rotary feeding wheels arranged side by side and adapted to engage the log at intervals in its length and acting in their rotation to impart a feeding movement thereto, gear rings on the respective wheels, a driving shaft common to all of the said wheels, and driving pinions frictionally engaged with the shaft and meshing with the respective gear rings.

In testimony whereof, I have affixed my signature.

NATHANIEL LOMBARD.