H. GUETTLER.

METHOD OF BARKING SLABS.

APPLICATION FILED NOV. 10, 1916.

1,247,526.

Patented Nov. 20, 1917.

3 SHEETS—SHEET 1.

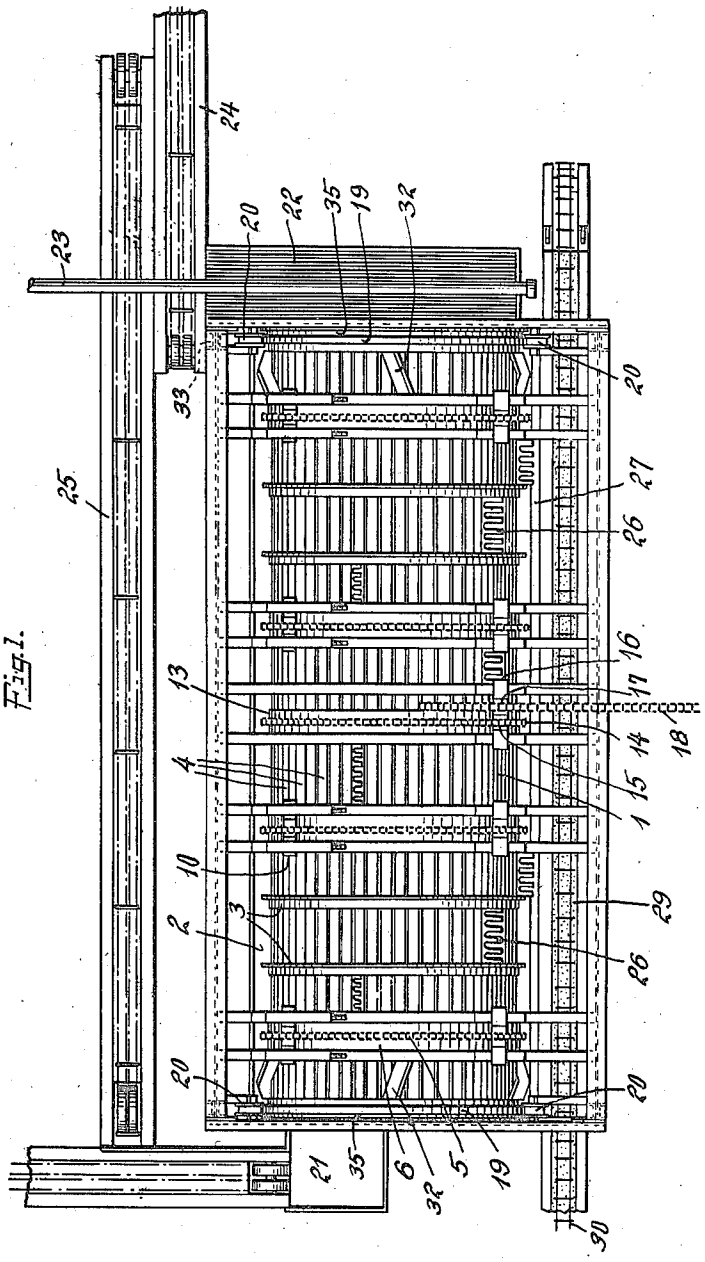


Fig. 1.

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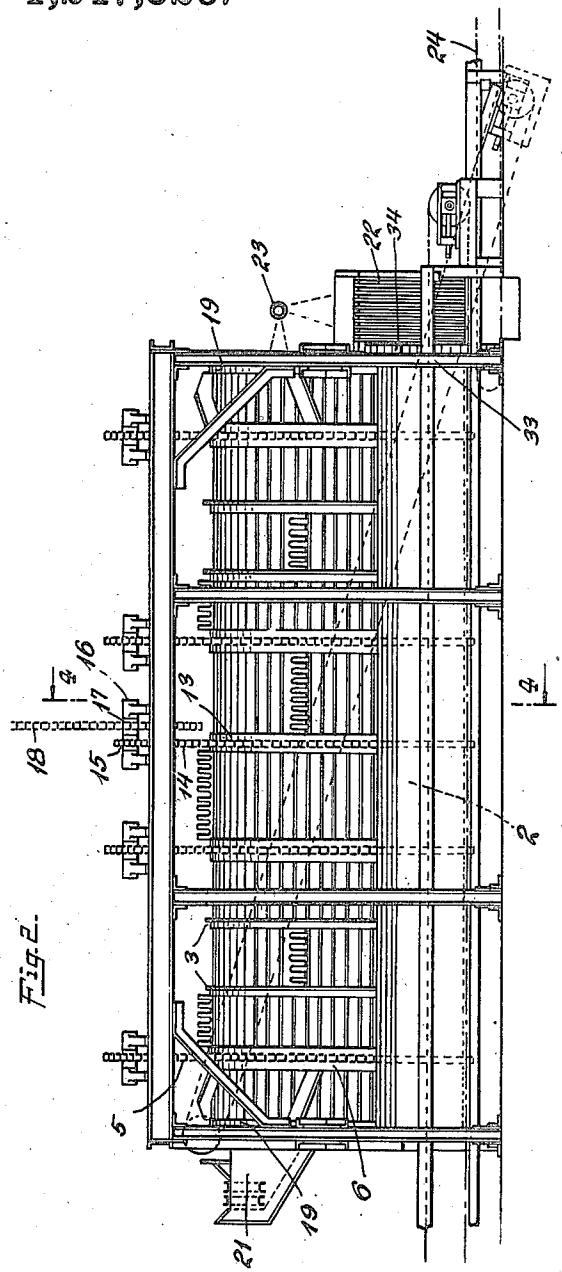


Fig. 2.

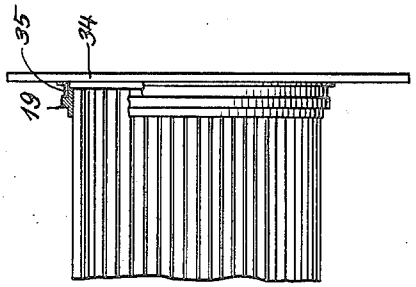


Fig. 3.

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3 SHEETS—SHEET 3.

Fig. 3.

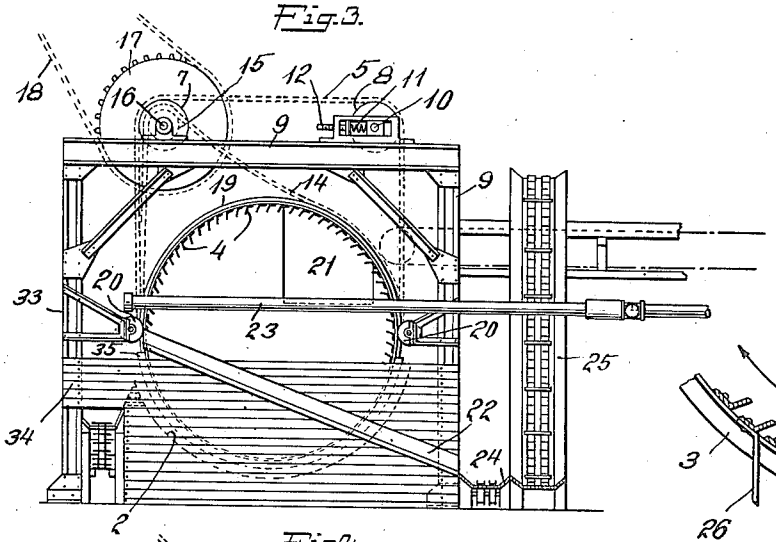


Fig. 4.

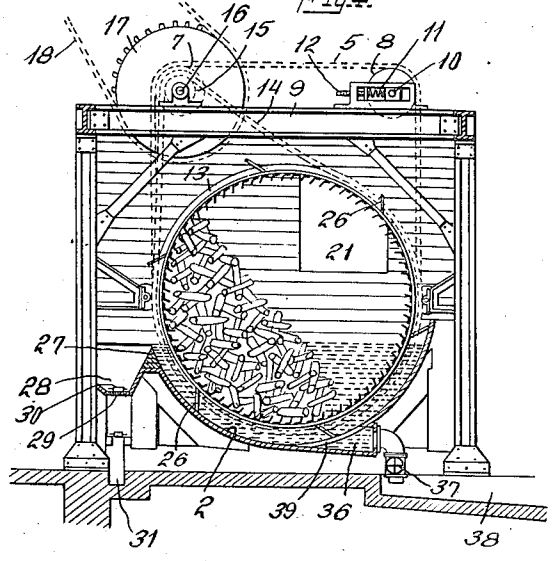


Fig. 5.

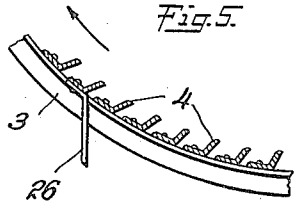


Fig. 6.

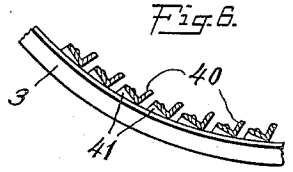


Fig. 7.

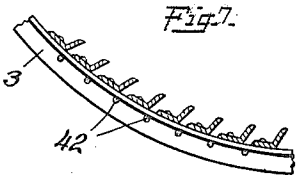
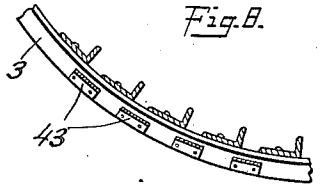


Fig. 8.



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METHOD OF BARKING SLABS.

1,247,526. Specification of Letters Patent. Patented Nov. 20, 1917.

Application filed November 10, 1916. Serial No. 130,517.

To all whom it may concern:

Be it known that I, HERBERT GUETTLER, a subject of the King of Norway, and residing in Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Methods of Barking Slabs; 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.

It is possible to remove bark from logs or blocks of wood preparatory to use of the wood in the paper making industry by tumbling the logs or blocks in a rotating drum which preferably, but not necessarily, is partially immersed in water held in a suitable tank. The bark thus removed from the wood may be allowed to escape from the drum into the tank through longitudinal slots in the drum.

It has not heretofore been customary to bark slabs, edgings or like mill waste in such a device, because such thin pieces would work themselves into the slots of the drum as ordinarily arranged, thereby closing up the slots and even projecting through far enough to strike against the sides of the tank or the driving mechanism, thereby preventing free rotation of the drum.

It is possible, however, as hereinafter disclosed, to provide a wood barking drum of such construction that while the separated bark can escape freely from the drum through longitudinal slots, these slots are of such construction and so protected that the slabs, or the like, will not close them and will not work out through them. With barking drums of this special construction, particularly when operated by the method hereinafter disclosed and claimed, it is possible to effectively and economically bark slabs, edgings and similar flat sided or thin pieces of wood, and thereby make available for use in the paper making industry raw material which heretofore was not used and could not economically be used because of the practical difficulties of removing the bark. It will, of course, be understood that the presence of bark in paper making stock stains the resultant paper and is in other respects highly detrimental. This fact, and the practical difficulties of completely removing outer and inner bark from logs, and particularly from slabs, edgings and like mill waste, are fully appreciated in the paper making industry.

The apparatus whereby the method herein claimed may be carried out comprises a rotating drum, the cylindrical wall of which is built up out of strips, angle bars, or the like, of such form or so arranged as to overhang or partially cover the slots between adjacent bars, preferably forming the slot into a tortuous passage through which the bark may freely escape, and yet into which the slabs or edgings will not enter, or at least will not project through, and strike stationary parts of the apparatus.

If slabs, edgings, or wood of like character, be charged into such a drum, and be tumbled and caused to cascade therein by rotation of the drum, there will result, as I have found in practice, a certain rather definite packing of the slabs, or like flat pieces, into a compact, foliated mass, whereof the superimposed or stacked slabs, edgings, or the like, constitute the laminæ. Merely rolling such a pack or foliated mass over and over in the drum as the drum rotates, does not efficiently or effectively remove the bark, for to secure good barking action in apparatus of this type, there should be a sliding and scraping of each piece of wood over its neighbors, as the pieces cascade from the upwardly moving side of the drum into the water at the bottom (or against the opposite side of the drum, if no water is being used in the tank.)

Pieces such as slabs or edgings which have flat surfaces are liable to pack together and at best slide or slither on each other without material concussions such as occur when more nearly round pieces roll over and away from and fall on each other. I have found that a charge composed only or principally of slabs and edgings does not operate satisfactorily, and I have discovered the fact that the addition of certain other pieces of wood to such a charge will improve its operation.

I have found that if there be present with the tumbling slabs, or the like, blocks of larger size in proper proportion, the packing or foliating of the slabs will in large measure be prevented the concussive action

will be improved, and a much more effective and efficient barking action will be secured. These larger blocks may be logs of the size and lengths now commonly barked in rotating drums in preparation for their manufacture into wood pulp.

They may be in barked or unbarked condition when initially charged into the intake end of the rotating drum, and after tumbling therein and delivery from the discharge end of the drum, may be and preferably are conveyed back and put through again with fresh slabs, and so used over and over.

The details of the method of my present invention, and of the apparatus by which this method may be carried out, will become clear and its objects and advantages be made plain, by the following detailed description, which is to be taken in conjunction with the accompanying drawings, wherein—

Figure 1 is a plan view of a barking drum through which slabs, edgings, or the like, may be passed for tumbling in the presence of larger blocks.

Fig. 2 is a side elevation of the same.

Fig. 3 is an end elevation.

Fig. 4 is a cross section on the line 4—4 of Fig. 2.

Fig. 5 is a fragmentary section of the drum showing how the angle bars are shaped and arranged to guard the slots against the entrance or passage of thin pieces of wood.

Figs. 6, 7 and 8 illustrate alternative arrangements for guarding the slots.

Fig. 9 shows a detail at the end of the drum for guarding the clearance space between the drum and an adjacent barrier.

The apparatus shown in the drawing comprises a drum 1 cylindrical in shape and open at both ends. The drum is arranged for rotation in a tank 2 adapted to contain water and having a concave bottom substantially concentric throughout with the drum and spaced therefrom but a relatively short distance.

The cylindrical drum is composed of a plurality of rings 3 to which are secured the bars 4, which constitute the side or cylindrical wall of the drum. In the embodiment illustrated in Fig. 5, these bars 4 are obtuse angle bars having their webs riveted to the inside of rings 3 and spaced apart, as shown in Figs. 4 and 5, to form long, narrow slots through which the separated bark is delivered from the drum.

The flanges of these obtuse angle bars are on the trailing edges of the bars, so that each overhangs its adjacent slot. The slot is therefore not radial, but approaches the tangential, and while the bark can find a ready exit through the slots when the drum is rotated in the direction indicated by the arrow (Fig. 5), the slabs, edgings, or the like, do not find a ready exit, but slide over from one bar to the next.

In the embodiment illustrated in Fig. 6, the bars 40 have their flanges at right angles to their webs, and the desired overhang for the slots is secured by inserting wedges 41 between the web of each bar and the adjacent web of the encircling ring 3, thereby tilting the bars inward at their forward edges and backward at their trailing edges, and so covering up the bark discharging slots to the extent necessary to prevent the slabs from stopping up the slots or projecting through to the outside of the drum.

With either of the embodiments illustrated in Figs. 5 and 6, an additional bar may be positioned on the outside of each slot to serve as a baffle and convert the slot into a tortuous passage through which only the bark can pass. As shown in Fig. 7, these additional bars 42 may be in the form of rods passed through holes in the flanges of rings 3 and lying against the webs of those rings opposite the gap between the adjacent pair of angle bars, or, as shown in Fig. 8, the additional bars 43 may be flat and riveted to the webs of rings 3 to cover up or restrict the adjacent bark discharging slot to the extent desired. These additional outside bars, particularly if in the form shown in Fig. 8, add somewhat to the rigidity of the drum, and as the drum may have a length of say 20 or 30 feet, and a diameter of say 10 to 12 feet, and weighs several tons, the rigidity of it under the stresses of a full load of wood is a matter of importance.

The drum 1 is supported by flexible, endless elements, such as chains 5, which engage smooth rings 6 with which the drum is provided, and pass over smooth traction wheels 7 and 8, which are supported on a suitable frame 9. These traction wheels are secured to independent axles, and the axles 10 of wheels 8 are preferably journaled in suitable take-up bearings each of which is pressed outward by a spring 11 having its inner end seated on a screw 12, whereby it can be adjusted with a wrench to increase or decrease the tension on the spring, thereby sliding the bearing with its axle 10 either inward or outward, and in this manner adjusting the tension on each individual supporting chain of which there may be four, as illustrated in the drawings. Not only can the slack of the chains thus be taken up independently and the load evenly distributed on the several chains, but shocks and stresses incident to rotation of the drum are to a certain extent taken up by the springs, thereby protecting framework 9 and other associated parts.

As a means for rotating the drum, there

is provided near its middle, an annular sprocket 13 bolted between the flanges of the two central drum rings 3, which for this purpose are placed side by side with their flanges opposed. Engaging with the sprocket is a driving chain 14 which passes over a driving sprocket 15 secured to a shaft 16. This shaft is preferably positioned above the upwardly moving side of the drum, and is driven in suitable manner, as by a sprocket 17 and chain 18. The driving chain may be slack on the following side, thereby giving the drum freedom of movement when springs 12 are adjusted or yield during normal operation of the apparatus. In order to prevent the drum from swinging laterally, it is provided adjacent its ends with guide rings 19 which are engaged by the flanged guide rollers 20, rotatably mounted upon the frame 9 at the sides of the drum.

The slabs, edgings or wood of like character, from which the bark is to be detached, are introduced into one end of the drum by means of a chute 21, and, after the bark has been removed, are delivered from the other end of the drum to a chute 22, preferably in the form of a grid or grating, and down this they slide while being washed off with jets of water from a pipe 23. The barked wood is ultimately delivered to an endless conveyer 24 by which it may be transported to other parts of the mill. There is a second conveyer leading from the discharge end of the drum to the intake end thereof for purposes hereinafter explained.

The plurality of bark discharging openings formed in the cylindrical surface of the drum between the angle bars 4, are of such size that the pieces of detached bark may pass freely therethrough and into the tank of water. Secured to the outer surface of the drum are a plurality of paddles or flights 26, preferably in the form of combs or forks. As the drum rotates these flights sweep through the water in tank 2 and remove therefrom the pieces of bark which have passed into the tank through the openings in the drum. This bark is discharged over the side wall 27 of the tank and received in compartment 28 which has a horizontal drain plate 29 and a scraping conveyer 30 for transporting the bark toward one end of the drum for ultimate delivery to a drying apparatus, or the like, whereby the bark is rendered suitable for fuel or for other industrial purposes. The water draining off through plate 29 is collected in a drain 31 and conveyer away. By supporting the drum upon the chains, as shown, the usual drum supporting rollers are not required, and thus the bottom of the tank is smooth throughout its entire extent and is free from any obstruction which might interfere with removal of the bark from the tank, or with the free rotation of the drum.

Near the ends of the drum the comb-shaped flights 26 may be replaced by imperforate baffles 32 of spiral form, secured to the outside of angle bars 4, and acting to propel inward toward the next adjacent section of the drum such bark as might otherwise collect near the ends of the tank or interfere with adequate clearance between the ends of the drum and the closures therefor.

By the method of my present invention, the charge of slabs, edgings, or like mill waste, is tumbled in the rotating drum while mixed with an appropriate quantity of blocks of larger size, serving to insure efficient and effective barking action, and serving to substantially prevent packing and foliating of the flat pieces, and giving to the mass as a whole a heterogeneous character conducive to good scraping and scrubbing action and good concussion as the drum rotates. These blocks of larger size may have a length of say two feet and a diameter of say six inches, and may be present in the drum to the extent of say a quarter the total volume of the tumbling mixture, though considerable variations from these sizes and proportions are permissible.

As the drum rotates, the charge is rotated until its upper surface assumes a certain critical angle, as indicated somewhat diagrammatically in Fig. 4, after which the slabs and blocks of wood tumble over one another and rub over and pound on one another in an irregular way, but in such manner that the bark becomes detached. The quantity of wood which can be treated, and consequently the angle of inclination which the surface of the charge assumes during the operation, depends upon the quality and character of the wood. In order that the machine may be adapted to treat different quantities of wood, or different qualities of wood, adjustable means are provided adjacent the discharge end of the drum to vary the height of the wood within the drum. As shown, the end posts 33 of frame 9 are adapted to support transversely extending planks 34 bolted thereto. When the planks are in place, they are as close to the open discharge end of the drum as is permissible with adequate clearance, and the height of the barrier thus built up by placing one plank above another, determines the height to which the tumbling wood pile must be built within the drum before the wood begins to tumble out over the end barrier.

To prevent small pieces of wood from working into the clearance gap between either end of the drum and its adjacent

plank barrier, and there becoming wedged and either stopping rotation of the drum or injuring some part of the apparatus, there is provided a guard 35 attached to the adjacent barrier and overlapping the end of the drum sufficiently to cover the clearance gap. In Fig. 9, this guard is in the form of an angle bar fastened to barrier 34 and shaped to conform to the curved lower half of the drum up to about the level of guide rollers 20 (Fig. 3). A similar guard is used at the intake end of the drum.

The amount of water in the tank 2 should be varied in accordance with the quantity of wood in the drum, in order that there may be sufficient water in the tank to keep the wood thoroughly soaked down without, however, permitting it to float. By thus proportioning the amount of water to the quantity of wood being treated, the water acts as a support for the wood and relieves to a great extent the weight which the chains 5 would otherwise be called upon to support. In order to vary the amount of water within the tank, the edge 27 thereof comprises a plurality of removable sections placed one above another. These sections form a dam and provide ready means for varying the level of water within the tank.

With some kinds of wood, as, for instance, hemlock, it is desirable at times to effect barking without periodically immersing the wood in water. By thus working in a dry way, the bark comes from the apparatus in dry condition and needs no treatment to render it suitable for use as fuel.

The apparatus here disclosed is readily adaptable for dry barking and to this end tank 2 is provided near its center with an outlet chamber 36 controlled by a valve or gate 37 in a discharge pipe leading to a drain channel 38. Over this chamber 36 and conforming to the curved interior of the tank, and flush therewith, is a removable grid or grating 39 through which the bark will not pass and from which the bark will be swept away by the moving flights or combs 26. When thus operating in a dry way, there is advantage in spraying the wood with water prior to its exit from the drum, to wash off adhering dust and bits of bark, and to this end spray pipe 23 may have openings along its side as well as along its bottom, and can be used for projecting water into the adjacent open end of the drum to wet down and wash off the wood when it is approaching delivery from the drum.

When working in a dry way, but more especially when working in the wet way, the blocks of wood which have been added to the slabs to prevent packing, have a tendency to gravitate toward or stay near the under side of the cascading mixture. Consequently, the smaller and lighter slabs, or the like, pass through the drum, and are discharged on grating 22 more readily than is the case with the larger blocks. But when the blocks or larger pieces do come from the drum, they may be recovered by a workman standing at the foot of grating 22 and may be deposited in the conveyer 25 and thereby be carried back from the discharge end of the drum to its intake end for action again on fresh slabs to be barked. The action on the slabs in the drum seems to be approximately the same whether the incoming blocks have previously been barked or not, but in charging slabs, edgings, or like mill waste, together with larger blocks, into the drum, it is important to regulate the relative quantity of each so that when tumbling in the drum and flowing therethrough and out at the discharge end, there will be maintained proper relative proportions of slabs and blocks to effect the desired result of breaking up the slab packs and causing the slabs or the like to tumble or cascade in irregular manner, and with effective rubbing, pounding, and scraping on adjacent slabs and blocks, to effect thorough and efficient removal of bark from the slabs or the like.

I claim:—

1. The method of barking slabs, edgings or like mill waste, which consists in progressively passing the material through a rotating drum and there tumbling it with blocks of larger size regulated in quantity to insure effective cascading of the material during tumbling; substantially as described.

2. The method of barking slabs, edgings or like mill waste, which consists in passing the material continuously into and out of a rotating drum and therein tumbling it with wood of larger size proportioned in quantity to prevent objectionable packing of the material while cascading in the drum as it rotates; substantially as described.

3. The method of barking slabs, edgings or like mill waste, which consists in charging the material and wood blocks of larger size into one end of a continuously rotating drum and tumbling the mixture until the material is barked and delivered from the other end of the drum, the proportion of material to larger blocks being such as to insure effective concussion and cascading of the material and to prevent it from objectionably packing together while passing through the drum; substantially as described.

4. The method of barking slabs, edgings or like mill waste, which consists in charging the material and wood blocks of larger size into one end of a rotating drum, tumbling said mixture therein, ultimately delivering said material and blocks therefrom,

returning said blocks for recharging into the drum, and maintaining the flow of blocks through the drum in such proportion to the flow of said material therethrough as to insure effective cascading and freedom from objectionable packing of the slabs; substantially as described.

5. The method of barking slabs, edgings and like mill waste, which consists in tumbling it in a rotating drum while mixed with wood blocks of larger size to the extent of about one quarter the total volume of the tumbling mixture, substantially as described.

In testimony whereof I affix my signature.

HERBERT GUETTLER.