Apparatus for Debarking Logs or for Preparing Logs for Debarking

The invention relates to an apparatus for debarking logs (1) or preparing logs for separately performed debarking - especially logs that are difficult to debark - the apparatus comprising a drum (3) rotating about its central axis (2), through the space limited by the cylindrical inner sleeve (4) of which drum the logs (1) to be treated are fed, whereby the logs are subjected to abrasion and impact blows in order to treat the bark. Inside the drum (3) is formed an inner member (5), which member is arranged to divide the space limited by the cylindrical inner sleeve (4) of the drum (3) into a treatment space (6) proper and a space (7) remaining outside of it, whereby the logs (1) fed through the drum (3) are arranged to travel through the drum (3) via the said treatment space (6).
APPARATUS FOR DEBARKING LOGS OR FOR PREPARING LOGS FOR DEBARKING

The invention relates to an apparatus for debarking logs or preparing logs for separately performed debarking - especially logs that are difficult to debark - the apparatus comprising a drum rotating about its central axis, through the space limited by the cylindrical inner sleeve of which drum the logs to be treated are fed, whereby they are subjected to abrasion and impact blows to treat the bark.

From the viewpoint of the quality of the pulp it is important to keep the amount of bark passing to chipping with the logs as small as possible. The removal of the bark from the surface of the logs usually takes place in a debarking drum in which the mutual movement and abrasion of the logs against one another bring about the debarking of the logs. The loose, finely crushed bark falls for the most part through the bark apertures in the drum to a bark conveyor under the drum.

With some wood species, the bark peels off as long strips or large slabs, in which case the peeled bark tends to leave the drum together with the logs at the discharge end of the debarking drum. Many deciduous trees, such as eucalyptus, acacia, hickory and birch, are this type of trees that are difficult to debark. The problem may, however, also be that the bark is very tightly attached to the log, which means that debarking the log in a conventional debarking drum is slow. With some wood species, a problem may in addition be presented by the fact that they - especially small logs - break easily in the debarking drum.

The object of the invention is to provide an apparatus in which the logs treated inside a rotating drum can be subjected to various treatments for detaching the bark, and which apparatus can also be used for logs that break easily and are difficult to debark.

According to invention, this object has been achieved in such a way, and the apparatus relating to the invention is characterised in that an inner member is formed inside the drum, the said member being arranged to divide the space
limited by the cylindrical inner sleeve of the drum into a treatment space proper and a space remaining outside it, whereby the logs fed through the drum are arranged to travel through the drum via the said treatment space.

Thanks to this arrangement, the logs will travel through the drum in a substantially more parallel manner than without the inner member. Since the logs are not able to settle crosswise in the drum, the logs will also not break very easily.

The treatment space limited by the inner member from the drum is preferably elongated in cross-section.

In one preferred embodiment of the invention, the arrangement is such that a number of blades for treating the logs fed through the drum are arranged to project from the surface of the cylindrical inner sleeve of the drum, the blades being arranged to cut or tear the surface of the logs being treated by the effect of the mutual movement of the drum and the logs. The bark will then be cut off and detach as pieces of suitable size during the said treatment or the actual debarking treatment following it.

Further preferable developments of the invention are disclosed in the dependent claims.

The invention is described in greater detail in the following, with reference to the appended drawings, in which

Figure 1 shows the apparatus relating to the invention as a perspective view.

Figure 2 shows the apparatus relating to the invention as a side view.

Figure 3 shows a section along line III-III in Figure 2.

Figure 4 shows a blade projecting from the inner sleeve of the drum.
Figure 5 shows a section along line V-V in Figure 4.

The apparatus for debarking logs or preparing logs for separately performed 
10 debarking - especially logs that are difficult to debark - is shown as a 
diagrammatic perspective view in Figure 1. The apparatus is shown from the 
discharge end side. Figure 2 shows a side view of the apparatus, where the 
direction of feed of the logs is marked with arrow A. Figure 3 further shows a 
section of Figure 2 along line III-III.

15 The apparatus comprises a drum 3 rotating about its central axis 2, through the 
space limited by the cylindrical inner sleeve 4 of which drum the logs 1 to be 
treated are fed, whereby they are subjected to abrasion and impact blows to treat 
the bark. The drum 3 is supported into an inclined position in such a way that its 
central axis 2 forms a sharp angle $\alpha$ with respect to the horizontal plane. The 
magnitude of the angle $\alpha$ is within the range from 2 to $12^\circ$. A typical value is 
approximately $5^\circ$.

In the example shown in the drawing, the drum 3 is supported from the outside on 
20 wheels 12 and provided with means designated generally by reference numeral 
13 for rotating the drum 3.

For the sake of clarity, both the conveyor by means of which the logs 1 are fed to 
the drum 3, and the conveyor by means of which the logs 1 discharged from the 
25 discharge end of the drum 3 are conveyed to further treatment stages, have been 
 omitted from the drawings.

30 Inside the drum 3 is formed an inner member 5 which is either fixed or adjustable 
to the desired position. The member 5 is arranged to extend to the desired area 
of the drum 3, in other words, over the entire length of the drum or only a portion 
of its length, and arranged to divide the space limited by the cylindrical inner 
sleeve 4 of the drum 3 into a treatment space proper 6 and a space 7 remaining 
outside it. The logs 1 fed through the drum 3 are then arranged to travel through 
the drum 3 via the said treatment space 6. The treatment space 6 is thus
comprised of a channel open at both ends, which is inside the drum 3, the inner sleeve surface of which channel is formed, on the one hand, by the solid wall 17 formed by the inner member 5 adjusted to the desired location, and on the other hand by the part of the rotating inner sleeve 4 of the drum 3 at the said wall.

The relative movement between the logs 1 and the inner sleeve 4 of the drum 3 can be changed by changing the position of the inner member 5.

A number of blades 11 for treating the logs 1 fed through the drum 3 are arranged to project from the surface of the cylindrical inner sleeve 4 of the drum 3. The blades 11 tear the bark of the logs 1 being treated or make crosswise cuts in the bark at suitable intervals, which means that the bark will detach more easily and at the same time as pieces of suitable size during preparation or subsequently in the actual debarking drum.

As seen best in Figures 1 and 3, the inner member 5 is arranged to rotate about the central axis 2 of the drum 3. The inner member 5 may also be mounted so as not to rotate with respect to the drum. For the purpose of rotating, the inner member 5 is supported at both ends by means of suitable beams 14 and supporting bearings 16 on the framework of the apparatus. As seen best in Figure 3, the inner member 5 is locked in its normal position formed by its actual operating position by means of an actuator 15. One end of the actuator 15, which may be comprised of, for example, a draw-spring, is attached to the solid framework 14 and the other end to the inner member 5.

In one embodiment, the inner member 5 is arranged to rotate away from its operating position or normal position when a force exceeding the predetermined force is directed at the inner member 5 and, correspondingly, to return to its normal position when the said force exceeding the predetermined force ceases to act. This type of force may appear if bark of wood wedges in the slot 9 between the drum 3 rotating in the direction of arrow B and the inner member 5 of the inner sleeve 4, which means that damage caused by the sudden jamming of the drum 3 and the inner member 5 can be reduced or completely avoided.
In the example shown in Figure 1, on the surface of the inner sleeve 4 of the drum 3 are arranged one, or most preferably several, ridge-like protrusions 8 winding in a spiral manner with respect to the central axis of the drum. In the example shown in Figure 1, where the drum 3 is arranged to rotate in the direction of arrow B, the ridge-like protrusion 8 forms a right-hand wind. In this case, the rotary movement of the drum 3 brings about a force directed at the discharge end of the drum 3 on the logs 1 resting against the protrusions 8, that is, a force in the direction of arrow A shown in Figure 2.

In principle, the angle of inclination $\alpha$ of the drum 3 is sufficient to bring about a progressive movement of the logs 1 in the direction of arrow A, if the angle of inclination $\alpha$ is sufficiently large. However, the protrusions 8 enhance the progression of the logs in the drum 3 and reduce strains on the inner sleeve 4 of the drum 3.

When using ridge-like protrusions 8, the blades 11 are arranged to project further from the surface of the inner sleeve 4 of the drum 3 towards the central axis 2 of the drum 3 than the ridge-like protrusions 8, so that when the drum 3 rotates and the logs 1 rest on the ridge-like protrusions 8, the blades 11 will cut or tear the surface of the logs 1 and thus cut the bark.

The wall 17 formed by the inner member 5 is shaped as a wedge-like beak 18 at the lower end, in such a way that the rotary movement of the drum 3 will force the logs 1 to move in the manner shown by arrow C in Figure 3, as guided by the wall 17 of the inner member 5 and the inner sleeve 4 of the drum 3. Between the said wedge-like beak 18 of the inner member 5 and the inner sleeve 4 of the drum is provided a slot 9 for discharging bark from the treatment space 6 to the space 7 on the opposite side of the wall 17 of the inner member 5. The slot 9 is dimensioned in such a way that it expands towards the said free space 7, which facilitates the discharge of bark through the slot 9 towards the space 7.

In space 7 is arranged a bark space 10 from which the bark is arranged to be discharged automatically by means of devices not shown. Alternatively, the bark
is arranged to be discharged from the said space 10 by the effect of the rotary movement of the drum 3 and the inclination of the drum 3 acting with it and/or the spiral protrusion 8 provided on the inner surface 4 of the drum 3.

In the example shown in Figure 3, the drum 3 may, in principle, rotate in a direction opposite to the direction of arrow B, in which case also the movement of the logs 1 will also be in a direction opposite to arrow C. In this case, the bark cannot be discharged through the slot 9, but only through both ends of the drum 3, primarily from the discharge end, and/or through the bark apertures (not shown) in the sleeve.

Figures 4 and 5 show an example of the attachment of the blade 11 to the drum 3. On the inner sleeve 4 of the drum 3 is formed an aperture 20 for the blade 11. Around the aperture 20, outside the drum 3, is welded a support plate 21 having an aperture of corresponding size and matching with aperture 20, and threaded holes 22 for the fixing screws 23 of the blade 11. The blade 11 is welded to a protrusion piece 24 which protrusion piece is in turn joined with an attachment plate 25. The attachment plate is attached to the support plate 21 by means of screws 23. In order to provide the blade 11 with the desired protrusion a from the surface of the inner sleeve 4, the required number of spacer plates 26 has been fitted between the support plate 21 and the attachment plate 25. Due to this arrangement, the blade 11 can easily be replaced from the outside of the drum 3.
Claims

1. An apparatus for debarking logs (1) or preparing logs for separately performed debarking - especially logs that are difficult to debark - the apparatus comprising a drum (3) rotating about its central axis (2), through the space limited by the cylindrical inner sleeve (4) of which drum the logs (1) to be treated are fed, whereby they are subjected to abrasion and impact blows in order to treat the bark, an inner member (5) is formed inside the drum (3), the said member being arranged to divide the space limited by the cylindrical inner sleeve (4) of the drum (3) into a treatment space (6) proper and a space (7) remaining outside it, whereby the logs (1) fed through the drum (3) are arranged to travel through the drum (3) via the said treatment space (6), characterised in that between the inner member (5) and the inner sleeve (4) of the drum (3) is provided a slot (9) for discharging bark from the treatment space (6) to the space (7) on the opposite side of the inner member (5).

2. An apparatus as claimed in claim 1, characterised in that in the said space (7) is arranged a bark space (10) from which the bark is arranged to be discharged by the effect of the rotary movement of the drum (3) and the inclination of the drum (3) acting with it and/or the spiral protrusion (8) provided on the inner surface (4) of the drum (3).

3. An apparatus as claimed in claim 1, characterised in that in the said space (7) is arranged a bark space (10) from which the bark is arranged to be discharged automatically.

4. An apparatus as claimed in claim 1, characterised in that the treatment space (6) limited by the inner member (5) from the drum (3) is elongated in cross-section.
5. An apparatus as claimed in claim 1, characterised in that a number of blades (11) for treating the logs (1) fed through the drum (3) are arranged to project from the surface of the cylindrical inner sleeve (4) of the drum (3), the blades (11) being arranged to cut or tear the surface of the logs (1) being treated by the effect of the mutual movement of the drum (3) and the logs (1).

6. An apparatus as claimed in claim 1, characterised in that the angle of inclination (α) of the central axis (2) of the drum (3) with respect to the horizontal plane is within the range from 2 to 12°.

7. An apparatus as claimed in claim 1, characterised in that the inner member (5) is arranged to rotate about the central axis (2) of the drum (3).

8. An apparatus as claimed in claim 5, characterised in that the inner member (5) has a certain normal position from which it is arranged to rotate away when a force exceeding the predetermined force is directed at the inner member (5), and to return to its normal position when the said force exceeding the predetermined force ceases to act.

9. An apparatus as claimed in claim 1, characterised in that on the surface of the inner sleeve (4) of the drum (3) are arranged one or more protrusions (8) which are spiral with respect to the central axis (2) of the drum.
## INTERNATIONAL SEARCH REPORT

**INTERNATIONAL APPLICATION NO.**

PCT/FI 00/01103

### A. CLASSIFICATION OF SUBJECT MATTER

**IPC7:** B27L 1/04

According to International Patent Classification (IPC) or to both national classification and IPC

### B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

**IPC7:** B27L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE, DK, FI, NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

**WPI, PAJ**

### C. DOCUMENTS CONSIDERED TO BE RELEVANT

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Further documents are listed in the continuation of Box C. ❐ See patent family annex.

### Date of the actual completion of the international search

6 April 2001

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10-04-2001

**Name and mailing address of the ISA:**

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