Jan. 25, 1966 G. M. DICK 3,230,989

STAVES FOR THE DRUM OF A LOG DEBARKER

Filed May 15, 1963 2 Sheets-Sheet 1

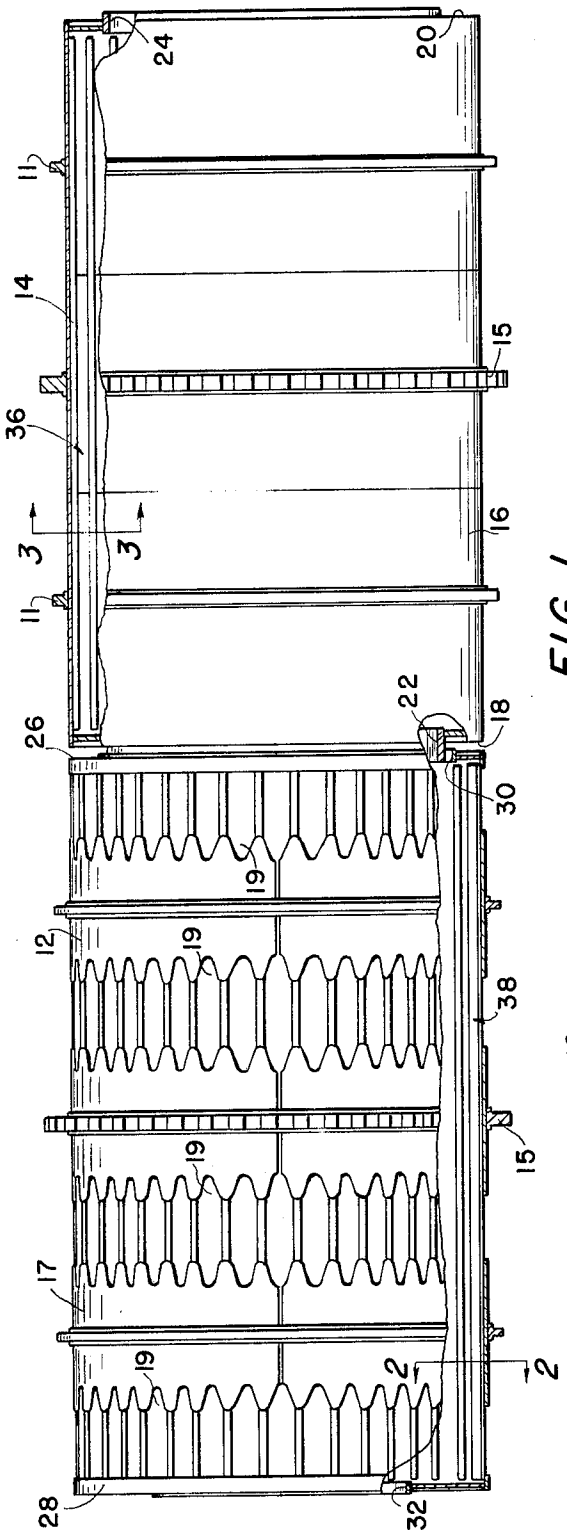

FIG. 1

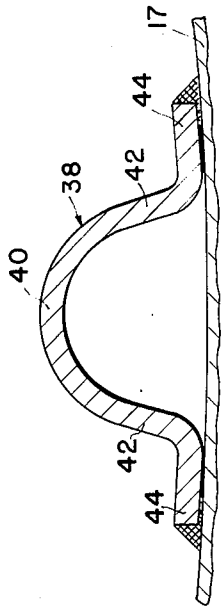

FIG. 2

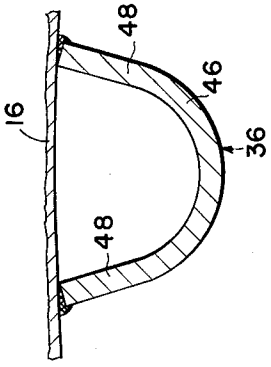

FIG. 3

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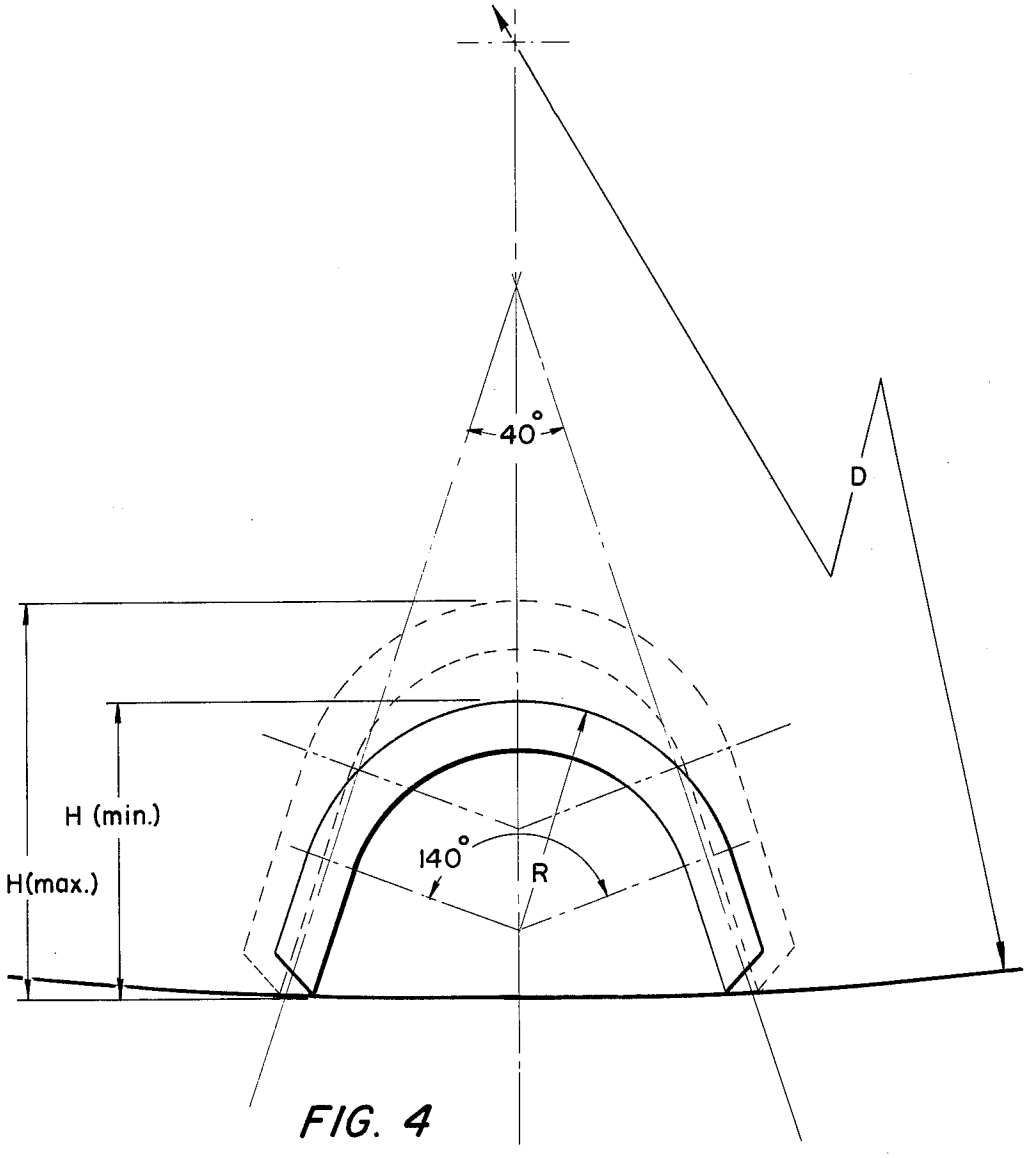

FIG. 4

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3,230,989

Patented Jan. 25, 1966

3,230,989

STAVES FOR THE DRUM OF A LOG DEBARKER

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Filed May 15, 1963, Ser. No. 280,673
2 Claims. (Cl. 144—208)

This patent application is a continuation-in-part of pending U.S. patent application Serial No. 109,420, filed May 11, 1961, now abandoned.

This invention relates to log debarkers and is primarily concerned with staves for the drum of a log debarker.

In the past it has been common practice to use staves of the type having an angular hat section for the drums of log debarkers. However, one of the disadvantages of such angular type staves is that the staves, and in particular the corners adjoining the top of the hat section, are subject to rapid wear as a result of the severe abrasive and pounding action of the logs on such corners of the staves.

Another disadvantage of the angular type staves is that the abrasive and pounding action of the logs on the corners of such staves causes spalling of slivers off the logs, such slivers being objectionable in the pulp.

It is therefore one of the objects of the invention to provide a stave for the drum of a log debarker capable for carrying the logs upwardly when the log debarker is operating to effect cascading of the logs.

Another object of the invention is to provide a stave for the drum of a log debarker that has a longer operative life than heretofore known staves.

Yet another object of the invention is to provide a stave for the drum of a log debarker constructed and arranged to reinforce the drum structure.

Another object of the invention is to provide a stave for the drum of a log debarker that eliminates spalling of slivers off the logs.

Another object of the invention is to provide a stave for the drum of a log debarker which minimizes the tendency for logs to jam in between one stave and another.

Accordingly the present invention contemplates an improved type of stave for the drum of a log debarker which comprises an arcuate shaped hat portion and straight diverging side walls secured to the arcuate hat portion.

The foregoing and other objects of the invention will be obvious from the drawings wherein:

FIGURE 1 is a partly side elevational and partly longitudinal sectional view of the drum of a log debarker,

FIG. 2 shows enlarged a cross sectional view of one form of stave for a log debarking drum taken along the line 2—2 of FIG. 1,

FIG. 3 shows enlarged a cross sectional view of another form of stave for a log debarking drum taken along the line 3—3 of FIG. 1, and

FIG. 4 is a diagram of one of the staves of the log debarking device according to the invention.

Referring to FIG. 1, 10 designates a log debarking device comprising two horizontally extending drum sections 12 and 14 axially aligned and mounted to be rotated by a motor (not shown). The drum may be supported for rotation in any suitable manner well known in the art; as for example, rollers (not shown) may be positioned below drum sections 12 and 14 to engage support rings 11 secured to the outer periphery of the drum sections. Drum sections 12 and 14 may be rotatively connected to the motor (not shown) in any suitable manner; as for example, by driving gears (not shown) which are supported in meshing relationship with ring gears 15 secured to the outer periphery of the drum sections by a drive shaft drivably connected to the motor.

Drum section 14 is the water containing portion or wet drum of the device including a cylindrical watertight drum wall 16 forming the peripheral wall thereof and having inner and outer end walls 18, 20 with centrally located openings 22, 24, respectively.

Drum section 12 is the dry drum of the device and includes a peripheral wall 17 constructed so as to provide a plurality of openings 19 for the escape of bark and water and other material during debarking operations. Drum 12 is also provided with inner and outer end walls 26, 28 having central openings 30, 32, respectively.

When debarking logs, both drums rotate and wet drum 14 is maintained with water to a level at or slightly below the lower surface of openings 22 and 24. Logs to be debarked after being fed into wet drum 14 through opening 24 are soaked by the water and agitated in the drum, by stave means according to this invention and hereinafter fully explained, so that the logs cascade and rub against each other with the purpose of abrading and loosening the bark from the logs. The logs after being tumbled about in wet drum 14 are discharged through opening 22 into dry drum 12 in which, by means to be explained hereinafter, the process of removing the bark from the logs is continued. From drum 12, the debarked logs are then discharged through opening 32 for further processing. It is to be noted that, when the device is in operation, the water that is continuously supplied to drum 14 overflows into drum 12 from where it is discharged together with the pulverized bark and other material through openings 19.

As debarking of the logs is achieved by the abrasive action of the logs falling on one another and rubbing and grinding against one another and against the stave means the logs are tumbled about and moved upwardly in the direction of rotation of the drums by such stave means to cause the logs to cascade repeatedly on one another.

The stave means according to this invention includes a plurality of staves 36 and 38 secured to the inner periphery of the drums 14 and 12, respectively. The number of staves for the dry drum and wet drum is determined in accordance with the diameter of the drums and with the requirements for the structural strength of the drums, protection of the drum shell, and for the proper cascading and tumbling action of the logs in the drums during rotation thereof. Accordingly, drum section 14 is provided with preferably sixteen staves 36 while drum section 12 is provided with preferably thirty-two staves 38, the staves being positioned longitudinally and in evenly spaced relation on the inner periphery of the associated drums. It has been found preferable to provide thirty-two staves for a conventional size log debarker dry drum having a diameter of twelve feet, since it provides the required structural strength for the drum commensurate with providing the required flow area of openings in the periphery wall of the drum and between the associated staves for the passage of water and pulverized bark and other material through such openings. It also provides for proper cascading and tumbling action of the logs in the drums during rotation thereof. As for the number of staves in a wet drum of conventional size having a diameter of twelve feet, it has been found preferable to provide sixteen staves since it provides the necessary structural strength for such drum and provides for effectively moving the logs upwardly in the direction of rotation of the drum for the cascading action of the logs without the wedging or jamming of logs between adjacent staves.

In order to provide for efficient tumbling and cascading action of the logs to be debarked, as well as for a form of stave to withstand the severe abrasive and pounding

action of the logs, the height H of the staves is to be held within a predetermined range of from H minimum to H maximum, while the outer radius R of the hat section is to be held substantially constant. Considering the value of R to be 1, the ratio of the height H of the stave relative to the radius R of the hat section of the stave is then within a range of approximately 1.2 to 1 to approximately 1.8 to 1.

Referring to the angle formed between the opposing side walls of the stave, this is determined by the factors of resistance of the stave to the pounding action of the logs, of eliminating the possibilities of wedging or jamming of the logs between the staves, and yet retaining the positive and effective tumbling action of the staves upon the logs. It has been found that an angle of 40° formed between the opposing side walls of the stave produces a stave which is not only highly resistant to the extremely heavy pounding action of the logs on the staves but also very effective in cooperating with other staves to prevent jamming or wedging of the logs between the staves. The angle between the face of the stave and the log end contacting the face of the stave diverges toward the drum center permitting the log to move readily from between two staves on continued rotation of the drum.

It has been found that the type of stave as hereinbefore described is highly effective when used in association with the standard size log debarker dry and wet drums having a diameter ranging from approximately ten to fifteen feet, the ratio between the diameter D of the drum relative to the height H of the stave attached thereto being within a range of from about 20 to 1 to about 42 to 1.

Referring to the structure of staves **38** associated with dry drum **12**, each stave **38** comprises an arcuate shaped portion **40** having opposing straight side walls **42** and flanges **44**. Portion **40** of the stave has a shape of a 140° arc of a circle, side walls **42** extending tangentially from portion **40** to form a stave with diverging side walls forming an angle of 40° with each other. Flanges **44**, extending laterally outwardly from side walls **42**, are slightly tilted relative to the inner surface of drum wall **12** so that when the flanges are held against the inner periphery of drum wall **17**, as shown in FIG. 2, there is a space between the outer end faces of flanges **44** and drum wall **12** into which, when the staves are welded to the drum wall, metal is introduced such that not only the edges are welded to the drum wall but also the faces of the flanges opposing the drum wall, whereby a maximum strength weld is provided.

Referring to the structure of staves **36** associated with wet drum **14**, each stave **36** comprises a 140° arc of a circle shaped portion **46** having opposing straight side walls **48** extending tangentially from arcuate portion **46**, identical to the body portion of staves **38**. Staves **36** are flangeless and the end faces of straight side walls **48** are such that when the stave is held against the inner periphery of drum wall **16** as shown in FIG. 3 there is a space between the end faces of straight side walls **48** and drum wall **16** into which metal is introduced when the staves are welded to drum wall **16** such that a weld of maximum strength is provided.

In operation, when drum sections **12** and **14** of log debarking device **10** are rotated, the logs are moved by the staves upwardly in the direction of rotation of drum sections **12** and **14** resulting in a cascading down on top of one another of the logs and producing the desired action for abrasion and removal of the bark from the logs.

It is to be noted that staves **36** and **38** by virtue of their rounded shape eliminate spalling of slivers off the logs, such slivers being objectionable in the pulp and necessitating additional screening for the removal of such slivers.

It is also to be noted that the diverging side walls of the staves cooperate with each other to form troughs between the staves having sides converging towards the drum wall to prevent jamming of the logs between the staves. When the side walls of the staves are constructed to form troughs between the staves having parallel sides or sides diverging towards the drum wall the logs tend to jam between the staves resulting in inefficient performance of the debarking drums.

Another advantage of the staves according to this invention is that when the staves are welded to the interior of their associated drum sections there is formed a "box" shaped cross section having the moment of inertia or section modulus that is practically uniform in all directions. The sectional moduli through the two axes of the stave are relatively high compared with the sectional area, thus providing resistance to bending in both directions of loading. As the drums are subjected to severe stresses during each revolution of the drums the stave structure and its mounting on the inner periphery of the drum walls provide rigidity to the drums to ensure a strong and reliable log barking device.

As for the flangeless staves **36** it is to be noted that the omission of the flanges results in saving of material and a lighter weight of the wet drum **14** with no sacrifice with respect to the structural strength of the drum. The provision of saves having flanges in the dry drum **12** gives additional support to the longitudinally projecting drum wall portions which form the boundary of openings **19**.

Thus, by the aforementioned construction, are accomplished among others, the objects hereinbefore referred to.

While there is shown and described a specific form of this invention, it is to be understood that various changes and modifications may be made without departing from the spirit of the invention as set forth in the appended claims.

I claim:

1. An apparatus for debarking logs, said apparatus comprising:
   - a horizontally disposed, rotatable, cylindrical drum including an imperforate peripheral drum wall for holding water in said drum;
   - a plurality of spaced staves extending axially on the interior of said imperforate drum wall for agitating the logs during the rotation of said drum;
   - each of said staves including spaced outer side walls inclined towards each other inwardly of said drum and an arcuate wall connecting said side walls inwardly of said drum, the angle formed between said side walls being 40°; and
   - each of said staves being secured on the interior of said imperforate drum wall by the free ends of said side walls and being of a height that is of a ratio within the range of from 1 to 20 to 1 to 42 of the diameter of said drum.

2. The device claimed in claim **1** in which the ratio between the height of each stave and the radius of said arcuate shaped portion of each stave is within a range of from approximately 1.2 to 1 to approximately 1.8 to 1.

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