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Young

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[54] **DRUM-TYPE DEBARKING APPARATUS**

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[52] **U.S. Cl.** ..... **144/208 B,** 241/182

[51] **Int. Cl.** **B21l 1/00**

[58] **Field of Search** ..... 144/208 R, 208 B, 309 R, 144/309 AC, 311; 241/182

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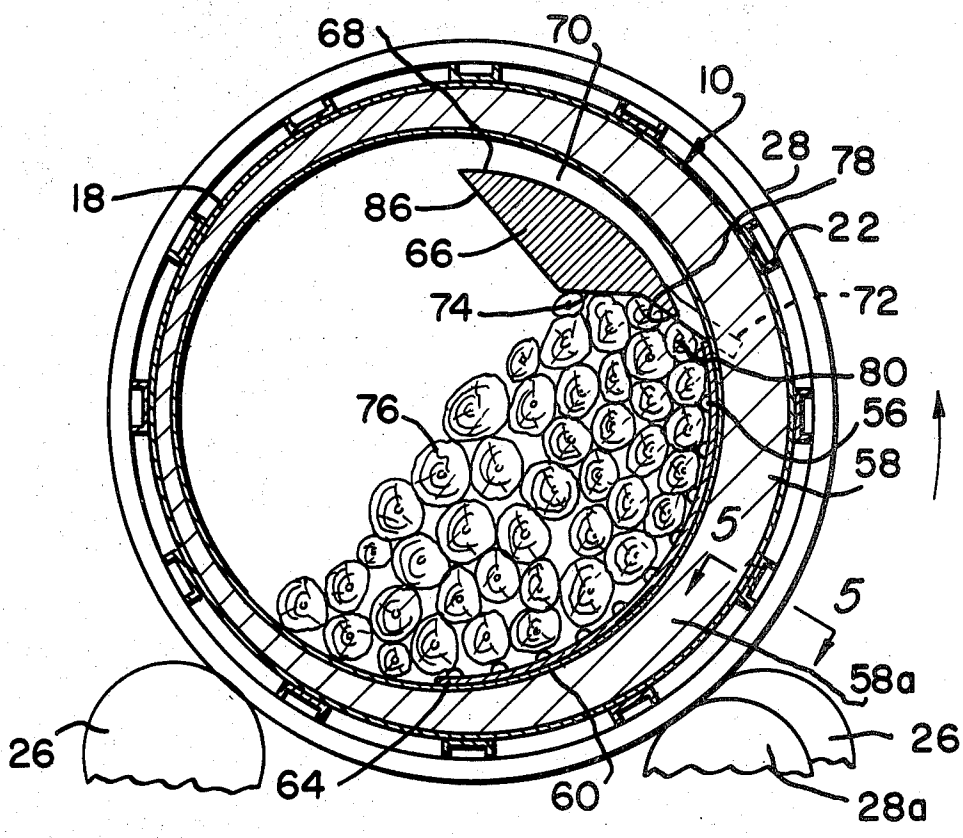
[57] **ABSTRACT**

Debarking apparatus comprising a rotatably driven drum and an anvil inside of the drum circumferentially surrounded by the latter and operatively associated therewith for restricting log movement with the drum during the drum rotation. The drum carries debarking tool means in the form of a plurality of individual, blunt, debarking tool elements which are shown as arcuately contoured on all working sides, said debarking tool elements being arranged in sets extending at least generally circumferentially of the drum at locations spaced longitudinally thereof; and adjacent ones of such sets of tool elements are eccentric to one another and in circumferentially stepped relationship.

49 Claims, 9 Drawing Figures



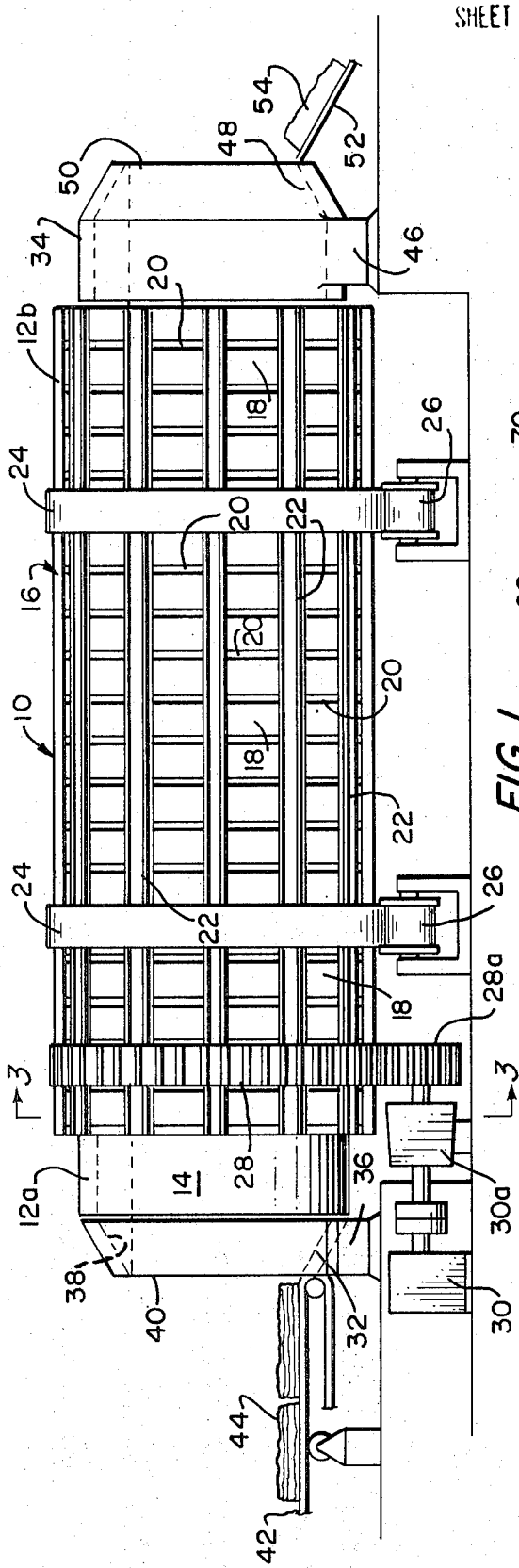


FIG. 1

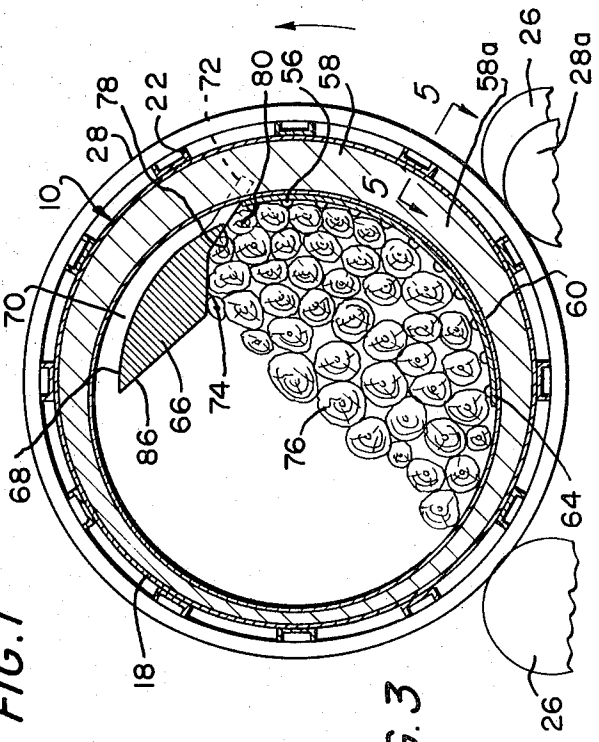


FIG. 3

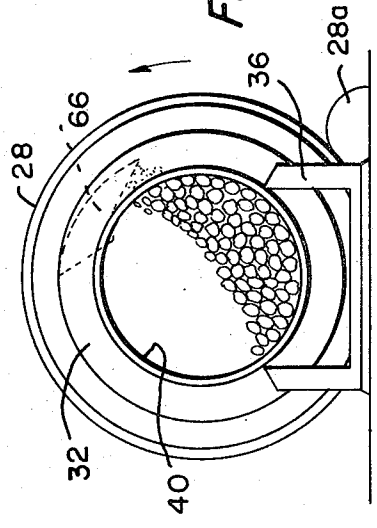


FIG. 2

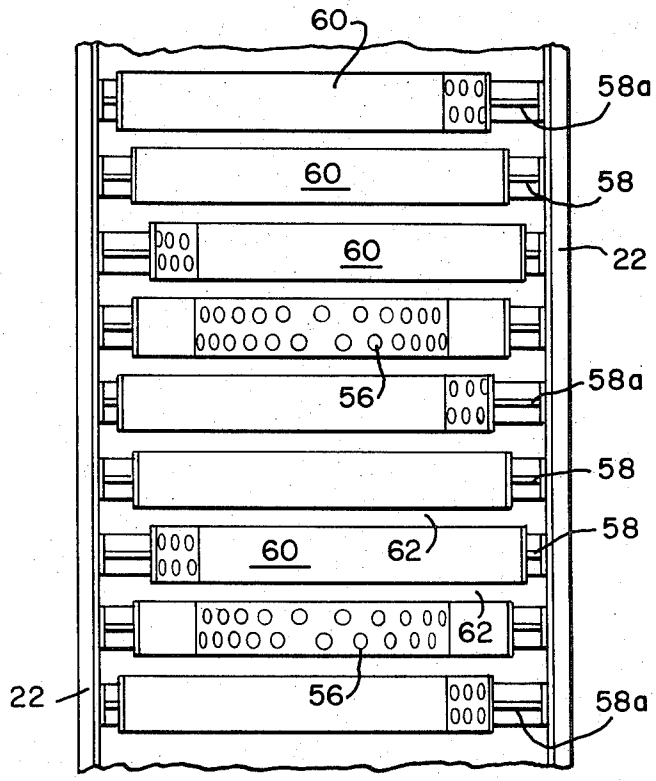


FIG. 4

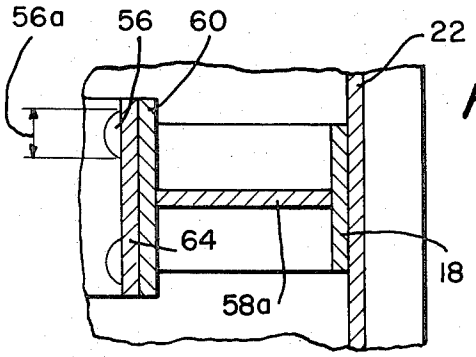


FIG. 5

FIG. 6

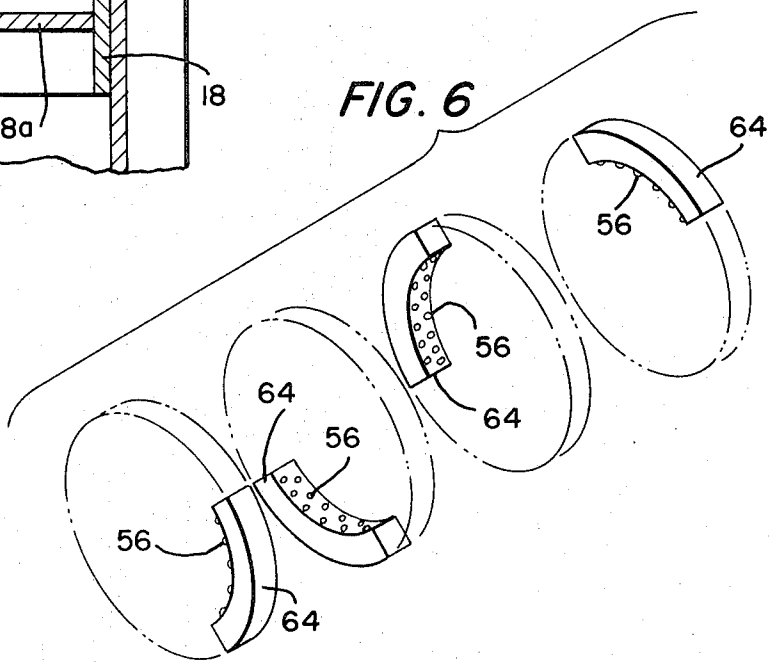
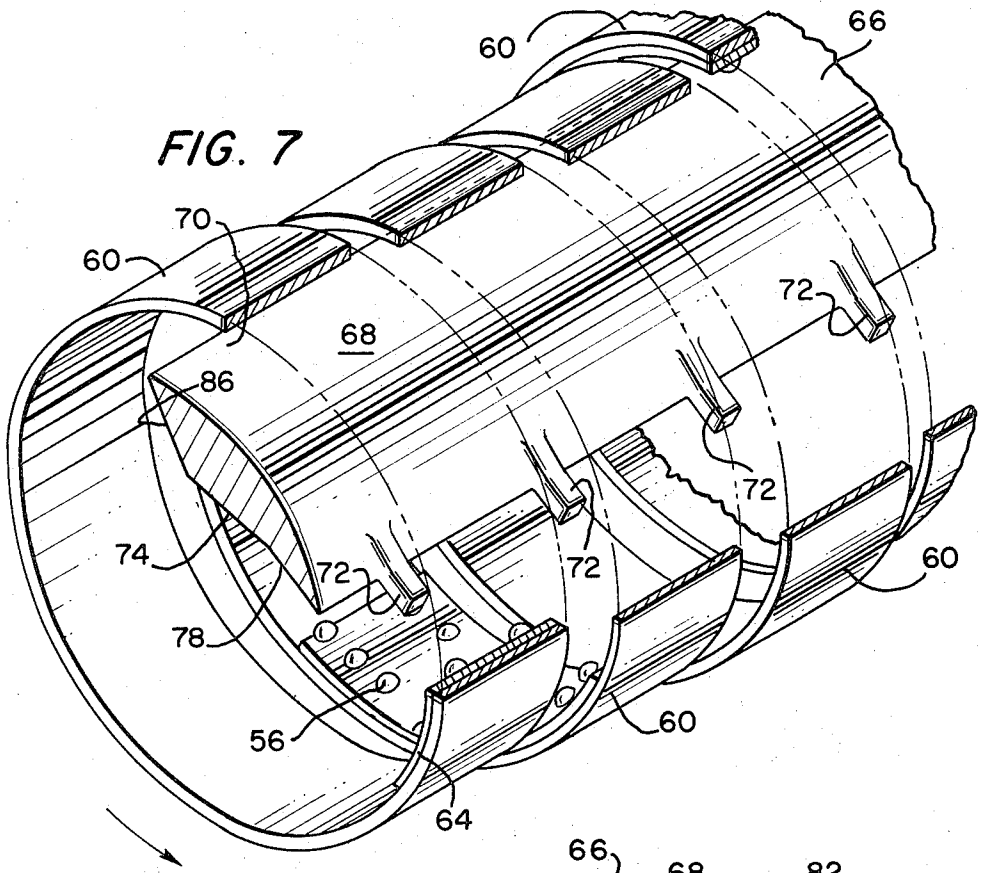


FIG. 7



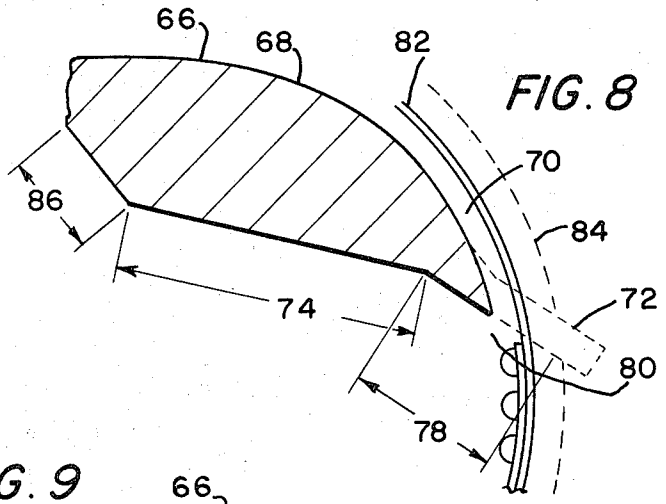
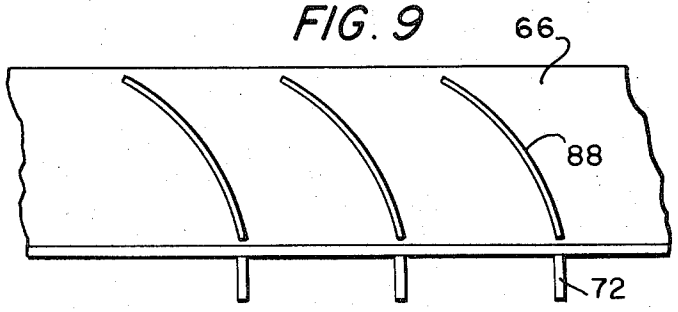


FIG. 8

FIG. 9



DRUM-TYPE DEBARKING APPARATUS

The present invention relates generally to debarking apparatus and more particularly to debarking apparatus of the drum-type wherein logs are debarked in a rotatably driven drum.

Commercially available, rotating drum-type debarking apparatus includes both traditional tumbling debarkers, usually employed for debarking pulpwood logs of up to eight feet in length, and more recently developed, rolling flow debarkers, usually employed for debarking pulpwood logs of eight feet and greater length.

Conventional tumbling debarkers are characterized by the drum carrying staves which are particularly adapted to provide minimum slip between the drum and its contained logs whereby, during drum rotation, the logs are caused to tumble in random manner while bark is removed due to the combined action of impact, compression and attrition primarily between the logs. Tumbling debarkers are unable to debark frozen logs and, when frozen wood is encountered, require that the outer layers of the logs be thawed either prior to, or during, the debarking. Typically, in North America this thawing of frozen logs to be debarked in tumbling debarkers is performed by providing the debarking drum with internal hot water showers and/or log immersion sections while in Europe the necessary thawing is usually performed upstream of the drum.

Effective debarking may be attained from tumbling debarkers particularly when such are accompanied by recirculation of only partially debarked logs back through the drum. However, tumbling debarkers are of undesireably limited capacity and their employment normally requires the use of multiple, parallel installed drums and associated wood handling equipment, thereby necesssitating relatively high capital and maintenance costs for their installation and operation. Furthermore, such debarkers are susceptible to breakage of small diameter logs, brooming of wood ends and sawdust loss and increased costs due to slashing of short length logs. In addition, the hot water showers and/or log immersion sections employed for providing the necessary thawing of frozen logs, create a myriad of problems in that the removed bark must be separated from the shower or immersion liquid prior to the burning of the bark and discharge of the liquid from the mill.

Conventional rolling flow debarkers are characterized by the drum carrying a larger number of staves of flatter, less aggressive profile adapted to permit slip between the logs and the drum; and, during the operation of such debarkers, the logs are maintained essentially parallel to the drum axis while a primarily rolling or spinning action is imparted to the logs to provide debarking by both log-to-log abrasion and log-to-drum abrasion. The drums of rolling flow debarkers have higher throughput rates than those of tumbling debarkers, thereby reducing wood handling costs. However, conventional rolling flow debarkers provide less effective bark removal than tumbling debarkers particularly with respect to irregular or small diameter logs. Also, rolling flow debarkers are of substantially higher capital costs than tumbling debarkers and are of relatively greater (for example, 150 to 200 foot) length. In addition, winter operation of rolling flow debarkers in cold climates again necessitates the thawing of the logs either prior to, or during, the debarking. Losses due to log slashing may be at least somewhat lower in rolling flow debarkers than in tumbling debarkers in some instances; and, although wood losses during the debarking operation may be lower in rolling flow debarkers than tumbling debarkers, it is believed that the amount of such lower wood losses is at least sometimes exaggerated.

Conventional, commercially available, tumbling debarkers and rolling flow debarkers all are limited to debarking a log of about twenty-four inches in maximum diameter; and larger softwood logs are usually individually debarked by ring debarkers, hydraulic jet debarkers or cutter head debarkers. Also, such conventional tumbling debarkers and rolling flow debarkers are not susceptible to relocatable installations, but rather require their employment in fixed installations. Moreover, although hardwood logs of certain species are sometimes debarked in either tumbling or rolling flow debarkers, the debarking of some major hardwood species (for examples, aspen) at certain times of the year requires the employment of hand peeling.

An object of the present invention is to provide new and improved rotating drum-type debarking apparatus which is particularly constructed and arranged to provide relatively rapid, highly effective debarking.

Another object of the invention is to provide new and improved rotating drum-type debarking apparatus which is particularly constructed and arranged such that the debarking drum, for a given diameter and length, provides substantially greater debarking capacity than the drums of the before-described conventional debarking apparatus.

Another object is to provide new and improved rotating drum-type debarking apparatus which is particularly constructed and arranged to permit construction of the debarking drum of substantially smaller diameter and/or length than possible in the beforedescribed conventional debarking apparatus of similar capacity.

Another object is to provide new and improved rotating drum-type debarking apparatus which is particularly constructed and arranged to readily debark logs, such as irregularly shapped and/or hardwood logs, currently believed to be difficult to debark.

Another object is to provide new and improved rotating drum-type debarking apparatus which is particularly constructed and arranged to readily debark frozen logs without the necessity for liquid defreezing of the logs, thereby avoiding the problems inherently arising in the event of such liquid defreezing.

Another object is to provide new and improved rotating drum-type debarking apparatus which is particularly constructed and arranged, to be capable of employment in either relocatable or fixed embodiments.

Another object is to provide new and improved rotating drum-type debarking apparatus which is particularly constructed and arranged to reduce wood loss during debarking due to positive orientation of the logs and relatively short retention time in the drum.

Another object is to provide new and improved rotating drum-type debarking apparatus which is particularly constructed and arranged to be rotatably driven at relatively rotary high speed.

Another object is to provide new and improved rotating drum-type debarking apparatus which is particu-

larly constructed and arranged to debark logs of substantially any desired length.

Another object is to provide new and improved rotating drum-type debarking apparatus which is particularly constructed and arranged to provide highly effective debarking while substantially minimizing or eliminating the necessity for log recirculation back through the debarking drum.

Another object is to provide new and improved rotating drum-type debarking apparatus which is particularly constructed and arranged to, for the debarking capacity of the drum, require only a relatively economical wood handling system.

Another object is to provide new and improved drum-type debarking apparatus which is particularly constructed and arranged to posess only relatively low power requirements.

Other objects and advantages of the invention will be apparent from the following description taken in connection with the accompanying drawing wherein, as will be understood, the preferred embodiments of the invention have been given by way of illustration only.

In accordance with the invention, debarking apparatus may comprise drum means, anvil means within the drum means operatively associated therewith for restricting log movement with said drum means during the rotation of said drum means, the drum means being rotatable relative to the anvil means for applying high unit pressure, localized impact blows to logs in said drum means during the rotation thereof, and debarking tool means carried by the drum means within the drum means, such debarking tool means being arcuately contoured on all working sides and being illustrated as particularly arranged to debark irregularly shapped logs.

Referring to the drawings:

FIG. 1 is an elevational side view of a debarking apparatus constructed in accordance with one embodiment of the invention;

FIG. 2 is a elevational end view showing the inlet end of the debarking apparatus illustrated in FIG. 1;

FIG. 3 is an enlarged elevational sectional view of such debarking apparatus taken on line 3—3 of FIG. 1, looking in the direction of the arrows;

FIG. 4 is an enlarged, fragmentary, longitudinal sectional view of the debarking apparatus illustrated in FIGS. 1 through 3;

FIG. 5 is an enlarged, fragmentary sectional view of said apparatus taken on line 5—5 of FIG. 3, looking in the direction of the arrows;

FIG. 6 is a schematic view illustrating the relative arrangement of four adjacent ones of the sets of tool elements carried by the drum of such apparatus;

FIG. 7 is a perspective view illustrating the relative arrangement of the avnil means and debarking tool mounting means of the FIG. 1 apparatus;

FIG. 8 is a view schematically illustrating the relative arrangement of the anvil means and debarking tool mounting means of the FIG. 1 apparatus; and

FIG. 9 is a fragmentary view illustrating an alternative form of anvil means for use in the debarking apparatus shown in FIG. 1.

Referring more particularly to the drawings wherein similar reference characters designate corresponding parts throughout the several views, FIG. 1 illustrates a debarking apparatus comprising an elongated, rotatable, debarking drum **10** which is at least generally horizontal although, if desired, angled downwardly from its inlet end **12***a* towards its discharge end **12***b* to facilitate the passage of logs longitudinally therethrough. The drum **10** includes an inlet section **14**, located adjacent the drum inlet end **12***a*, and a debarking section **16** which is unitary with the inlet section **14**. The drum inlet section **14** is formed from an imperforate rolled plate and intended only for introducing logs into the drum **10**. The drum debarking section **16** is illustrated as formed from a plurality of coaxial ring supports **18** spaced apart longitudinally of the drum **10** by therebetween bark discharge openings **20**, and longitudinally extending channels **22** circumferentially spaced around the ring supports **18** and interconnecting the latter. As will be understood, however, the debarking section alternatively could be formed from annular plate or of other construction, providing that suitable bark discharge openings are therein provided. Also, although not shown, the drum inlet section **14** could, if desired, be provided with helical or other suitable means for facilitating the flow of logs therethrough.

The drum **10** includes a pair of annular tires **24**, rigidly mounted circumferentially around the channels **22** at locations spaced apart longitudinally of the drum **10**, and is ground supported by pairs of rotatable trunnion rollers **26** rotatably engaging each of the tires **24**. The drum **10** rigidly carries a circumferential toothed gear **28** intermeshing with a driving pinion **28***a* and is rotatably driven therethrough by a conventional driving motor **30** which is connected to the pinion **28***a* through a conventional speed reducer **30***a*. The motor **30** is suitably sized to rotatably drive the drum **10** loaded with logs at a relatively high rotary speed within the range of, for example, twenty to one-hundred revolutions per minute. The direction of this drum driven rotation, as viewed in FIGS. **2, 3, 7,** and **8,** is counterclockwise and schematically depicted by the arrows shown adjacent the drum circumference in such FIGS. It will be understood however that, although the drum **10** has been shown as so supported and rotatably driven, such has been done only for the purposes of illustration; and, alternatively, the drum **10** could be otherwise wise suitably supported and rotatably driven at the beforementioned relatively high rotary speed.

The debarking apparatus further comprises stationary or non-rotatable log supply and discharge sections **32,34,** respectively, adjacent the inlet and discharge ends **12***a*,**12***b* of the drum **10**. The stationary log supply section **32** is ground mounted by a supporting pedestal **36** and contains a supply chamber **38** at one open end to the interior of the drum inlet section **14** for supplying unbarked logs thereto. The other end of the inlet chamber **38** is of reduced cross-section and communicates through a relatively small diameter inlet opening **40** with a conveyor **42** or other source of logs **44** to be debarked; and the supply chamber **38** progressively increases in cross-section to the full cross-section of the interior of the drum inlet section **14** as it extends from the inlet opening **40** towards the inlet section **14**. The stationary discharge section **34** is ground mounted by a supporting pedestal **46** and contains a discharge chamber **48** at one end open to the interior of the drum discharge end **12***a* for discharging debarked logs therefrom. Adjacent its other end, the discharge chamber **48** includes a portion progressively narrowing in cross-section; and at its said other end the discharge chamber **48** terminates in a relatively small discharge opening **50**

communicating with a discharge chute **52** adapted for discharging debarked logs **54** therefrom. Alternatively, as will be understood, either or both of the supply and discharge sections **32, 34** may be carried by the drum **10** for rotation therewith rather than being stationary and separate from the drum **10.**

The drum debarking section **16** is provided with relatively blunt debarking tools or tool elements **56** particularly constructed for applying high intensity, hammer-like impacts to logs passing through the debarking section **16** during the relatively high speed driven rotation of the drum **10.** The tool elements **56** serve to debark the logs and also cause log rotation and a transverse pattern of circulation of the logs resulting in repeated presentation of varying parts of the logs to the tools **56.**

As illustrated, the debarking tools **56** are in the configuration of generally hemispherical protrusions, arcuately contoured on all working sides to minimize wood damage, which are sufficiently small to provide high unit pressure, localized impact blows to the logs during the debarking operation. By way of example, the arcuately contoured working surface **56***a* of each tool element **56** could be of three-eights to one-half inch radius for a 34 inch diameter experimental drum and one to one and one-quarter inch radius for a 6 foot diameter drum, that is of a radius of around approximately one-fiftieth to one-hundredth of the drum diameter. As will be understood, the debarking tools **56** could be of other than generally hemispherical configuration providing that their dimensions longitudinally of the drum **10** are maintained only a relatively small or minor portion of the length of the logs to be debarked whereby they are enabled to provide said high unit pressure, impact blows to the logs. Also, although not shown, the debarking tools **56** could be of different sizes at different locations in the drum **10.** For example, the tools **56** adjacent the inlet section **14** of the drum **10** could be of smaller size than the others thereof with the size of the tools **56** progressively increasing from the drum inlet section **14** towards the drum discharge end **12***b*.

The debarking tools **56** are particularly arranged to provide random impacts to logs passing through the drum **12** as well as to debark hollow or recessed portions of the logs. More specifically, as illustrated, an annular eccentric mounting plate **58** of continuously varying radial cross-section is affixed along its outer circumference to the inner circumference of each ring support **18.** Moreover, adjacent ones of the mounting plates **58** longitudinally of the drum **10** are circumferentially offset whereby the most radially enlarged portions **58***a* of such adjacent plates **58** extend arcuately along successive arcuate segments of the drum circumference and longitudinally overlap for minor portions of their lengths. The inner circumference of each mounting plate **58** has affixed thereto an annular tool mounting ring **60,** spaced by a space **62** from each of the thereadjacent ones thereof; and each tool mounting ring **60,** in turn, carries an arcuate tool mounting segment **64,** shown for the purposes of illustration as being of around one hundred degrees in arcuate length, which is located to extend along the most radially enlarged portion **58***a* of the corresponding mounting plate **58.** Each tool segment **64** along its inner circumference carries a set of debarking tools **56,** each such set of the tools **56,** as illustrated, comprising a plurality of generally circumferentially arranged rows of the tools **56** and justaposed rows of the tools **56** of each set thereof being offset axially of the drum **10.** Alternatively, however, the tools **56** of each set could be arranged other than in circumferential rows such as, for example, with circumferentially adjacent ones of the tools **56** offset in the longitudinal direction of the drum **10.** Also, each set of the tools **56** could, if desired, be arranged in a spiral pattern.

As will be seen, the illustrated arrangement of the tool mounting segments **64** causes adjacent ones thereof to extend arcuately along successive arcuate segments of the drum inner circumference and longitudinally overlap for a minor portion of their arcuate lengths. Hence, as shown in FIGS. **4** and **6,** throughout the length of the debarking section **16,** adjacent ones of the sets of tools **56** are resultantly caused to similarly extend around successive arcuate segments of the drum inner circumference and overlap circumferentially of the drum **10,** whereby the sets of the tools **56** are in circumferentially stepped relationship. Also, due to the beforedescribed arrangement of the tools **56,** the tools **56** are eccentric to the drum **12;** and sets of the tools **56** at different locations longitudinally of the drum **10** are eccentric to one another. As a result, the tools **56** are unusually effective in debarking hollow or recessed portions of logs and provide random impacts to the logs during the drum rotation.

The debarking apparatus further includes anvil means within the drum **10** circumferentially surrounded by the latter and preventing rimming of logs with the drum **10** during the relatively high speed drum driven rotation (that is, restricting log movement with the drum **10** during its rotation by preventing logs from being carried completely around the inner circumference of the drum **10**) while further, controlling the velocity of the transverse circulation of the logs, thereby maximizing the relative velocity of the tools **56** and the log mass and also maximizing the forces between the tools **56** and the log mass. Such maximizing of said relative velocity and said forces by the anvil means has been found to substantially increase the effectiveness of the bark removal and the capacity of the apparatus for any given size drum.

As illustrated, this anvil means comprises an elongated anvil, designated generally as **66,** which longitudinally extends through the interior of the drum **10** and is rigidly connected at opposite ends to the supply and discharge sections **32,34,** respectfully. (As will be understood, in the event that the sections **32,34** were rotatable with the drum **10,** the opposite ends of the anvil **66** could be mounted to stationary mounting frames on the opposite sides of the sections **32,34.**) Hence, the anvil **66** is normally held in fixed position during operation of the apparatus. Alternatively, however, as will be understood, the anvil **66** could be pivotally mounted either for adjustment or free swinging movement during the operation of the apparatus, the drum **10** again, of course, being rotatable relative to the anvil **66.**

As shown in FIGS. **3** and **7,** the anvil **66** projects through the upper half of the interior of the drum **10** and is in the portion of such upper half leading in the direction of the drum driven rotation. It will be understood, however, that the anvil **66** could be otherwise suitably located internally of the drum **10,** but preferably is in the upper half of the drum **10** to permit maximum drum loading and maximize the unit pressure with which the debarking tools **56** impact the logs.

Throughout the portion of the anvil **66** internally of the debarking section **16**, the anvil **66** includes an outwardly facing, upper, generally convex, surface **68** opposing the inner circumference of the drum **10**. The anvil **68** is spaced from the drum carried rotating components of the apparatus by an arcuate space **70** sufficient to permit rotation of such components relative to the anvil **66**; and the space **70** preferably progressively increases in the direction of the drum driven rotation to permit log fragments of small diameter to readily escape therefrom. As best shown in FIGS. **7** and **8**, at intervals throughout the portion of its length internally of the debarking section **16**, the anvil **66** comprises integral depending comb-like portions **72** projecting generally radially outwardly intermediate each of the adjacent ones of the mounting plates **58**. The comb-like portions **72**, as will be understood, prevent small diameter logs from entering the space **70**.

The lower side of the anvil **66** includes an at least generally downwardly facing portion **74** which is particularly constructed for controlling the transverse circulation of the logs in the debarking section **16**, to cause logs emerging from the top of the therebelow log pile to roll downwardly along the free surface, designated generally as **76** in FIG. **3**, of the log pile. The portion **74** thus prevents the logs emerging from the top of the log pile from being thrown outwardly above the free surface **76**, and causes the weight of the emerged logs to act through the log pile to increase the debarking forces between the tools **56** and the there-adjacent logs. In addition, the portion **74** controls the velocity at which logs emerge from the top of the log pile in the transverse circulation of the logs and thereby controls both the velocity of the logs adjacent the tools **56** and the relative velocity of the tools **56** and logs.

The lower side of the anvil **66** includes an at least generally downwardly facing portion **78**, at least partially defined by the comb-like portions **72**, which insures smooth flow of successive logs of varying diameters in the transverse circulatory pattern of the log movement. More particularly, the portion **78** serves to prevent the entrapment of smaller diameter logs at the location indicated generally as **80** in FIGS. **3** and **8**, which entrapment might otherwise occur in the event that a small diameter log at said location were followed by a succession of larger diameter logs in the circulatory pattern. The portion **78** performs this function due to its location above the center of the drum **10**, its length transversely of the drum **10** and its angle relative to the surface **74**. The actual length of the portion **78** and said angle thereof will, of course, vary in different embodiments of the invention dependent upon the nature of the logs to be debarked and the size and capacity of the drum **10**. However, as shown in FIG. **8** wherein the inner and outer positions of the rotating eccentric parts of the drum **10** are designated as **82** and **84**, respectively, the angle of the surface **78** relative to the surface **74** may be around 15° and preferably is between 12° and 25°. The remaining portion **86** of the lower side of the anvil **66** preferably slopes upwardly from the portion **74** and may be of substantially any desired configuration not interfering with the transverse log circulation and providing the anvil **66** with appropriate strength and stiffness.

As shown in FIG. **9**, the lower side of the anvil **66** may be provided with ribs **88** or other means adapted for facilitating log movement longitudinally through the debarking section **16**, the ribs **88**, as illustrated, being located at intervals along such anvil lower side.

Throughout the operation of the debarking apparatus, the drum **10** and its carried debarking tools **56** are rotatably driven relative to the anvil **66** at a relatively high rotary speed (for example 20 to 100 revolutions per minute) by the motor **30**. The logs **44** to be debarked may be either continuously or intermittently supplied by the conveyor **42** through the supply chamber **38** in the supply section **32** to the inlet section **14** of the rotating drum **10** and the debarked logs **54** are discharged from the discharge end **16** of the drum **10** to the discharge chute **52** through the discharge chamber **48** in the discharge section **34**.

Internally of the debarking section **16** of the rotating drum **10**, the tools **56** debark the logs by applying high intensity, hammer-like impacts thereto and also cause rotation and the beforedescribed transverse circulation of the logs. The tools **56**, due to their arrangement, moreover, readily debark irregularly shaped logs while, as the logs are maintained at least substantially parallel to the drum axis, wood losses due to brooming are substantially minimized. The anvil **66** controls the transverse circulatory velocity of the logs and the transverse pattern of log flow, thereby maximizing the debarking effect by maintaining maximum relative velocity between the tools **56** and the logs and maximizing the forces between the tools **56** and the adjacent logs. The anvil **56**, moreover, prevents logs from entering the space **70** and insures uniform flow free from interference by the formation of log structures at **80**. The bark removed from the logs in the debarking section **16** is rapidly discharged therefrom by the bark discharge openings **20**, thereby preventing the bark from interfering with the bark removal processes; and the entire debarking process, including the debarking of frozen logs, can be performed without the necessity for thawing.

From the preceeding description it will be seen that the invention provides new and improved means for accomplishing of the beforestated objects and advantages. It will be understood, however, that although only two embodiments of the invention have been illustrated and hereinbefore specifically described, the invention is not limited merely to these embodiments, but rather contemplates other embodiments and variations within the scope of the following claims.

Also, it will be further understood that the apparatus of the invention could be employed for both delimbing and debarking of appropriate species of trees.

I claim:

1. Debarking apparatus comprising drum means, anvil means inside of said drum means operatively associated therewith for restricting log movement with said drum means during the rotation of said drum means, said drum means being rotatable relative to said anvil means, and debarking tool means carried by said drum means within said drum means for applying high unit pressure, localized impact blows to logs in said drum means during the rotation thereof, said debarking tool means being accurately contoured on all working sides.

2. Debarking apparatus according to claim **1**, wherein said anvil means is adapted to create transverse log circulation in said drum means and to cause logs to roll downwardly across the free surface of a therebelow log pile.

3. Debarking apparatus according to claim 1, wherein said anvil means is adapted to control the relative velocity of said debarking tool means and logs in said drum means during rotation of said drum means.

4. Debarking apparatus according to claim 1, wherein said anvil means is adapted to prevent build-up of log structures adjacent to said drum means.

5. Debarking apparatus according to claim 1, wherein said debarking tool means comprises tool element means eccentric to said drum means.

6. Debarking apparatus according to claim 1, wherein said debarking tool means comprises tool element means arranged at least generally circumferentially of said drum means at locations spaced longitudinally thereof.

7. Debarking apparatus according to claim 6, further comprising said tool element means being eccentric at said spaced locations.

8. Debarking apparatus according to claim 1, wherein said debarking tool means comprises a plurality of individual tool elements at locations spaced longitudinally and circumferentially of said drum means.

9. Debarking apparatus according to claim 8, wherein said tool elements each are, longitudinally of said drum means, only a minor portion of the length of logs to be debarked.

10. Debarking apparatus according to claim 8, further comprising mounting means extending at least generally circumferentially of said drum means at locations spaced longitudinally thereof mounting said tool elements on said drum means, said anvil means including portions projecting intermediate adjacent ones of said mounting means.

11. Debarking apparatus according to claim 1, wherein said debarking tool means comprises a plurality of sets of tool elements extending at least generally circumferentially of said drum means at locations spaced longitudinally thereof.

12. Debarking apparatus according to claim 11, wherein said sets of tool elements include sets thereof eccentric to said drum means.

13. Debarking apparatus according to claim 12, wherein said sets of tool elements include sets thereof eccentric to one another.

14. Debarking apparatus according to claim 11, wherein said sets of tool elements each extend around only a portion of said drum means.

15. Debarking apparatus according to claim 14, wherein adjacent ones of said sets of tool elements overlap circumferentially of said drum means.

16. Debarking apparatus according to claim 14, wherein adjacent ones of said sets of tool elements extend around successive portions of the circumference of said drum means.

17. Debarking apparatus according to claim 16, wherein adjacent ones of said sets of tool elements overlap circumferentially of said drum means.

18. Debarking apparatus according to claim 14, wherein said sets of tool elements include sets thereof eccentric to one another.

19. Debarking apparatus according to claim 12, further comprising arcuate mounting means mounting said tool elements on said drum means, said anvil means including portions projecting between adjacent ones of said mounting means.

20. Debarking apparatus according to claim 1, wherein said anvil means is non-rotatable at least during normal operation of the apparatus.

21. Debarking apparatus according to claim 1, wherein said anvil means extends longitudinally through said drum means and is supported at opposite ends thereof.

22. Debarking apparatus according to claim 21, wherein said drum means is at least generally horizontal and said anvil means is in the upper half of said drum means.

23. Debarking apparatus according to claim 1, wherein said anvil means includes an at least generally downwardly facing anvil surface.

24. Debarking apparatus according to claim 23, wherein said anvil surface is adapted to control the relative velocity of said debarking tool means and logs in said drum means during rotation of said drum means.

25. Debarking apparatus according to claim 23, wherein said anvil surface is adapted to create transverse log circulation in said drum means and to cause logs to roll downwardly across the free surface of a therebelow log pile.

26. Debarking apparatus according to claim 23, wherein said anvil surface is adapted to prevent build-up of log structures adjacent to said drum means.

27. Debarking apparatus according to claim 1, wherein said anvil means includes first and second at least generally downwardly facing anvil surfaces, said first anvil surface being adapted to control the relative velocity of said debarking tool means and logs in said drum means during rotation of said drum means, said first anvil surface also being adapted to create transverse log circulation in said drum means and to cause logs to roll downwardly across the free surface of a therebelow log pile, and said second anvil surface being adapted to prevent build-up of log structures adjacent to said drum means.

28. Debarking apparatus according to claim 27, wherein said second anvil surface is angled relative to said first anvil surface.

29. Debarking apparatus according to claim 27, further comprising mounting means extending at least generally circumferentially of said drum means at locations spaced longitudinally thereof mounting said debarking tool means on said drum means, said anvil means including portions intermediate adjacent ones of said mounting means, and said second anvil surface being on said projecting portions of said anvil means.

30. Debarking apparatus according to claim 1, further comprising means associated with said anvil means for facilitating log movement longitudinally through said drum means.

31. Debarking apparatus according to claim 30, wherein said log movement facilitating means comprises rib means carried by said anvil means.

32. Debarking apparatus according to claim 1, further comprising means adjacent one end of said drum means providing a supply chamber communicating with such end of said drum means for supplying logs thereto, said supply chamber including at least a portion progressively increasing in cross-section as it extends towards said drum means end.

33. Debarking apparatus according to claim 1, further comprising means adjacent one end of said drum

means providing a discharge chamber communicating witth such end of said drum means for discharging logs therefrom, said discharge chamber including at least a portion progressively decreasing in cross-section as it extends from said drum means end.

34. Debarking apparatus according to claim **1**, further comprising means adjacent one end of said drum means providing a supply chamber communicating with such one end of said drum means for supplying logs thereto, said inlet chamber including at least a portion progressively increasing in cross-section as it extends towards said one end of said drum means, and means adjacent the other end of said drum means providing a discharge chamber communicating with such other end of said drum means for discharging logs therefrom, said discharge chamber including at least a portion progressively decreasing in cross-section as it extends from said other end of said drum means.

35. Debarking apparatus according to claim **34**, wherein at least one of said mentioned chamber providing means is non-rotatable during rotation of said drum means.

36. Debarking apparatus according to claim **1**, wherein said debarking tool means comprises a plurality of sets of tool elements extending at least generally circumferentially of said drum means at locations spaced longitudinally thereof, said sets of tool elements each extend around only a portion of said drum means, said sets of tool elements include sets thereof eccentric to one another and sets thereof eccentric to said drum means, said drum means is at least generally horizontal, and said anvil means extends through the length of said drum means and includes an at least generally downwardly facing anvil surface throughout the length of said drum means.

37. Debarking apparatus according to claim **36**, wherein adjacent ones of said sets of tool elements extend around successive arcuate portions of said drum means.

38. Debarking apparatus according to claim **36**, wherein successive ones of said sets of tool elements overlap circumferentially of said drum means.

39. Debarking apparatus according to claim **36**, further comprising annular mounting rings mounting said tool elements on said drum means, said anvil means at intervals along its length including portions projecting intermediate adjacent ones of said mounting rings.

40. Debarking apparatus according to claim **39**, wherein said anvil means is in the upper half of said drum means and is normally non-rotatable during operation of the apparatus.

41. Debarking apparatus comprising drum means and debarking tool means carried by said drum means within said drum means, said debarking tool means comprising a plurality of sets of tool elements extending at least generally circumferentially of said drum means at locations spaced longitudinally of said drum means, and said sets of tool elements each extending around only a portion of the circumference of said drum means.

42. Debarking apparatus according to claim **41**, wherein adjacent ones of said sets of tool elements extend around successive segments of the circumference of said drum means.

43. Debarking apparatus according to claim **42**, wherein adjacent ones of said sets of tool elements overlap circumferentially of said drum means.

44. Debarking apparatus according to claim **41**, wherein said sets of tool elements include sets thereof eccentric to one another.

45. Debarking apparatus according to claim **41**, wherein said sets of tool elements include sets thereof eccentric to said drum means.

46. Debarking apparatus according to claim **45**, wherein adjacent ones of said sets of tool elements extend around successive portions of the circumference of said drum means and overlap circumferentially of said drum means.

47. Debarking apparatus according to claim **46**, wherein said tool elements are arcuately contoured on all working sides.

48. Debarking apparatus comprising drum means, a plurality of debarking tool elements carried by said drum means within said drum means for applying high unit pressure, localized impact blows to logs in said drum means during rotation thereof, said debarking tool elements being accurately contoured on all working sides, and anvil means inside of said drum means for controlling the relative velocity of said debarking tool elements and logs in said drum means during rotation of said drum means, said drum means being rotatable relative to said anvil means.

49. Debarking apparatus according to claim **48**, wherein said anvil means is non-rotatable at least during normal operation of the apparatus, and said debarking tool elements are at locations spaced longitudinally and circumferentially of said drum means.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,807,470 Dated April 30, 1974

Inventor(s) Douglas L. G. Young

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 2, line 43, cancel "shapped" and substitute ----shaped----
Column 3, line 16, cancel "posess" and substitute ----possess----
lines 28-30, cancel "for applying high unit pressure, localized impact blows to logs in said drum means during the rotation thereof"
line 32, immediately before the comma, insert ----for applying high unit pressure, localized impact blows to logs in said drum means during the rotation thereof----
line 34, cancel "shapped" and substitute ----shaped----
line 54, cancel "avnil" and substitute ----anvil----
Column 4, line 42, cancel "wise"
Column 5, line 23, cancel "eights" and substitute ----eighths----
line 67, cancel "justaposed" and substitute ----juxtaposed----
Column 8, line 38, cancel "preceeding" and substitute ----preceding----
line 60, cancel "accurately" and substitute ----arcuately----
Column 10, line 47, immediately after "portions" insert ----projecting----
Column 12, line 38, cancel "accurately" and substitute ----arcuately----

Signed and Sealed this

twenty-sixth Day of *August 1975*

[SEAL]

Attest:

RUTH C. MASON
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents and Trademarks