April 12, 1966 D. W. SHIELDS 3,245,443

MULTI-ARM DEBARKER

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Fig. 1

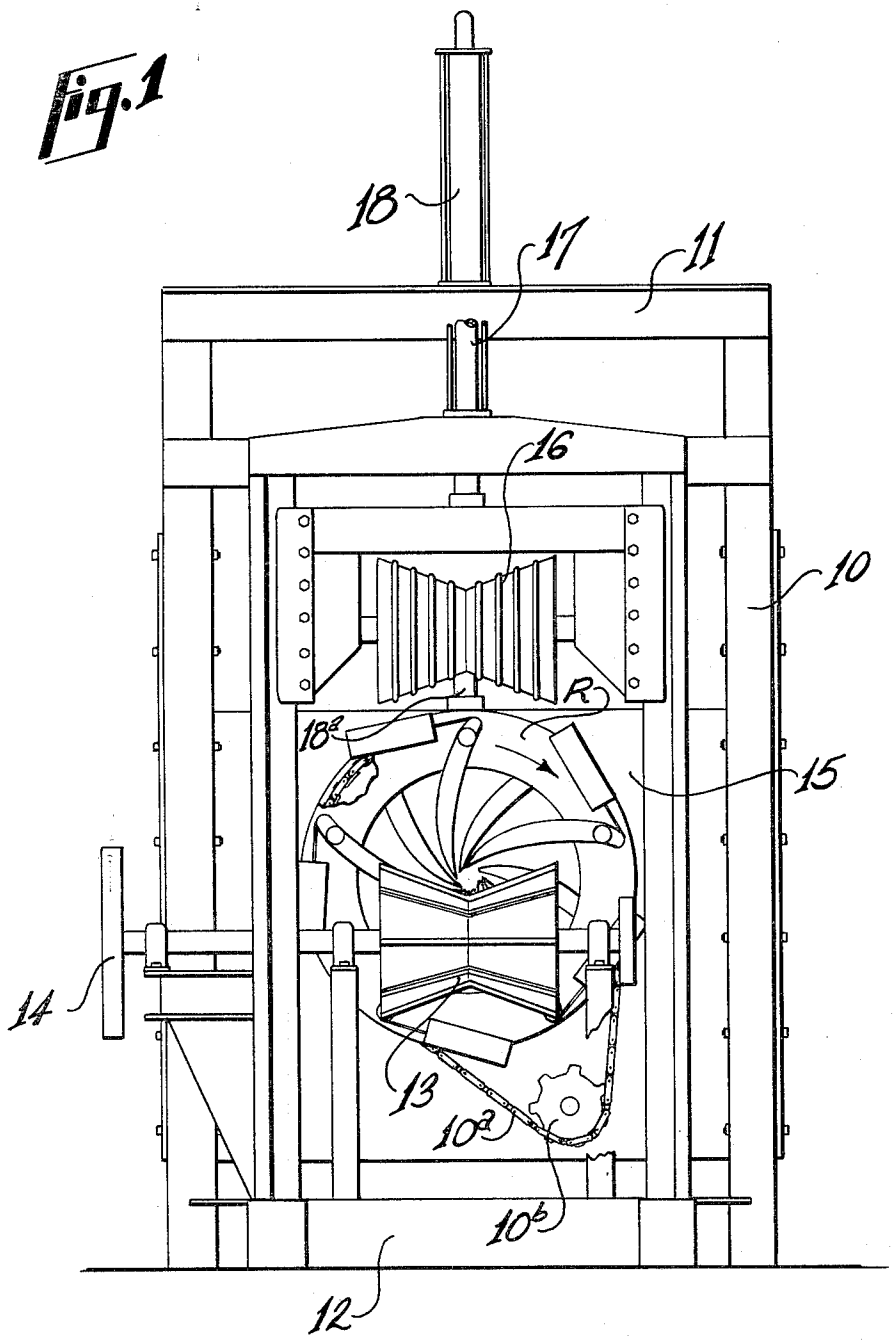

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Fig. 3

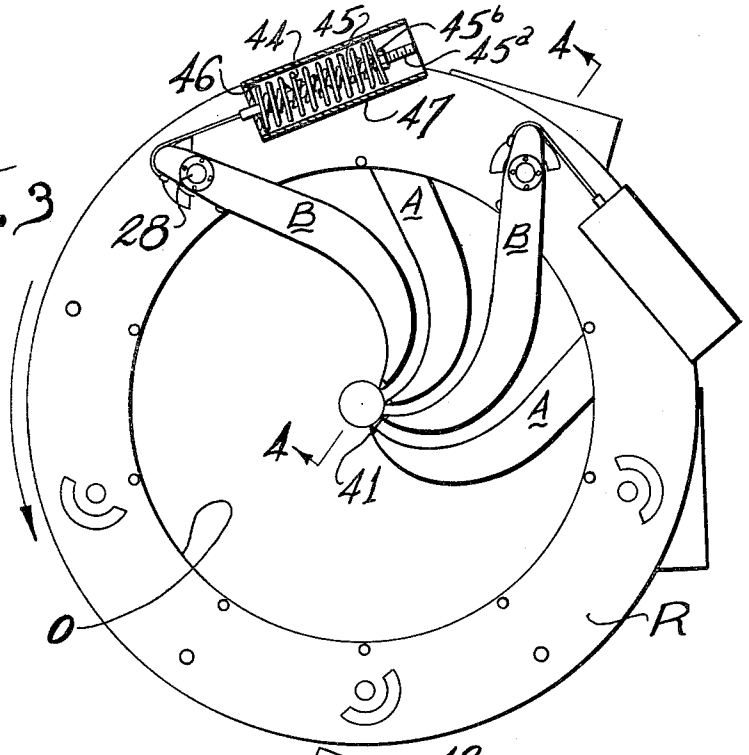
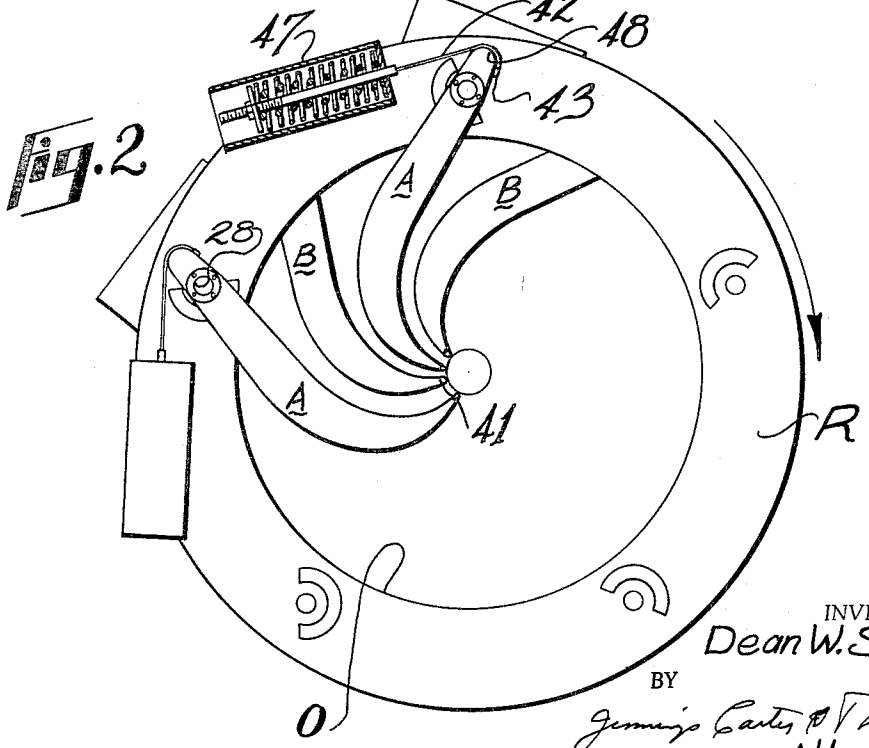


Fig. 2



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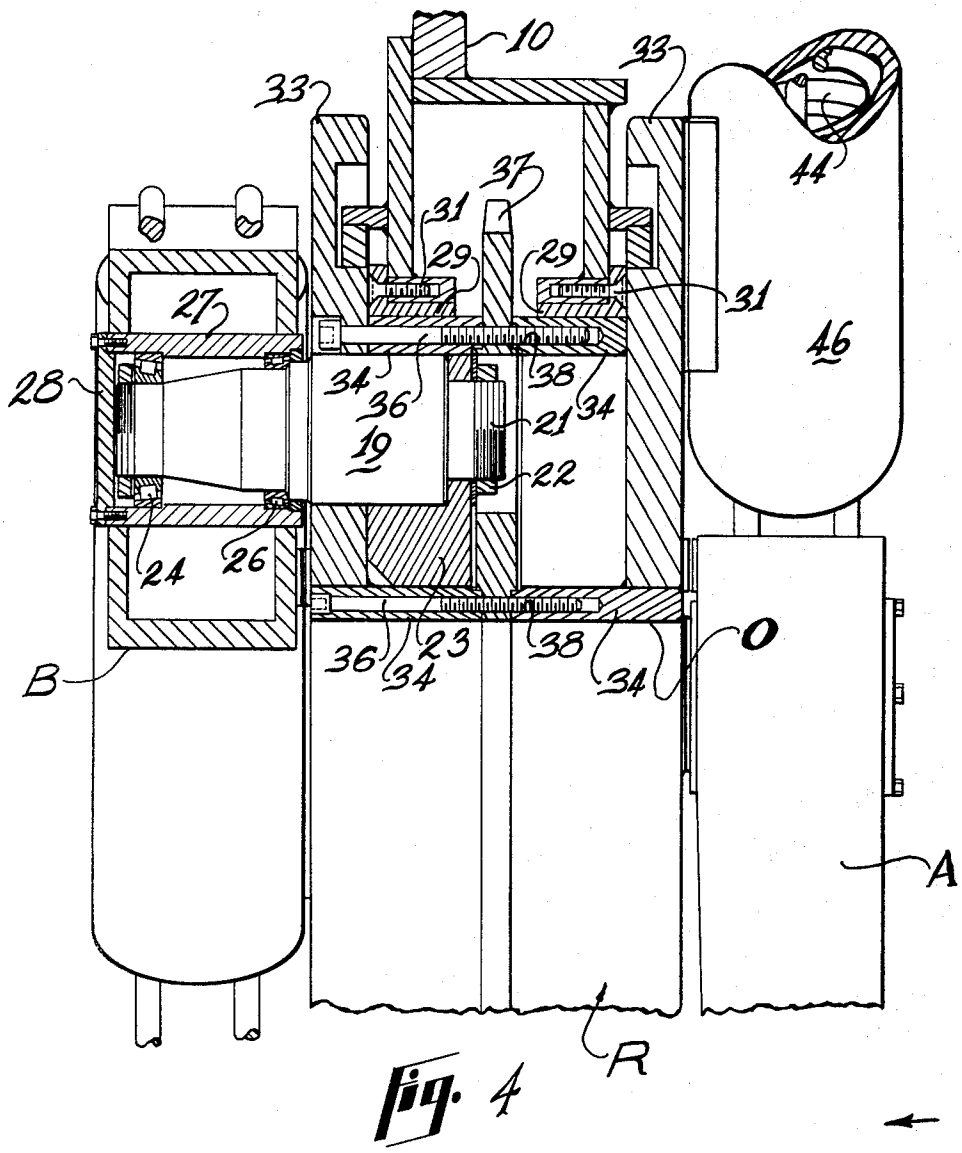

Fig. 4

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MULTI-ARM DEBARKER

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7 Claims. (Cl. 144—208)

This invention relates to apparatus for debarking logs and specifically to the general type of debarker known as a rotary ring machine.

In this art two of the principal shortcomings of present ring type debarkers are low debarking capacity and incomplete debarking. These limitations are principally related to inability to cause more than a certain amount of debarking contact of the tools in unit time. That is, due to the geometry of the log shape and because every practical debarker must take logs within a range of sizes, the tools should not exceed more than 3½ inches in length, that is, axially of the log. As heretofore constructed tool arms have been mounted on the ring so that all the tools lie in a common plane. Thus, when the ring rotates about an axially moving log the path of contact of the tools on the log in effect is a spiral. Since the length of cut is limited by the tool length and since the speed of the ring is limited by practical considerations involving power, tool chatter, centrifugal force, etc., the area of surface contact and hence the amount of bark removed in unit time is limited. Simply speeding up the rate of movement of the log through the machine with present debarkers is not the answer to the problem. Increased speed results in incomplete debarking or, "barber pole" cutting of the bark from the surface of the log, or both.

In view of the foregiong the prime object of my invention is to provide an improved log debarker in which a plurality of tools, rotating in different planes axially spaced along the log, engage the bark at different axially spaced positions thereon, whereby the speed of the log may be increased while at the same time insuring the complete removal of the bark.

Another object of my invention is to provide a rotary ring debarker having at least two sets of debarking arms carrying debarking tools, the arms preferably being mounted on opposite sides of the ring, whereby, when desired, the set of tools on the infeed side of the ring may be biased into contact with the log with greater force than the tools on the outfeed side, permitting what might be called a "hard" cut on the infeed side and a "finish" cut on the outfeed side.

A further and more specific object of my invention is to provide a debarker of the character designated in which the sets of arms on either side of the ring are equiangularly spaced relative to the arms on the other side, resulting in an extremely compact arrangement and one which is substantially dynamically balanced.

Apparatus illustrating features of my invention is shown in the accompanying drawing forming a part of this application, in which:

FIG. 1 is an elevational view looking at the machine from the infeed side;

FIG. 2 is an enlarged view of the ring completely removed from the apparatus and also looking at the same from the infeed side, some of the debarker arms being omitted;

FIG. 3 is a view of the ring from the outfeed side, some of the debarker arms being omitted; and,

FIG. 4 is an enlarged detail sectional view taken generally along line 4—4 of FIG. 3.

Referring now to the drawings for a better understanding of my invention I show in FIG. 1 in somewhat diagrammatic form a log debarker embodying a main vertical frame **10** together with cross members **11** at the top and **12** at the bottom. Rotatably mounted as will later be explained in a vertically movable frame **15** is the debarking ring R which carries several sets of tool arms as also will be explained more in detail. The ring is driven by a chain **10a** from a driven sprocket **10b**. Feed works for moving the log axially through the ring includes the lower roll **13** which is driven from a pulley **14** from any suitable source of power, not shown, and the upper hold-down roll **16**. The roll **16** may be moved downwardly under the influence of a hydraulic cylinder **17**, to rest on top of the log and hold it down. It will be understood that the ring itself is mounted in the framework **15** which may be raised and lowered through a hydraulic cylinder **18**, the piston rod of which is indicated at **18a**, whereby it may be centered relative to any given size log being passed through the apparatus. It will be understood that the ring is driven in the direction of the arrows in the several figures.

By and large, the structure so far described is old in the art. My invention consists in the construction of the ring itself and the provision of multiple sets of debarking arms on each side thereof as will now be described.

Referring particularly to FIG. 4 it will be seen that the dbearking arms A on the infeed side and the debarking arms B on the outfeed side are journaled on stub shafts **19**. Since each mounting is identical, a description of one will suffice. More in detail, the shafts **19** have shank portions **21** which are secured by nuts **22** to an annular member **23** forming a part of the ring. Bearings **24** and **26** are provided for mounting the hub **27** of each arm rotatably on the shaft **19**. A plate **28** covers the end of the hub **27**. It will further be noted that the ring is substantially duplicated on either side of the vertical center line thereof as viewed in FIG. 4. Thus, at **29** there are annular, L-shaped bearing members of brass or the like which are secured by screws **31** into a portion of the vertically movable frame **15** of the debarker. Front and rear face plates **33** of the ring are welded to concentric annular members **34** and these in turn are secured by a plurality of bolts **36** to the annular central portion of a sprocket **37**. The bolts **36** pass through openings **38** in drive sprocket **37**. The ring of course has a centrally disposed log passing opening O.

From the construction shown in FIG. 4 it will be seen that when the ring is assembled and the bolts **36** pulled up, the sprocket is secured to the ring proper. Power applied to the sprocket **37** through sprocket **10b** rotates the entire ring in the L-shaped bearing members **29**.

The arms A are mounted identically with the arms B and the description of the same is not deemed necessary. However, as shown in FIGS. 2 and 3 it will be seen that the sets of arms A and B are equiangularly spaced relative to each other on their respective sides of the ring so that the ring is dynamically balanced.

It will be understood that the arms A and B carry tools **41** which are adapted to engage a log passing axially through the center of the apparatus. As before stated, the desirable limit of these tools in length is about 3½ inches.

I preferably employ the means shown in my copending application, Serial No. 225,634, now Patent No. 3,128,806 filed September 24, 1962, "Arm Biasing Construction for Ring Type Debarkers," for biasing the arms toward the log. Briefly, this means comprises a flexible member such as a cable **42** which is anchored generally in the region **43** to each of the tool arms A or B, outwardly of the pivot points thereof. The flexible member is secured at its other end to a rod **45** having a threaded end **45a**. A compression spring **44** has one end resting against a wall **46** of a housing **47** which is mounted to the side of the ring. A nut and washer combination **45b**

is provided so that compression on the springs and hence the tool force may be adjusted and varied within wide limits. The nose 48 of each arm is so contoured as to compensate for the decrease in pressure of the spring 44 due to travel thereof, centrifugal force, tool arm movement, etc., all as is disclosed in the aforesaid application. Suffice it here to say that the arms A and B are each provided with individual adjustable means for biasing the tools 41 thereof into engagement with the log to be debarked.

From what has been described it will be seen that with a debarker constructed in accordance with my invention the ring R is provided with two complete sets of debarking arms spaced axially along the length of the log. Therefore, when a log starts into the debarker on the infeed side the arms A first engage the bark and as the log progresses through the ring the set of arms B on the outfeed side in turn engage the log. In view of the fact that on the common ring there are two sets of axially spaced arms I am enabled to increase the rate of feed of the log axially quite materially over what has been possible in the past. Furthermore, the second set of arms B assure complete removal of the bark even though some of it may not have been removed at all by the first set A, or only partly loosened from the log by the first set.

As a specific example of speeds at which my improved debarker has successfully operated, I cite the following:

With a debarker capable of taking logs up to 22 inches in diameter, having ten arms, that is, five to each side, I have successfully passed 22 inch diameter logs through the same at 250 feet per minute. In this instance the ring was rotating at a speed of 125 r.p.m., giving in effect 750 feet per minute travel of the tools on the surface of the log. With such a ten arm machine the tools on the arms A and B were spaced axially apart approximately 18 inches on center. Imperically, I have determined that the ring speed should be about 1.53 times the rate of axial feed of the log if the log is to be passed through the machine at any rate above 150 feet per minute. In other words, if the log is fed at a greater rate than 150 feet per minute with the double sets of arms, ten in number, the speed ratio of approximately 1.53 must be observed or otherwise the bark is likely to be cut from the log in "barber pole" fashion, leaving some bark on the log.

Further in connection with the double sets of arms and tools, by the adjustment afforded by the springs, I have found it desirable under some circumstances to use tool loadings on the arms A on the order of about 500 pounds whereas on the outfeed arms B tool pressures on the order of 250 pounds are desirable. For instance, when debarking soft woods such as balsam spruce, soft maple and the like, I prefer to increase the tool force on the infeed side over that imposed on the tools on the outfeed side. Again, when debarking frozen logs I have found it desirable to use more pressure on the infeed arms than on the outfeed arms, if debarking at the speeds set forth above. Also, when debarking dried woods and in order to run my improved apparatus at full capacity, I have found it desirable under some circumstances to use the same or different tool pressures on the infeed and outfeed arms. Thus, these pressures may be from around 750 pounds on both sets of arms; or as much as 750 pounds on the infeed arms A only and as little as 250 pounds on the outfeed arms B. Settings to suit the particular debarking situation thus are readily available with my improved machine.

From the foregoing it will be apparent that I have devised an improved, high capacity, multi-arm debarker. The multiple sets of arms, operating in axially spaced planes, afford an opportunity for high speed, complete debarking which cannot be obtained in machines equipped with only a single set of arms operating in a common plane. It appears that at such high rates of feed of the logs, the first set of arms many times in effect will loosen the bark without completely removing it. Upon being contacted by the second set the bark is completely removed. As has been stated, the speed at which these debarker rings can be run is limited by many considerations. Even if increased speeds were practical simply to speed up the ring of a debarker equipped with a single set of arms, in combination with feeding the log faster through the machine, will not completely remove the bark. By the addition of the second set of arms, spaced axially from the first set, I am enabled to run the ring at optimum speed, to feed the log through the machine at maximum speed, and to achieve the final and desirable end result of debarking the log completely. The low speed at which I am able to operate the ring eliminates the chatter of the tools, prevents the tools from skipping bark when passing over knots and the like, and otherwise has all of the advantages heretofore pointed out.

While I have shown my invention in but one form, it will be obvious to those skilled in the art that it is not so limited, but is susceptible of various changes and modifications without departing from the spirit thereof, and I desire, therefore, that only such limitations shall be placed thereupon as are specifically set forth in the appended claims.

What I claim is:

1. In a log debarker of the rotary ring type,
   (a) a tool arm ring having a central log passing opening,
   (b) means mounting the ring for rotation, and
   (c) sets of debarker tool arms pivotally mounted on opposite sides of the ring and effective to engage a log passing through the ring opening.

2. In a rotary ring log debarker,
   (a) a rotary driven tool arm carrying ring having a centrally located opening for passing an axially moving log, and
   (b) separately mounted independently acting sets of tool arms pivotally secured to opposite sides of the ring, whereby as a log is passed through the ring both sets of arms operate upon the log simultaneously in axially spaced positions on the log.

3. For use as a bark removing element of a log debarker,
   (a) a ring adapted for rotation in a substantially vertical plane and having a centrally disposed log passing opening therethrough,
   (b) separate and independently operable sets of debarking arms disposed on opposite sides of the ring, and
   (c) means pivotally mounting the sets of arms to the ring at points lying on circles of substantially equal radius from the center of the ring, and the centers of said pivots of each set of arms being substantially equiangularly spaced relative to the centers of the arm pivots of the other set.

4. A debarker ring as set forth in claim 3 in which the ring includes a power transmitting connection between the two sets of debarker arms.

5. The debarker ring as set forth in claim 3 in which a peripherally extending drive sprocket is secured to the ring between the two sets of arms.

6. In a log debarker,
   (a) a first plurality of separately operable debarking tool arms,
   (b) debarking tools on the arms operable to contact and remove bark from a log moving relatively axially with respect to the tools,
   (c) a plurality of other tool arms carrying debarking tools spaced axially of the log from the first plurality of arms, and
   (d) means mounting the spaced tool arms for rotation about the log, whereby bark is simultaneously removed from the surface of the log at a plurality of places along the axis thereof by said tools rotating in axially spaced planes.

7. In a log debarker,

(a) a rotary tool arm ring having a central opening therethrough for passing a horizontally disposed axially moving log,

(b) a set of independently operable debarker arms pivoted to the ring on the infeed side thereof,

(c) a second set of arms similar to the first named set pivoted to the ring on the outfeed side thereof,

(d) log engaging debarking tools on the arms,

(e) separate means on each set of arms to bias the tools carried thereby into contact with a log in the apparatus, and

(f) means independently to adjust the force supplied to the log by the two sets of arms, whereby the tool force exerted by the arms on the outfeed side may be different than that exerted by the arms on the infeed side of the ring.

No references cited.

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