Oct. 7, 1958 N. G. LEFFLER 2,855,010

BARKING MACHINE HAVING CENTRIPETALLY BIASED SCRAPERS AUTOMATICALLY SWUNG TO BARK-REMOVING POSITIONS BY AN ONCOMING LOG

Filed Oct. 31, 1952 4 Sheets-Sheet 1

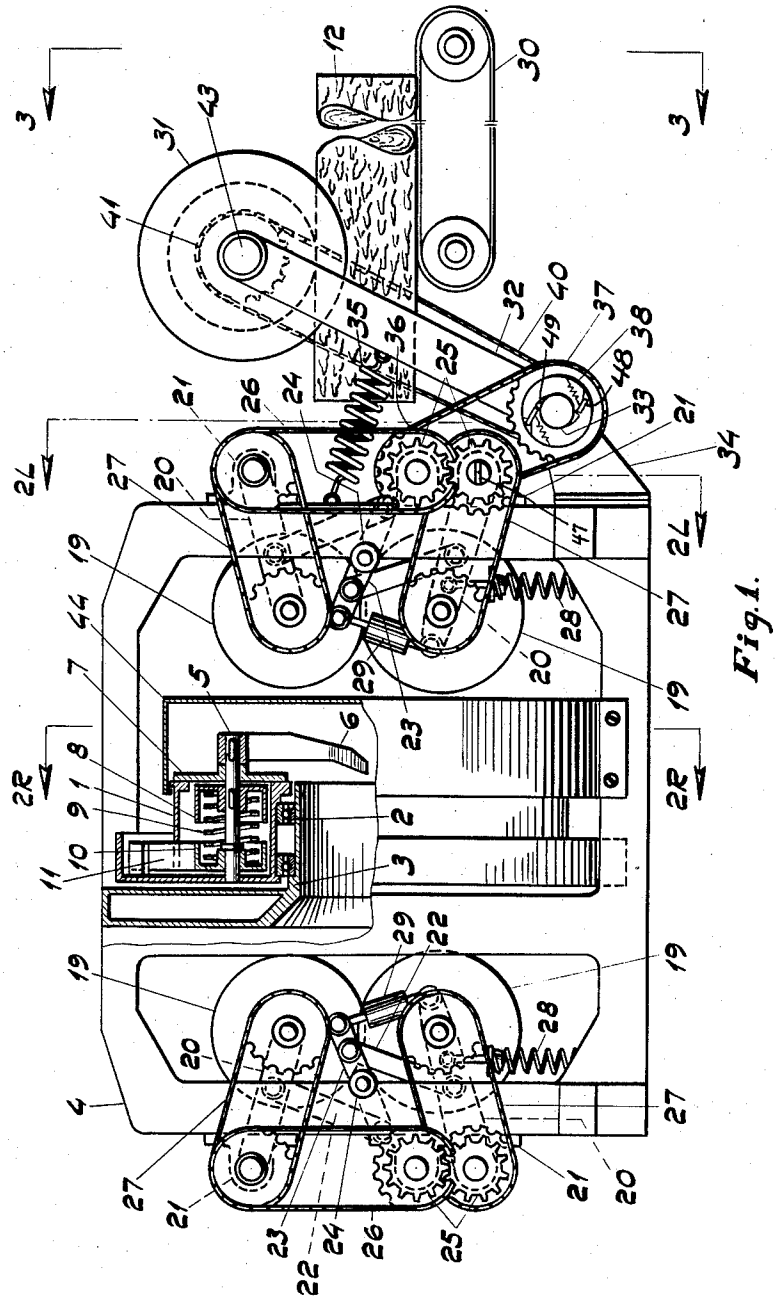


Fig. 1.

INVENTOR.
Nils Gustav Leffler
BY
Pierce, Scheffler & Parker
attys

Oct. 7, 1958 N. G. LEFFLER 2,855,010

BARKING MACHINE HAVING CENTRIPETALLY BIASED SCRAPERS AUTOMATICALLY SWUNG TO BARK-REMOVING POSITIONS BY AN ONCOMING LOG

Filed Oct. 31, 1952 4 Sheets-Sheet 2

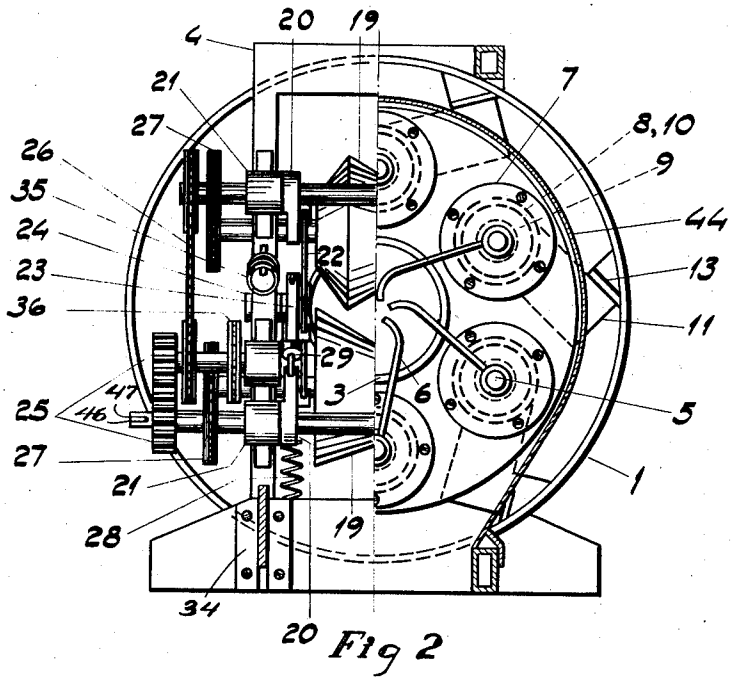


Fig 2

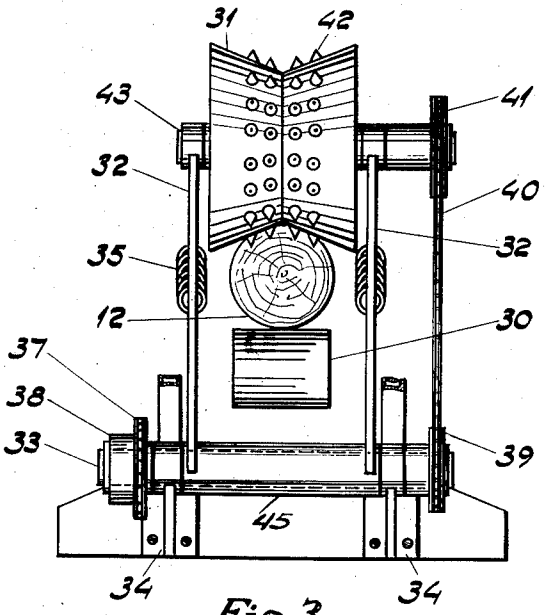


Fig 3

INVENTOR.
Nils Gustav Leffler
BY
Pierce, Scheffler & Parker
attys

Oct. 7, 1958 N. G. LEFFLER 2,855,010

BARKING MACHINE HAVING CENTRIPETALLY BIASED SCRAPERS AUTOMATICALLY SWUNG TO BARK-REMOVING POSITIONS BY AN ONCOMING LOG

Filed Oct. 31, 1952 4 Sheets-Sheet 3

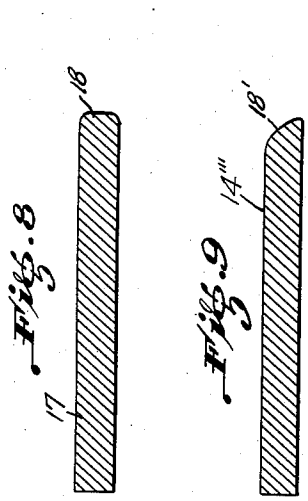


Fig. 8

Fig. 9

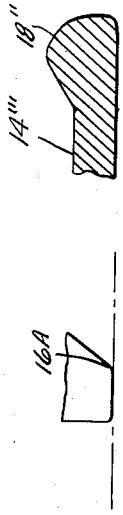


Fig. 11

Fig. 10

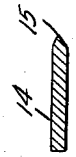


Fig. 6

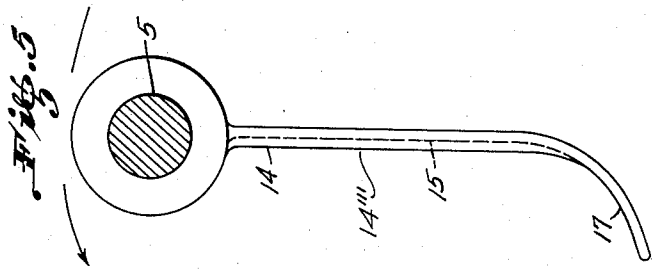


Fig. 5

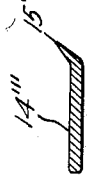


Fig. 7

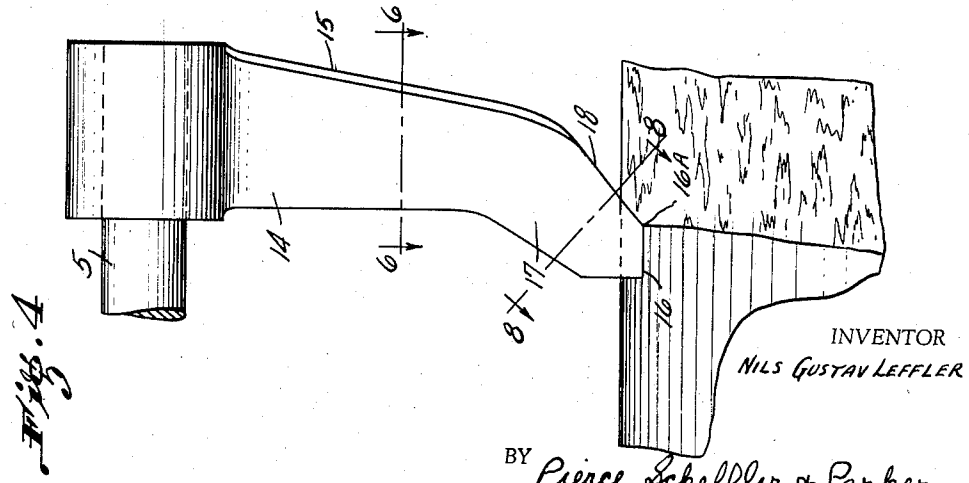


Fig. 4

INVENTOR
NILS GUSTAV LEFFLER

BY Pierce, Scheffler & Parker
ATTORNEYS

Oct. 7, 1958 N. G. LEFFLER 2,855,010

BARKING MACHINE HAVING CENTRIPETALLY BIASED SCRAPERS AUTOMATICALLY SWUNG TO BARK-REMOVING POSITIONS BY AN ONCOMING LOG

Filed Oct. 31, 1952 4 Sheets-Sheet 4

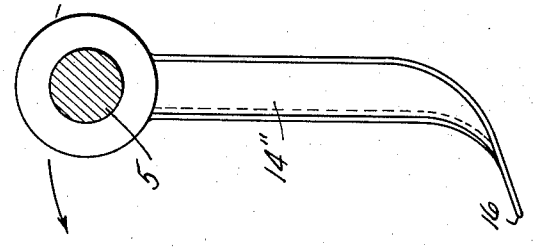


Fig. 15

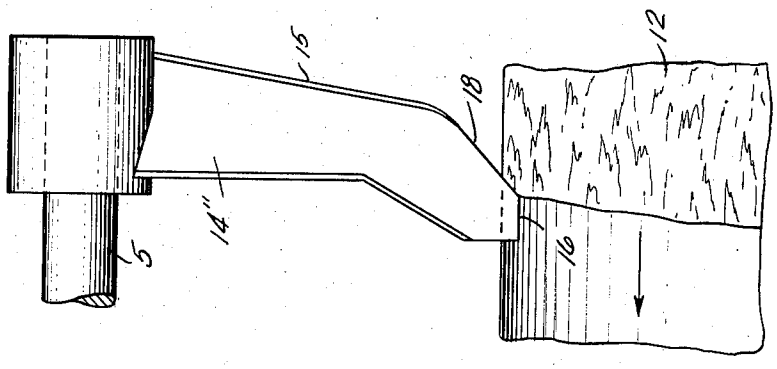


Fig. 14

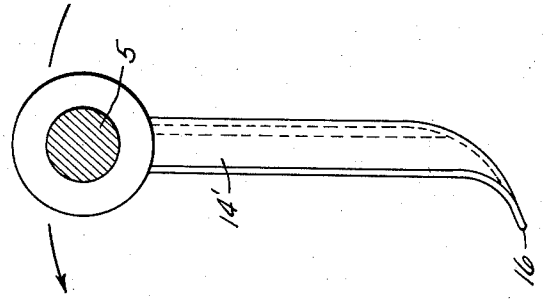


Fig. 13

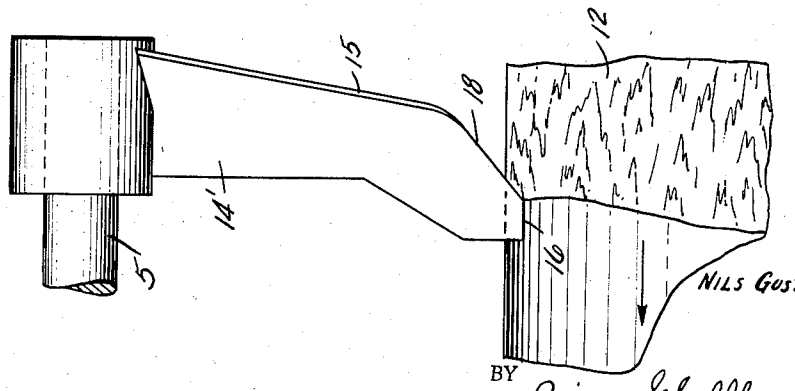


Fig. 12

INVENTOR
NILS GUSTAV LEFFLER

BY Pierce, Scheffler & Parker
ATTORNEYS

United States Patent Office 2,855,010 Patented Oct. 7, 1958

2,855,010

BARKING MACHINE HAVING CENTRIPETALLY BIASED SCRAPERS AUTOMATICALLY SWUNG TO BARK-REMOVING POSITIONS BY AN ONCOMING LOG

Nils Gustav Leffler, Sundsbruk, near Sundsvall, Sweden, assignor to Svenska Cellulosa Aktiebolaget, Stockholm, Sweden

Application October 31, 1952, Serial No. 317,980

Claims priority, application Sweden November 3, 1951

14 Claims. (Cl. 144—208)

For barking pulp-wood, saw-logs et cetera several machines have been employed. Well-known are the so-called barking drum, in which a great number of logs are treated simultaneously, the bark being removed by the friction of the logs against each other and against the walls of the drum during the rotation of the drum. A relatively good barking result is obtained but several drawbacks exist in connection with this method of barking. For example, the ends of the logs become splintered, and satisfactory chips cannot be obtained therefrom. Furthermore, the drums are expensive and the construction and operation costs are high. They are heavy and cannot possibly be made transportable.

Therefore, in recent years new constructions, such as the Aström barking machine and the Andersson barking machine, have been developed. In both of said types of machine the logs are treated one by one in a considerably smaller machine than the barking drums. In the former machine the bark is rubbed away from the log by means of chains that are held pressed against the log and in the latter machine by means of scraping members. In both machines the barking members are provided on a rotary structure through which the log is fed without rotation.

In using the two last mentioned machines there are considerable drawbacks, too. For each log an "opening operation" has to be performed on the barking members, which as regards the construction involves special mechanical means and which as regards the operation means a special man carrying out said "opening operation." In practice it has, moreover, proved impossible to apply the barking members to the leading end portion of a log's periphery so as to prevent leaving a cuff of bark thereon. Said drawbacks are particularly pronounced in barking short logs, when percentually many opening operations and bark cuffs are involved per cubic unit of timber.

The above drawbacks have been completely eliminated by the following invention, other considerable advantages having been obtained, too. The invention relates to machines in which either the log and/or the barking members are caused to rotate, while subjected to the contact pressure required for the barking, the log and/or the barking members being fed forward at the same time.

The invention will now be described with reference to the drawings, which are to be considered only as illustrating examples of ways in which the invention can be carried into effect and not as limiting the scope of the invention.

Fig. 1 is a side elevation with a portion of the outer casing broken away and parts shown in section so as to reveal the mechanism within the casing,

Fig. 2 is a composite sectional view of the right hand end of the apparatus shown in Fig. 1, the left-hand and right-hand halves, respectively, of Fig. 2 being taken on different planes, as indicated by the section lines 2L—2L and 2R—2R,

Fig. 3 is a detail elevation of the roller conveyor at

the right-hand end of the apparatus shown in Fig. 1 as indicated by the viewing line 3—3,

Fig. 4 is an elevation of the trailing face of one of the barking members,

Fig. 5 is a left-hand elevation of Fig. 4 and shows the trailing edge of the barking member,

Fig. 6 is a cross section of the barking member on the line 6—6 of Fig. 4 and illustrates one form of its log-impactible knife-edge,

Fig. 7 is a cross section corresponding to Fig. 6, but shows a modified barking member having a log-impactible knife-edge that forms an obtuse interior angle with the leading face of the barking member,

Fig. 8 is an enlarged-scale cross section on the line 8—8 of Fig. 4 and shows a log-contacting rounded edge of a bowed portion of the barking member,

Fig. 9 is an enlarged-scale cross section corresponding to Fig. 8 but shows a log-contacting edge having a modified rounded shape,

Fig. 10 is a fragmentary view of the bark-scraping portion of the barking member shown in Fig. 4,

Fig. 11 is an enlarged-scale fragmentary cross section corresponding to Figs. 8 and 9, but shows still another usable shape of the log-contacting edge of the barking member.

Fig. 12 is an elevation of the trailing face and Fig. 13 is an elevation of the left-hand or trailing edge of a barking member having its leading and trailing faces inclined so as to throw the bark in the direction opposite to the direction of movement of the log, and

Fig. 14 is an elevation of the trailing face and Fig. 15 is an elevation of the left-hand or trailing edge of a barking member having its leading and trailing faces inclined so as to throw the bark in the direction of movement of the log.

Figure 1 shows a rotary drum **1**, which is known per se and which by means of bearings **2** is supported for rotation about a horizontal axis by a stationary tube **3**, which in its turn is rigidly secured to a supporting pedestal **4**. In the drum **1**, one or more, for example six, shafts **5** are rotatably mounted, said shafts having their center lines substantially parallel with the axis of rotation of the drum. At one end of each shaft **5** there is secured a scraping member **6** (which will be described more fully later on) or some other suitable barking member located within an annular stationary bark-collecting housing **44**. A circular plate **7** supports one end of each shaft **5** inside the housing **44** and covers a circular opening in one end wall of the drum **1**. A small annular plate member **8** is keyed to the shaft **5** and is actuated by a helical spring **9**. At its other end said spring is secured to a small annular plate member **10**, which is adapted to turn on the shaft **5** and to which also a centrifugal weight **11** is secured.

By means of the aforesaid drum arrangement substantially the following is effected: Upon rotation of the drum the centrifugal weight is thrown outwards to apply torque to the spring **9** by way of the plate member **10**, the spring **9** then yieldably transmitting such torque to the plate **8**, and hence to the shaft **5** and the scraping member **6**, which thus is pressed inwards and against the log **12** to be barked. Due to the fact that the weight actuates the scraping member by way of a spring, the scraping member is more easily movable than if it were secured directly to the weight and it will follow the irregularities of the log even when the number of revolutions of the drum is high. Of course, any type of springs may be used, such as coil springs, arranged for pressing or pulling, torsion springs, flat springs et cetera. The use of helical springs, as shown in the drawing, involves considerable advantages from a constructional point of view. They are easily built into the drum and no additional

means, such as levers or the like, are required for the connection with the scraping member and the counterpoise weight, which means not only a reduced weight but also a small bulk, resulting in an easily movable scraping member.

In order to obtain the required tension of the spring **9** it is not necessary to provide centrifugal weights but, when using such weights, the plate member **10** may be adjusted angularly by means of a mechanical device according to U. S. Patent No. 2,692,623 of which this application is a continuation-in-part.

For damping the counterpoise weight and the scraping member, damping means are built in, preferably one for each. Figure 2 shows damping of the counterpoise weight by means of a rubber block **13**.

Many different types of barking members may be used but the barking member **6**, shown in Figs. 4–6, 8 and 10, and modified forms thereof, shown in Figs. 7, 9 and 11–15 are deemed particularly suitable. In each of Figs. 5, 7, 9 and 11 reference numerals **14'''** marks the leading face of the barking member.

In Figures 4 and 5 that part of the scraping member which is next to the shaft **5** is indicated by **14**. A part or leading edge **15** thereof facing an oncoming log forms an acute angle with a plane which is perpendicular to the axis of rotation of the drum. It could also be said that the angle between the edge **15** and a line lying parallel to the axis of rotation of the drum shall be less than 90°. When the fore end of the log to be barked impacts the leading edge **15** the contact between the log and the scraping member will be established substantially only at that part of the log end which is located next to the periphery of the log. If the scraping member is being revolved around an axially fed log in the direction of the arrow shown in Fig. 5, or if a traveling log is being rotated in the opposite direction, the scraping member will be swung outward or be screwed away from the center of the log. In order to make sure that impactment of the edge **15** of the scraping member by the log **12** will produce such outward swinging movement, said edge should be sharp and may be shaped as a knife according to Figure 6 or, more preferably, as an inclining knife **15'** according to Figure 7. The outward extent of the log-impactible knife-edge is determined by the diameter of the thickest log and the knife-edge should extend a short distance along a bow-shaped or curved portion **17** of the scraping member, as shown in Fig. 4. When said log-impactible edge at the curved portion **17** of the scraping member penetrates the peripheral corner of the butt end of the log, the angular speed of the outwardly-swinging scraping member will be increasing owing to the shown radius of said bow-shaped or curved portion **17** and the scraping edge **16** of the scraping member will be thrown onto the surface of the log. If a log-contacting edge **18** of the curved portion **17** of the scraping member slides into contact with the log, the scraping member is not swung outwardly in the same manner nor for the same reasons as when the portion **14** is impacted by the log. In order that axial movement of the log will not be arrested by its contact with said log-contacting edge **18**, the latter is sloped forwardly from the knife-edge **15** or toward the trailing edge of the scrapers, so that the angle it makes with a line parallel to the axis of rotation of the drum is less than that of the log-impactible edge **15**, which is already mentioned is less than 90°. Hereby an advantageous wedge angle is obtained and the bowed portion **17** is wedged up, so that the scraping edge **16** will move onto the surface of the log, the log-contacting edge **18** and the log sliding relatively to each other; for which reason said edge **18** should be rounded in cross section as shown in Figure 8 or be formed with a clearing angle as shown in a modified log-contacting edge **18'** in Fig. 9. Figures 8 and 9 are shown on a scale which is three times as large as the scale shown in Figure 4. Finally a leading heel portion **16A** of the bark-scraping edge **16** should have a rounded shape when the trailing face of the scraper is viewed in elevation, see Figure 10. Figure 11, finally, shows how the leading edge of the scraper can be formed as an enlarged rounded portion **18''**.

Of course the invention is not limited by the shape of the scraping member described above but may be modified in several ways and still be based on the same inventive idea.

As will be seen from Figures 4 and 5 the leading and trailing faces of the scraping member have planar portions which extend parallel to the pivot axis of the shaft **5**. They may, however, form an angle with said shaft, as shown in Figures 12 to 15. In the embodiment according to Figure 12 the bark is thrown contrary to the feeding direction of the log and in the embodiment shown in Figure 14 it coincides with the feeding direction of the log as a result of the inclination of planar portions of the leading and trailing faces of the scraping members **14'** and **14''** respectively. In all of the embodiments of the edge portion **16** may be parallel with the generatrix of the log or form an angle with the same.

It should also be pointed out that the scraping member according to the invention may be made to possess one or more of the special characteristics set forth above.

The drawing shows the scraping member to be rigidly connected to a hub.

The barking part of the machine has now been described and in addition to said part of the machine is provided with means for feeding the log. Thus, in Figures 1 and 2, **19** are feed rollers mounted on arms **20**, the latter being turnably mounted on brackets **21**. In order that the log shall always be kept at the center the arms **20** are connected to an arm **23** by means of links **22**, said arm being in turn mounted in a bracket **24** secured to the frame. The driving of the rollers may be provided for by a cylindrical gear **25** and a chain drive **26**. Gear **25** may be driven from a power source (not shown) which may be connected to a shaft **46** by a key-groove **47**. The drive between the two feeding mechanisms may be transmitted by means of a chain or, for example, by means of a horizontal shaft, two chain wheels being required in the former case and two mitre gears being required in the latter case. Said details are not shown in the drawing. The drive of the upper and lower rollers is effected by means of chains **27**. The contact pressure is obtained from a spring **28** and the bump arising when the log is leaving the rolls is damped by a shock absorber **29**.

For feeding in the log to the fore feeding mechanism there may be provided a conveyor **30** and/or a roller **31**. The conveyor may be made as a belt conveyor, as shown, or as a roller conveyor in a conventional manner and preferably it is driven at the same peripheral speed as that of the feeding mechanisms. The roller **31** is, however, made in a special way so as to bring about important advantages.

As shown in the drawing the roller **31** is turnably mounted by a shaft **43** bearing in the free ends of two arms **32**, the inner ends of said arms being attached to a sleeve **45** which is turnably mounted on a shaft **33**, which is supported by brackets **34**. The contact pressure of the roller is adjusted by means of a spring **35**, and the degree of compression of the spring should be so chosen that the roller will contact the log with a slight pressure.

The roller **31** may be driven by means of a separate motor or also, as shown in the drawing, from the fore feeding mechanism. A chain wheel **36** is provided on the gear **25** and drives the shaft **33** by way of a chain wheel **37**, which may be connected to an overrunning clutch or ratchet **38**. As shown, the outer part of this clutch is driven by the chain wheel **37** and carries two pawls **48** which cooperate with shoulders **49** on the shaft **33** to rotate the shaft **33** clockwise. On said shaft **33** there is secured a chain wheel **39**, which by way of a chain **40** and a chain wheel **41** drives the roller **31**. The gear ratios may be chosen in such a manner that the

roller **31** is driven at a somewhat lower but certain peripheral speed than are the rollers of the feeding mechanisms, and the overrunning member of the clutch should be arranged in such a manner that it will be in engagement when, by means of the chain driving means, the roller is driven at the above-mentioned certain peripheral speed, but it should admit of the roller being driven at a higher peripheral speed by the log. It is not necessary in this connection to deal more particularly with the construction of the overrunning clutch, because the above-mentioned condition will be obtained by any conventional one-way engaging clutch which automatically transmits torque in one direction of movement but not in the opposite direction.

If the driving of the roller **31** is arranged in this way, said roller will serve as an auxiliary roll, i. e. it will not feed the log except in case the speed of the latter should become reduced for some reason or other, so that its speed will become lower than the certain peripheral speed of the roller. Consequently, the feeding means of the machine will function in the following manner: By means of a device not shown in the drawing a log is placed on the conveyor **30** and by the latter is moved toward the barking members. The log will first meet the roller **31**, and will then simultaneously swing it upward and toward the drum, so that the log is able to pass under the roller. Since the roller is partly balanced by the spring **35** the log and the conveyor will not skid relatively to each other. The roller thus having been moved onto the surface of the log it will be driven by the log, because the speed of the log is greater than the certain peripheral speed at which the roller was driven when not in contact with a log. The contact pressure of the roller against the log will of course also be very low and feeding spikes **42** of the roller will make no marks or markings in the wood that will cause the formation of splinters in the surface of the log, when the barking members are applied.

Next the log meets the rollers **19** of the feeding mechanism. If the log enters directly between the same than no change takes place in the mode of operation of the roller **31**. Should the log, however, be stopped by the rollers **19**, the roller **31** will take over the feeding and will cause the log to enter between the rollers **19**. The contact pressure of the roller **31** on the log will then be dependent on the existing feeding resistance, and it is advantageous that the greater the feeding resistance, the greater will become the feeding component of the contact pressure. It is very easy to predetermine the relation between the horizontal feeding component and the vertical component by choosing a proper initial angle of inclination for the arms **32**. It is advantageous, too, for the contact pressure to increase when debarking thick logs, and this occurs because the arms **32** will be moved to a more vertical position than by thin logs and will correspondingly increase the compression of the spring **35**.

As soon as the log has entered between the fore rollers **19** it will be driven by said rollers at the higher peripheral speed. The feeding component of the contact pressure of the roller **31** on the log will then be reduced to zero or less as before the introduction of the log between the rollers **19**, and the roller **31** will again be rotated by the log.

When the log then meets the scraping members **6**, the same conditions arise as when it met the fore rollers **19**. If said rollers are able to press the log in between the scraping members the roller **31** will not carry out any feeding work but it will begin to drive the log, if the log should slow down or stop. There is no risk of the feeding pressure of the roller **31** becoming so high that parts of the machine would be pressed asunder, because the feeding spikes **42** of the roller are not made so large that they will penetrate into the wood, in case the resistance should become too large.

The roller **31** brings about important advantages. Thus the surface of the wood may easily become damaged by the fore rollers **19** whenever they have to be presented against the log hard enough to cause a high feeding pressure, as when the log has to press the barking members and the back rollers **19** apart. Such damaged areas of the wood would subsequently be increased by the scraping action of the barking members. Furthermore, the log will skid sometimes on the conveyor **30** and will not enter between the fore rollers **19**. By the provision of the roller **31** the contact pressure of the rollers **19** can be low, namely, only such pressure as is required for the barking operation alone. Should the log be slowed down or stopped the roller **31** begins to drive the log in the manner previously mentioned. The damage to the wood which may be caused by said roller can be overlooked because this will only take place along very short parts of the length of the log.,

Of course, it is not necessary that the roller **31** be driven by means of an overrunning clutch. It may be driven directly by a chain drive and at the same peripheral speed as that of the conveyor **30** and of the feed rollers **19**. It will then be feeding all the time with a contact pressure that will be dependent on the feeding resistance.

Finally, it may be pointed out that it may be preferable to combine the present invention with the invention according to the afore-mentioned U. S. Patent No. 2,692,623.

Having now described my invention, what I claim as new and desire to secure by Letters Patent is:

1. An improvement in barking machines of the kind having at least one scraping member mounted in a drum and movable into and out of engagement with a log, said machines having at least one of the two elements, the scraping member and a log, adapted to rotate relatively to the other about the axis of the drum, said improvement comprising a scraping member having a bark-scraping edge at its free end, pivot means for mounting its opposite end on the drum so that the scraping member will swing on an axis which is substantially parallel with the axis of the drum, said scraping member being provided with a log-impactible edge adapted to be hit by a fore end of an oncoming log fed into the machine and to form an angle of less than 90° with a line parallel to the axis of the drum, said log-impactible edge being provided with a sharp edge to penetrate such fore end of an impacting log for the purpose of causing the scraping member, during its relative rotation with respect to an impacting log, to be swung on its pivot axis in such a manner that the free end of the scraping member will climb onto a peripheral surface of an impacting log.

2. Improvements according to claim 1 in which the scraping member comprises a bow-shaped portion and in which the log-impactible sharp edge extends onto said bow-shaped portion of the scraping member in order to increase the angular velocity of the outwardly swinging scraping member so as to cause the free end of the scraping member to be thrown onto such peripheral surface of an impacting log.

3. Improvement according to claim 1, in which the log-impactible sharp edge is wedge-shaped in cross section.

4. An improvement in barking machines as defined in claim 1 in which the log-impactible edge of the scraping member extends forwardly at an obtuse angle from the leading face of the scraping member.

5. An improvement in barking machines as defined in claim 1, in which the scraping member has a curved configuration so as to increase the angular velocity of the outwardly swinging scraping member.

6. An improvement in barking machines as defined in claim 1 in which leading and trailing faces of the scraping members are inclined at an angle to a line parallel to the axis of the drum so as to throw the bark in a direction opposite to the axial direction of movement of a log.

7. An improvement in barking machines as defined in claim 1 in which leading and trailing faces of the scraping members are inclined at an angle to a line parallel to the axis of the drum so as to throw the bark in the axial direction of movement of a log.

8. An improvement in barking machines of the kind having at least one scraping member mounted in a drum and movable into and out of engagement with a log, each of said machines having at least one of the two elements, said scraping member and a log, adapted to rotate relatively to the other about the axis of the drum, said improvement residing in that said scraping member has a bark-scraping edge at its free end and pivot means for mounting its opposite end on the drum so that the scraping member will swing on an axis which is substantially parallel with the axis of the drum, said scraping member being provided with a bow-shaped portion and a log-impactible edge adapted to be hit by a fore end of an oncoming log fed into the machine and to form an angle of less than 90° with a line parallel to the axis of the drum, said log-impactible edge extending onto said bow-shaped portion and being provided with means adapted to penetrate such fore end of an impacting log for the purpose of causing the scraping member, during its relative rotation with respect to an impacting log to be swung on its pivot axis, said log-impactible edge merging at said bow-shaped portion into a log-contacting edge which forms a smaller acute angle with a line parallel to the axis of the drum than does the log-impactible edge for the purpose of facilitating the outward swinging movement of the scraping member when contacted by such fore end of an oncoming log so that the free end of the scraping member will ride onto the peripheral surface of such log.

9. Improvement according to claim 8 in which the log-contacting edge of the scraping member has a rounded shape for the purpose of facilitating relative sliding movement between the scraping member and such fore end of an impacting log.

10. In a log-peeling machine, a bark-scraping device comprising a rotary drum, means to feed logs longitudinally through the drum, arms pivoted to said drum and each provided with a scraping edge, springs actuating said arms to keep them in engagement with a log being peeled, the arms being formed as wings or blades, each of said wings or blades having a concave guide surface for deflecting scraped-off bark, said guide surface facing substantially toward an unbarked portion of a log being peeled, so as to guide such scraped-off bark toward said unbarked portion.

11. In a log-peeling machine, a bark-scraping device

comprising a rotary drum with a radial flange forming a partition, arms pivoted to said flange and each provided with a scraping edge, resilient means forcing said edge into contact with a log being fed through the drum, the arms being located at one side of said partition and the resilient means being located at the other side thereof, whereby said resilient means are protected from bark scraped from such a log.

12. In a log-peeling machine, a bark-scraping device comprising a rotary drum with a radial flange forming a partition, arms pivoted to said flange and each provided with a scraping edge, resilient means forcing said edge into contact with a log being fed through the drum, the arms being located at one side of said partition and the resilient means being located at the other side thereof, the inner edge of said partition being at least as near the axis of said drum as the innermost part of said resilient means, whereby said resilient means are protected from bark scraped from such a log.

13. In a log-peeling machine, a bark-scraping device comprising a rotary drum with a radial flange forming a partition, arms pivoted to said flange and each provided with a scraping edge, resilient means forcing said edge into contact with a log being fed through the drum, the arms being located in front of said partition and the resilient means being located at the other side thereof, whereby said resilient means are protected from bark scraped from such a log.

14. In a log-peeling machine, a bark-scraping device comprising a rotary drum, a second drum which is coaxial with said rotary drum, a radial flange extending from said rotary drum toward said second drum and forming a partition, arms pivoted to said flange and each provided with a scraping edge, resilient means forcing said edge into contact with a log being fed through said drums, the arms being located at one side of said partition and the resilient means being located at the other side thereof whereby said resilient means are protected from bark scraped from such a log.

References Cited in the file of this patent

UNITED STATES PATENTS

1,248,700	Olson	Dec. 4, 1917
2,448,689	Schnyder	Sept. 7, 1948
2,625,968	Eklund et al.	Jan. 20, 1953
2,646,092	Kolpe	July 21, 1953

FOREIGN PATENTS

151,988	Australia	Jan. 11, 1951
56,059	Sweden	Feb. 19, 1924
436,638	Italy	June 14, 1948