

Nov. 15, 1949

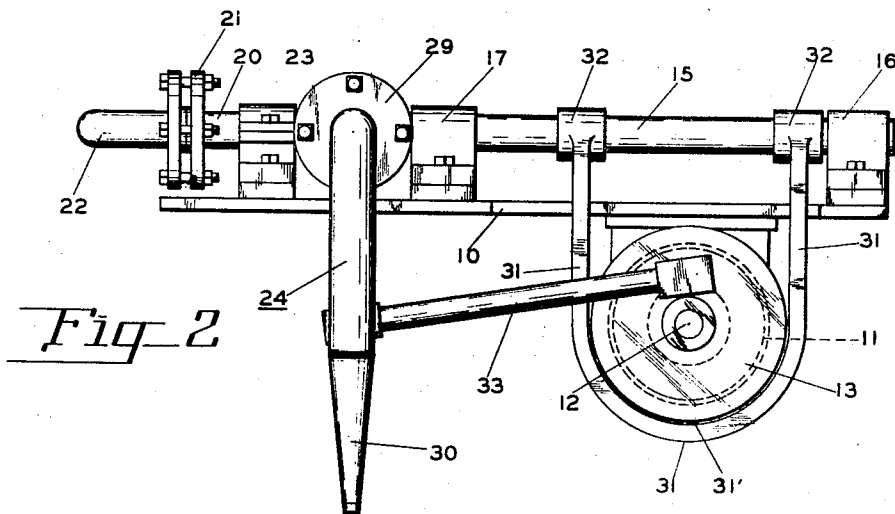
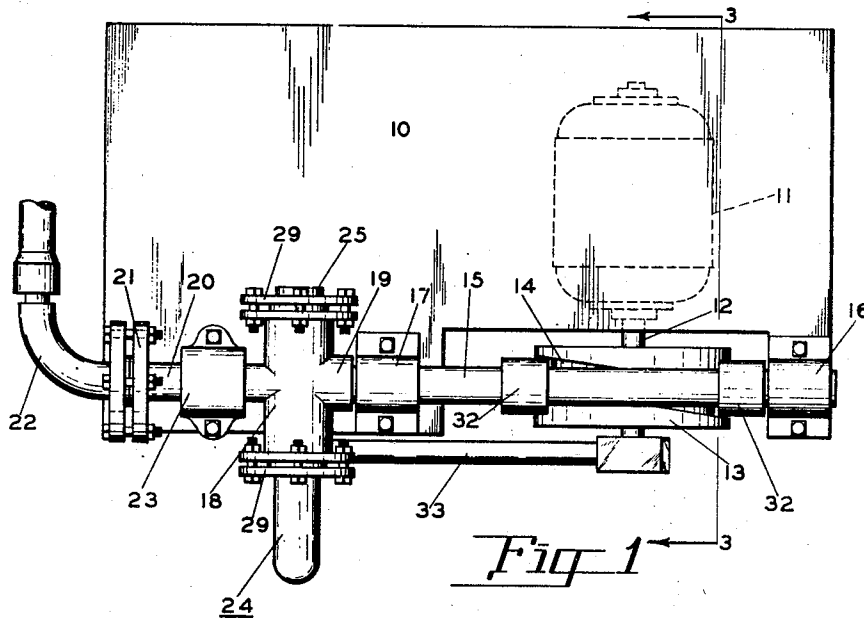
F. H. SWIFT

2,488,041

HYDRAULIC DEBARKING METHOD

Filed Oct. 3, 1946

4 Sheets-Sheet 1



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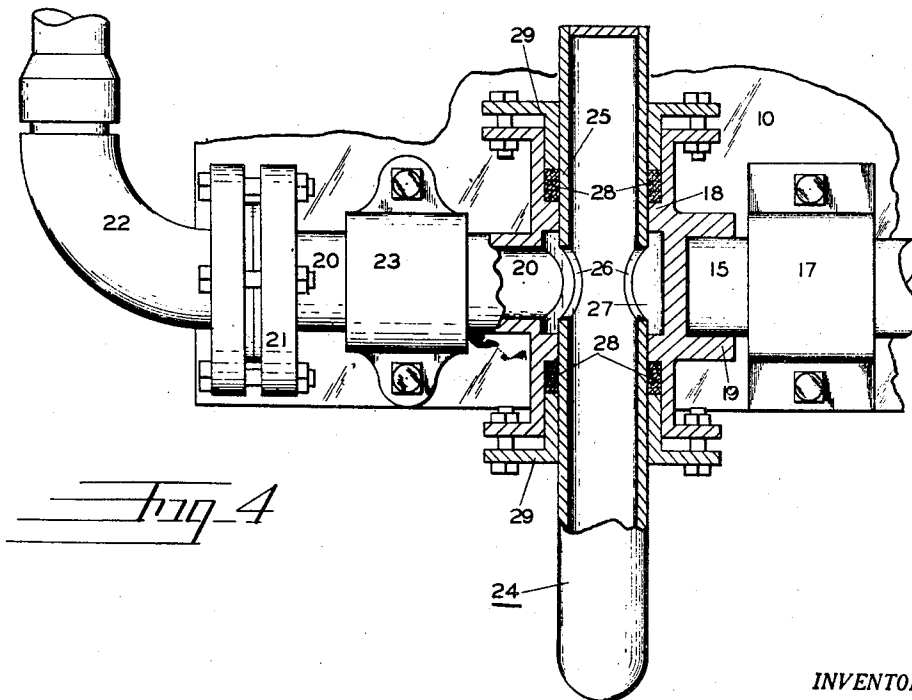
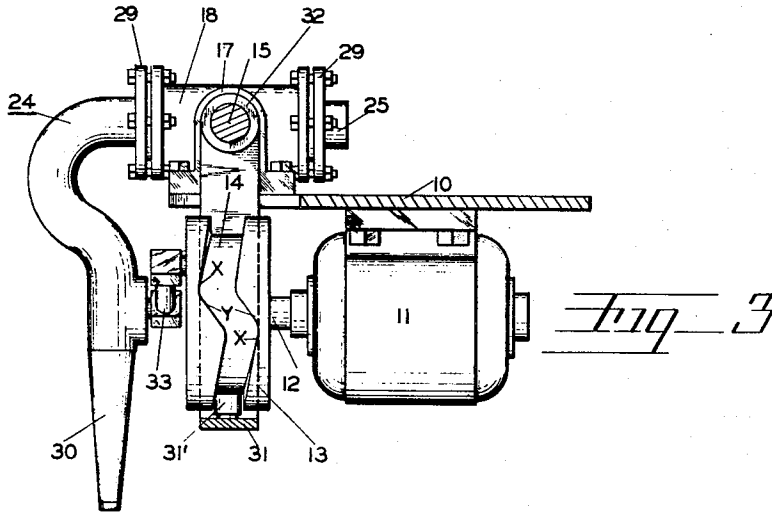
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HYDRAULIC DEBARKING METHOD

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4 Sheets-Sheet 2



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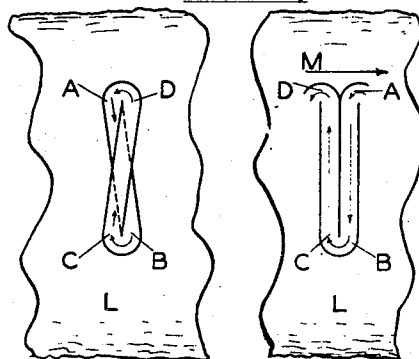
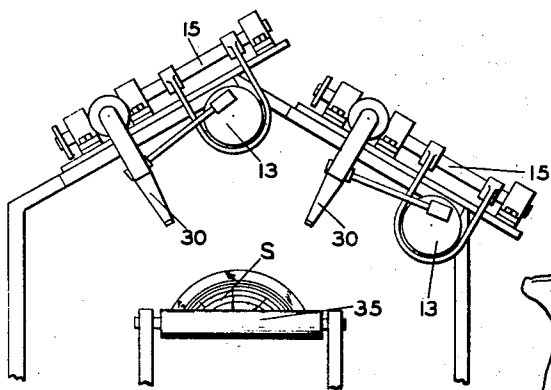
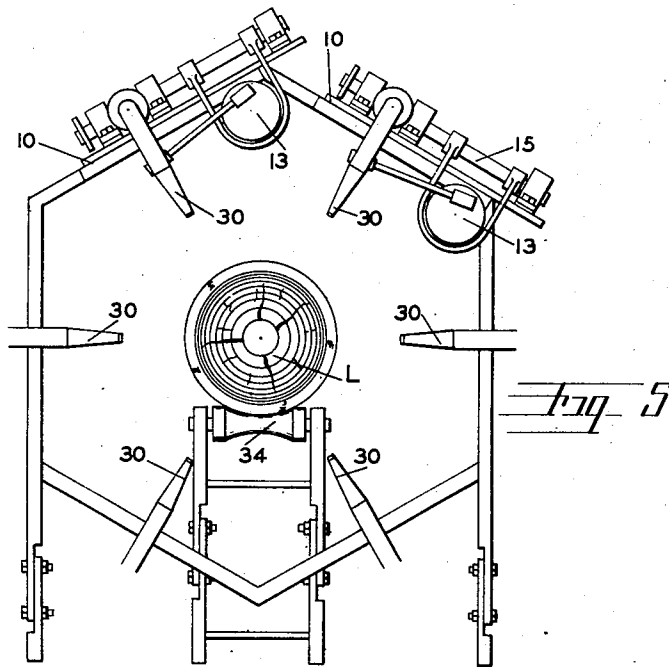
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HYDRAULIC DEBARKING METHOD

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4 Sheets-Sheet 3



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HYDRAULIC DEBARKING METHOD

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4 Sheets-Sheet 4

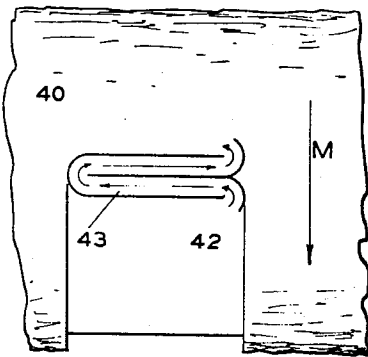
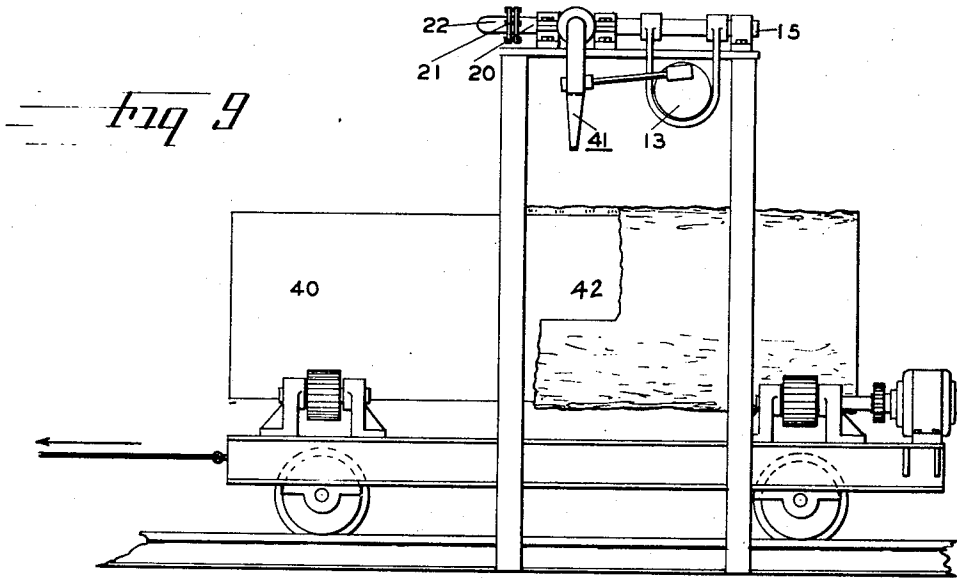


Fig 10

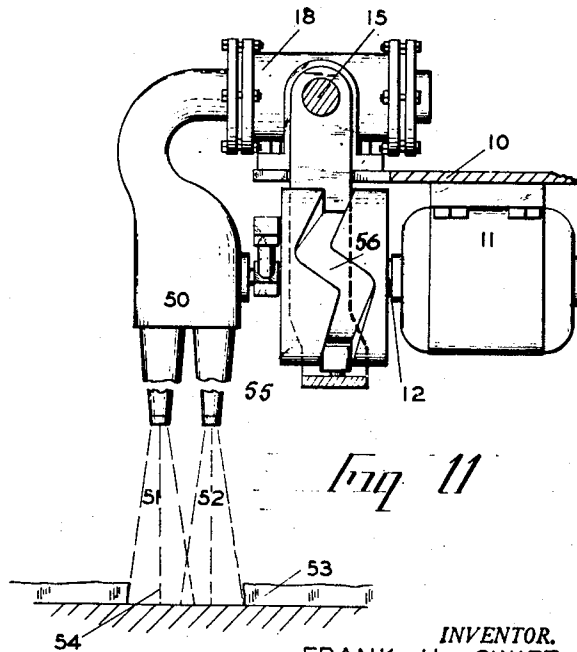


Fig 11

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2,488,041

HYDRAULIC DEBARKING METHOD

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Application October 3, 1946, Serial No. 700,998

3 Claims. (Cl. 144—309)

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This application is a continuation in part of my pending application, Serial No. 538,360, filed June 2, 1944, entitled Hydraulic barker for slabs, now U. S. Patent No. 2,413,341, issued December 31, 1946. Reference is also to be made to my co-pending application, Serial No. 700,999 on Hydraulic barker, filed under even date and relating to similar subject matter.

The present invention relates to the removal of bark from logs, cants or slabs by high velocity jets of water.

Various devices which are at present being employed for the hydraulic debarking of logs have shown that a high velocity jet of water, if properly directed against the bark surface of a log, will remove the bark in its path satisfactorily without the aid of any mechanical debarking means. Some of these devices, however, require the logs to be rotated as well as moved longitudinally during the debarking and are less satisfactory on that account, since the necessity for mounting the logs for rotation and for rotating them at the proper rate under varying circumstances, present certain difficulties and problems; and furthermore, these devices cannot be used for cants or slabs. Other hydraulic debarking devices necessitate the simultaneous employment of a considerable number of debarking jets, and thus require the utilization of a large volume of water under high pressure in order to enable the debarking to proceed with sufficient speed to be practicable.

The object of the present invention is to provide an improved method to be employed in hydraulic debarking in which each hydraulic jet will be utilized to remove the bark over a greater area.

Another object of this invention is to provide a practical method for debarking a log with a minimum number of hydraulic debarking nozzles with or without rotation of the log.

An additional object is to provide an improved method of employing hydraulic debarking nozzles which can be utilized for cants and slabs as well as whole logs, and by which method each nozzle will remove the bark in a broad, longitudinally-extending strip on a log, cant or slab.

The accompanying drawings illustrate a simple means which I have developed for carrying out my method, and my improved method will be easily understood from a brief description of the operation of the particular means illustrated in the drawings. Various other means could of course also be employed in a similar manner as will be evident later.

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Referring to the drawings:

Fig. 1 is a top plan view of a single debarking nozzle assembly, which is assumed to be located above a log or cant or slab;

Fig. 2 is a front elevation of the same;

Fig. 3 is a sectional side elevation taken on line 3—3 of Fig. 1;

Fig. 4 is a fragmentary top plan view and partial plan section drawn to a larger scale;

Fig. 5 is a more or less diagrammatic elevation illustrating the debarking of a log by my method.

Fig. 6 is a similar elevation illustrating the debarking of a slab.

Fig. 7 is a diagrammatic plan view of the path described on the surface of a log by the jet from a single nozzle assembly as illustrated in Figs. 1 to 5, when the log is stationary;

Fig. 8 is a similar diagrammatic plan illustrating the resulting path of the same nozzle jet on the log surface when the log is moved longitudinally at a proper rate of speed;

Fig. 9 illustrates diagrammatically a modified manner in which my method may be employed on a rotating log;

Fig. 10 is a diagrammatic representation of the debarking of a strip on a rotating log by a single hydraulic nozzle in the employment of my method in such modified manner; and

Fig. 11 is a fragmentary elevation of one of the nozzle assemblies showing a slight modification in which a double nozzle, or a pair of nozzles moving in unison, can be used for producing the jet path on the bark surface which composite jet path carries out my method.

Referring first to Figs. 1 to 4 inclusive, 10 indicates a stationary platform or deck which is securely supported on a suitable frame (not shown) at a predetermined location with respect to the logs, cants or slabs to be debarked. An electric motor 11, suspended from the platform 10, rotates a horizontal shaft 12 on the end of which a drive wheel 13 is secured. The perimeter of the wheel 13 is formed with a specially shaped cam groove 14 (Fig. 3), the nature and purpose of which will be subsequently explained.

A shaft 15 is rotatably supported in a pair of bearing blocks 16 and 17 mounted on the platform 10. A nozzle housing 18, the shape and construction of which are shown most clearly in Fig. 4, is secured to the end of the shaft 15. Preferably the housing 18 is formed with an external boss 19 into which the end of the shaft 15 is fitted and to which it is firmly secured in any suitable manner. The housing 18 has a

lateral pipe branch or arm 20 extending in the opposite direction from the boss 19 and so arranged as to extend in axial alignment with the shaft 15. The pipe branch 20 terminates in a swing joint 21 through which the housing is connected to a supply pipeline 22. A bearing block 23, mounted on top of the platform 10, rotatably supports this pipe branch 20 of the housing 18.

The nozzle, designated in its entirety by the reference character 24, has a horizontal upper portion 25 which is rotatably mounted in the housing 18. A plurality of ports 26 (Fig. 4), in this upper portion of the nozzle, connect with the interior chamber 27 of the housing. Thus water from the supply pipeline 22 passes through the housing branch 20 into the housing chamber 27 and thence into the nozzle through the ports 26. Suitable packing glands 28 are provided around the nozzle on the exterior of the housing 18 and are held in place in the usual manner by locking rings 29 provided with external flanges which are connected by bolts to adjacent flanges formed at corresponding ends of the housing.

From the description thus far it will be apparent that while the nozzle is mounted to rotate in the housing 18 on one axis, the entire housing, and with it the nozzle, is mounted to rotate on another axis, the two axes being normal to each other. The nozzle 24 terminates in a discharging tip 30 by means of which a debarking jet of predetermined shape and dimension is directed against the surface to be debarked.

A U-shaped metal strap member 31 has both ends formed with sleeves 32 which are keyed or otherwise rigidly secured on the shaft 15. On the member 31, at the bottom, is mounted a roller 31' (Fig. 3), which extends into the cam groove 14 on the perimeter of the drive wheel 13 and acts as a cam follower. With the rotation of the wheel 13 the cam follower 31', and with it the bottom of member 31, will be moved towards and away from the motor 11, as apparent from Fig. 3. In other words, member 31 will be rocked back and forth as the wheel 13 rotates. The rocking of member 31 will cause a rocking of the shaft 15 to which it is rigidly secured and the rocking of shaft 15 in turn will cause the entire housing 18 and thus the entire nozzle assembly 24 to be rocked similarly.

The cam groove 14 has two identical main sloping sections, indicated by x in Fig. 3, and two short and more abruptly and oppositely curved sections y between the main sections x . Thus with each half rotation of the wheel 13 the nozzle tip 30, as viewed in Fig. 3, will be moved gradually to the right and then quickly moved back to the left to the original position.

The rotation of the wheel 13 also produces another movement of the nozzle through the intermediary of a connecting rod 33. This connecting rod is shown more clearly in Figs. 1 and 2. One end of the connecting rod 33 is connected to the drive wheel 13 preferably through the intermediary of a universal joint, and the other end is similarly connected to the nozzle 24. Thus with each rotation of the drive wheel 13 the nozzle 24 is swung back and forth in the nozzle housing 18, but at the same time the nozzle housing 18 is also rocked on its separate axis by the member 31 as previously described. The effects of these two component directions of reciprocating movement on the resultant path of the jet from the nozzle will be described with reference to Figs. 7 and 8.

In Fig. 7 it is assumed for the purpose of illus-

tration that the log L, against the bark surface of which the jet from the nozzle tip is impinged, is temporarily stationary while the nozzle is being driven by the rotation of the wheel 13 in the manner previously described. The location of the connection between the drive wheel 13 and the connecting rod 33 is so arranged with respect to the sections x and y of the cam groove 14 on the wheel 13 that one of the sections y (Fig. 3), will engage the roller 31' of member 31 whenever the wheel and rod connection is at either end of the longitudinal diameter of its circular path. As the rotation of the wheel 13 and the operation of the crank shaft 33 cause the nozzle tip to swing transversely with respect to the log axis, the travel of the cam follower or roller 31' in one of the main sections x of the cam groove of wheel 13 will also cause the nozzle tip to move slightly longitudinally with respect to the log axis. Then, when the connecting rod 33 is about to reverse the direction of transverse swing of the nozzle tip, the travel of the cam follower on the next section y of the cam groove will cause the nozzle tip to move quickly back longitudinally with respect to the log axis. Thus, referring to Fig. 7, let it be assumed that the center of the jet from the nozzle strikes the log at some point A when the connecting rod has reached the limit of its travel in one direction. While the connecting rod causes the nozzle to swing transversely with respect to the log axis, one of the cam groove sections x causes the nozzle to move longitudinally with respect to the log axis. As a result of these two component forces acting on the nozzle the jet from the nozzle will travel in the oblique path A-B on the surface of the log. When the center of the jet reaches the point B, however, the engagement of the cam follower 31' with one of the sections y of the cam groove 14 results in movement of the jet quickly to the point C. Next, the moving of the nozzle by the connecting rod and the engagement of the cam follower in another cam groove x will result in the jet traveling the transverse oblique path from C to D. Finally, when the center of the jet reaches the point D the engagement of the cam follower with another section y of the cam groove causes the center of the jet to move again to the point A, and the jet proceeds to repeat its same travel. The amount of slope of the sections x and y in the cam groove 14 is made such that the tilting of the nozzle jet longitudinally with respect to the log axis will in each instance be approximately equal to the width of the jet longitudinally as it strikes the log surface.

If, instead of remaining stationary during the movements of the nozzle jet as previously described, the log L is moved longitudinally in the direction of the arrow M in Fig. 8, and if the rate of longitudinal travel of the log is constant and corresponds to the width of the nozzle jet with each transverse swing of the nozzle produced by the connecting rod 33, the jet paths A-B and C-D will be normal to the log axis and will adjoin each other, as illustrated in Fig. 8, and, with the continued travel of the log and transverse swinging of the nozzle, the bark will be removed from the log surface in a broad, longitudinal strip equal in width approximately to the distance A-B. Thus by my method, the jet from a single nozzle can be used to cover a broad, longitudinal strip on a log, without passing over any portion of the bark surface twice and without any rotation of the log. Thus any wasting of water is avoided, the highest possible efficiency

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is obtained from each nozzle jet, and the problem of rotating the log is eliminated.

By employing a plurality of such nozzle assemblies, thus, for example, arranging five or six similar nozzle assemblies in symmetrical location about the log and equidistant from the log surface, it is possible to debark the entire log surface during a single travel of the log longitudinally without any rotation of the log. In Fig. 5 I indicate such an arrangement of 6 nozzle assemblies employing my method. Due to the fact that the jet from each nozzle debarks a broad, longitudinally-extending strip on the surface of the log, comparatively few nozzle assemblies are required, and for smaller diameter logs even less than six nozzle assemblies will suffice for debarking the entire log surface as the log, supported by suitable means, such as rollers 34, moves longitudinally at the prescribed rate of speed.

In Fig. 6 I illustrate the use of my method employing a pair of nozzle assemblies in the debarking of a slab S, as the slab similarly is moved longitudinally on supporting rollers 35.

Should the bark on the particular type of logs, cants or slabs to be debarked be of such nature or such thickness as to require the debarking jets to go over the surface twice for complete removal of the bark, all that would be necessary with my method would be to reduce the rate of longitudinal travel of such logs, cants or slabs without changing the nozzle speed.

It would of course be possible, with my method, to have the nozzle assemblies mounted on a carriage and have the entire carriage in turn arranged to travel longitudinally along the log, cant or slab. However, since it is a relatively simple matter to move logs longitudinally compared to the difficulty of mounting them for rotation and rotating them, I believe in most cases it will be found preferable to have the frame, on which the nozzle assemblies are mounted, remain stationary.

As previously mentioned, various devices, other than the particular one which I have shown, could be used for carrying out my improved method. All that is required is to have the jet from each nozzle move in rapid strokes, traveling in the composite directions described, while the desired relative longitudinal movement of the long, cant or slab takes place with respect to the support on which the nozzle assemblies are mounted.

Thus far I have described the carrying out of my method in the debarking of a log when relative longitudinal movement is given to the log with respect to the barker—that is, either when the log is moved longitudinally through the barker or when the nozzle assembly or assemblies are moved longitudinally along the log—but without any rotation of the log. However, my method can also be satisfactorily employed when the log is mounted for rotation and a single debarking nozzle assembly can be used for an entire log under such conditions in various ways. For example, in Figs. 9 and 10 the log 40 is assumed to be mounted for rotation by any suitable means in addition to being mounted for longitudinal movement. It is assumed also, merely for purpose of illustration, in Figs. 9 and 10, that the longitudinal movement of the log is arranged to occur intermittently, thus at the end of each rotation. Various means for mounting logs for rotation and for imparting intermittent as well as constant longitudinal movement of the log

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are well known in the art and need not be described here.

Under such modified conditions the debarking nozzle assembly 41 of Fig. 9 is turned 90° from the position previously described so that the major swings of the nozzle will be only slightly divergent from the axial line of the log. The strip 42 then debarked by the nozzle on the log 40 will extend around the log, as shown in Fig. 10 instead of extending longitudinally of the log. The path of the jet from the nozzle will follow back and forth courses across the strip 42 which courses will be in a forward oblique direction with respect to the direction of rotation or direction of travel of the rotating log surface, resulting in the parallel adjacent paths 43 indicated in Fig. 10. When the strip 42 has been completed around the log the log is advanced longitudinally a distance approximately equal to the width of the strip 42. If the rate of rotation of the log corresponds to the width of the path of the nozzle jet in the strip 42 with each major swing of the nozzle it will be apparent from the explanation previously given that the jet will cover the entire area in each lateral strip 42 without passing over any portion of the strip twice.

If, instead of having the longitudinal movement of the rotating log occur intermittently, the log moves steadily longitudinally as it rotates, such movement of the log also being well known in other types of debarking machines, the strip 42 in which the debarking occurs would extend spirally over the log surface but there would be no further change in the employment of my method.

I have heretofore referred to each debarking nozzle assembly as embodying a single nozzle and corresponding single jet. It would, however, be possible to substitute a double nozzle or even a plurality of nozzles moving in unison in each assembly and so placed that their jets would combine to form a single path on the bark surface. Such a modification is shown in Fig. 11, in which a double nozzle 50 is shown in place of the single nozzle tip 30 of Fig. 3. The two jets 51 and 52 from the double nozzle 50 combine on the surface of the log 53 to form a single path 54 equal approximately to the combined widths of the two jets. The path 54 then follows the forwardly oblique transverse courses previously described and thus in principle there would be no change in my method. With such a double nozzle a drive wheel 55 having a wider perimeter and a cam groove 56 producing greater movement of the shaft 15 would be employed.

I claim:

1. In the hydraulic debarking of a log, the method of removing bark in a wide strip with a hydraulic jet engaging the log in a path in said strip, said method comprising providing for a relative movement between the surface of said log and the debarking apparatus during the debarking of the strip, causing said jet to move back and forth in rapid strokes transverse with respect to said strip and thus causing said path of said jet to follow transverse courses across the strip, directing said strokes of said jet so that each transverse course of said path will be in a forward oblique direction with respect to said relative movement of the surface of said log but so that the position of said path at the termination of each stroke will be not more than the width of said path ahead of the position of said path at the beginning of that stroke, moving said jet in a direction opposite said relative

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movement of the log surface at the end of each stroke so that said path will be moved back a distance not exceeding the width of said path, and restricting the said relative movement of said log surface to an amount not exceeding the width of said path for each stroke.

2. In the hydraulic debarking of a log or cant, the method of removing bark in a wide, longitudinally-extending strip with a single hydraulic jet engaging the log or cant in said strip, said method consisting in providing a constant longitudinal movement of said log or cant during the debarking of the strip, causing said jet to move back and forth in rapid transverse oblique strokes with reference to the strip to be debarked so that the path of said jet on the bark will follow transverse oblique forward-extending courses, directing said strokes so that the position of said path at the end of each course will be approximately the width of the path longitudinally ahead of the position of the path at the beginning of that stroke, moving said jet in a direction opposite said longitudinal movement at the end of each stroke sufficiently so that said path will be moved back in a corresponding opposite direction a distance equal approximately to the width of said path before said path follows the next oblique course, and having the log or cant move longitudinally a distance approximately equal to the width of said path for each of said transverse strokes, whereby said jet will cover the entire bark surface along a relatively broad strip without passing over any portion of the strip twice and thus enable most efficient coverage to be obtained from the jet.

3. The improved method of removing bark from

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the surface of a log or cant by hydraulic debarking apparatus, which method consists in providing means for causing a bark-removing jet from a nozzle or nozzles to be impinged against said surface, providing for a relative movement in a constant direction between said surface and said apparatus, moving said jet so as to cause the path of said jet to follow equal transverse courses across a wide strip on said surface in a forward oblique direction with respect to the direction of said relative movement of said surface, limiting said forward oblique direction of said courses so that the position of said jet path at the termination of each transverse course will not be more than the width of said path ahead of the position of said path at the beginning of that course, causing said jet to move in a direction opposite the direction of said relative movement of said surface at the end of each transverse course for a distance not exceeding the width of said path, and restricting said relative movement of said surface to an amount not exceeding the width of said path during the time required for each transverse course.

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The following references are of record in the file of this patent:

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