March 12, 1946. M. L. EDWARDS ET AL 2,396,255

LOG BARKING APPARATUS

Filed July 14, 1942 4 Sheets-Sheet 1

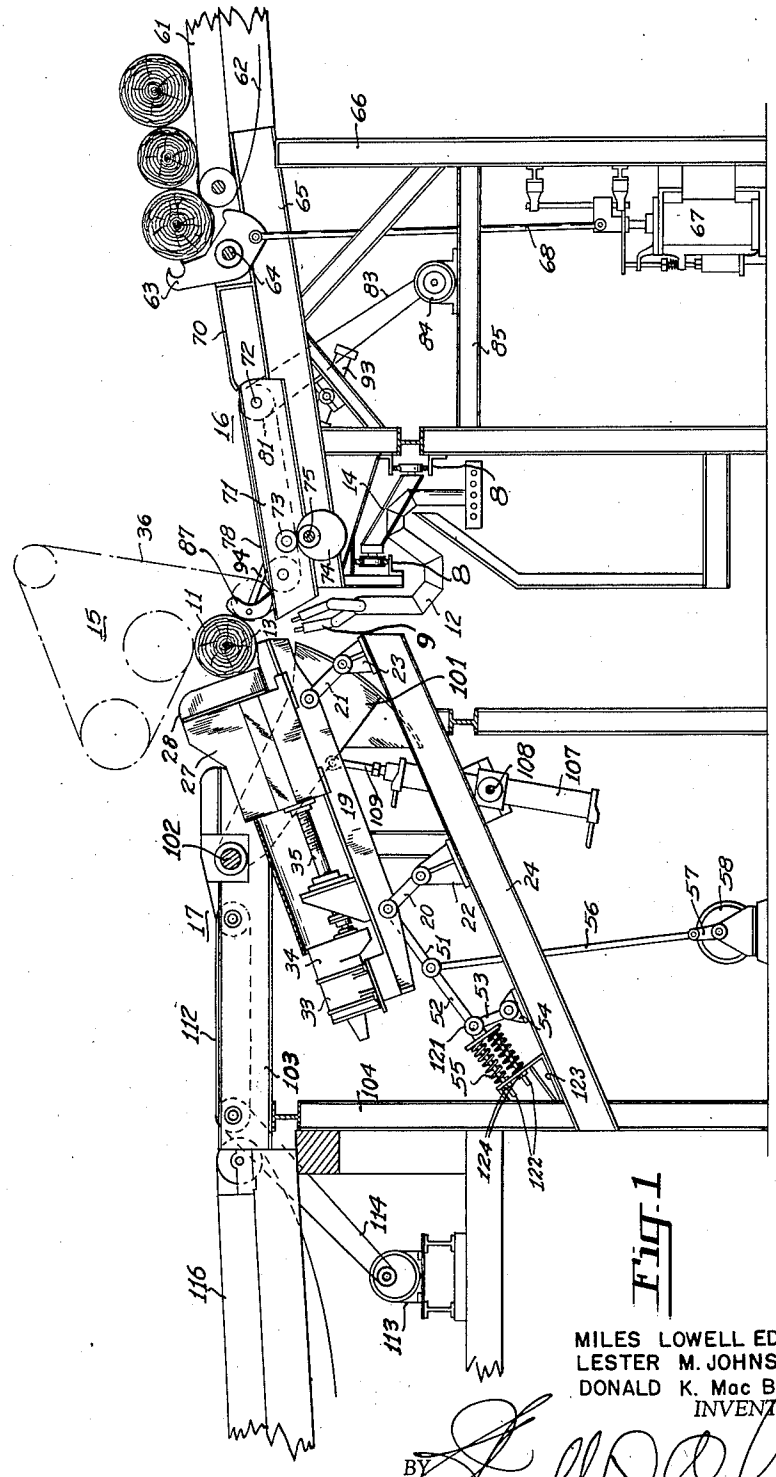


Fig. 1

MILES LOWELL EDWARDS
LESTER M. JOHNSON
DONALD K. Mac BAIN
INVENTORS

BY Harold D. Cook
ATTORNEY

March 12, 1946. M. L. EDWARDS ET AL 2,396,255

LOG BARKING APPARATUS

Filed July 14, 1942 4 Sheets-Sheet 2

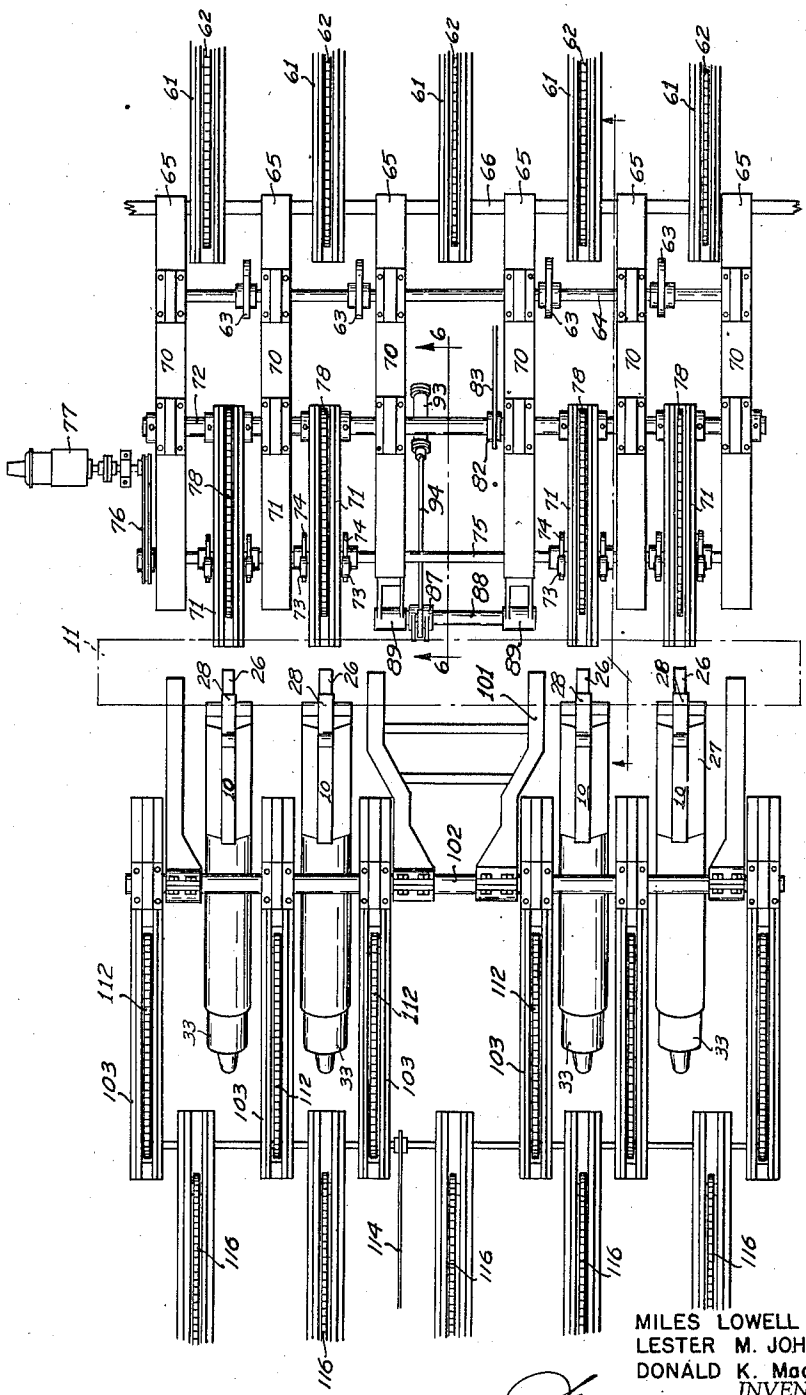


Fig. 2

MILES LOWELL EDWARDS
LESTER M. JOHNSON
DONALD K. MacBAIN
INVENTORS

BY Harold W. Cook
ATTORNEY

March 12, 1946. M. L. EDWARDS ET AL 2,396,255

LOG BARKING APPARATUS

Filed July 14, 1942 4 Sheets-Sheet 3

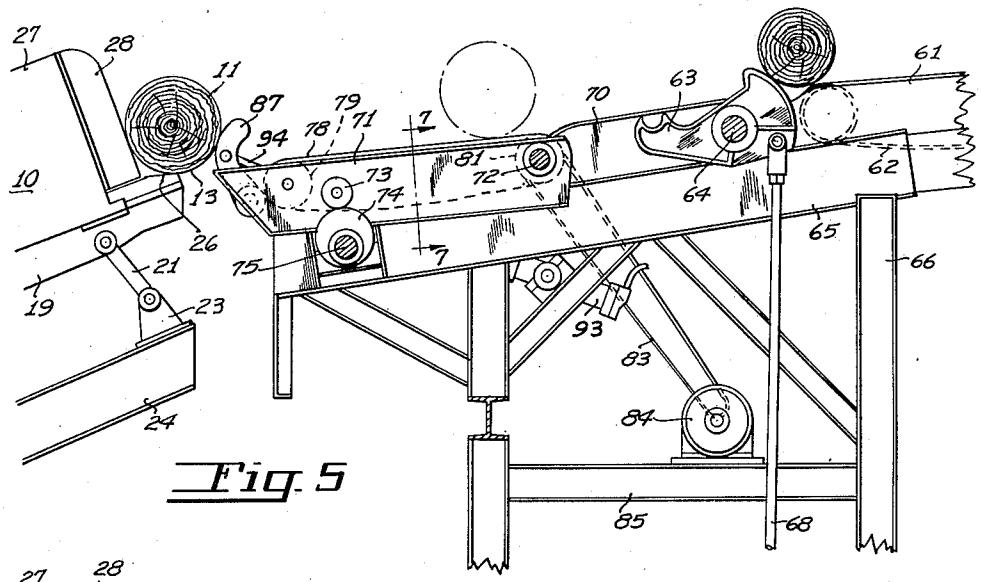


Fig. 5

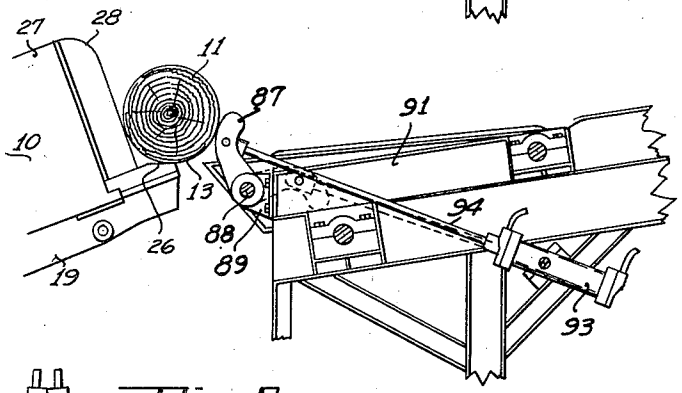


Fig. 6

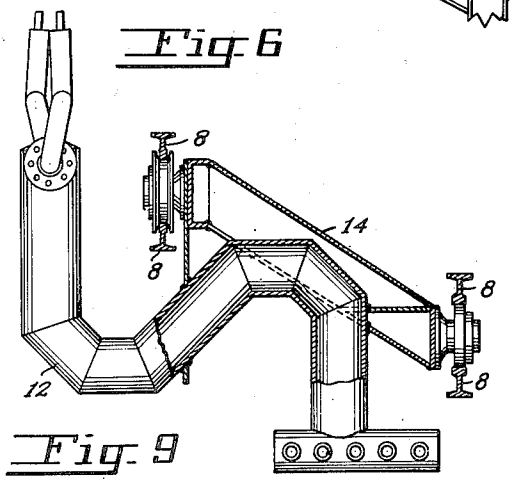


Fig. 9

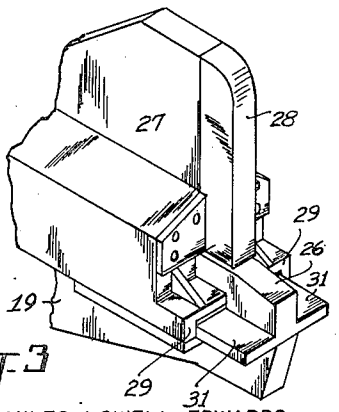


Fig. 3

MILES LOWELL EDWARDS
LESTER M. JOHNSON
DONALD K. Mac BAIN
INVENTORS

BY Harold D. Cook
ATTORNEY

March 12, 1946. M. L. EDWARDS ET AL 2,396,255

LOG BARKING APPARATUS

Filed July 14, 1942 4 Sheets-Sheet 4

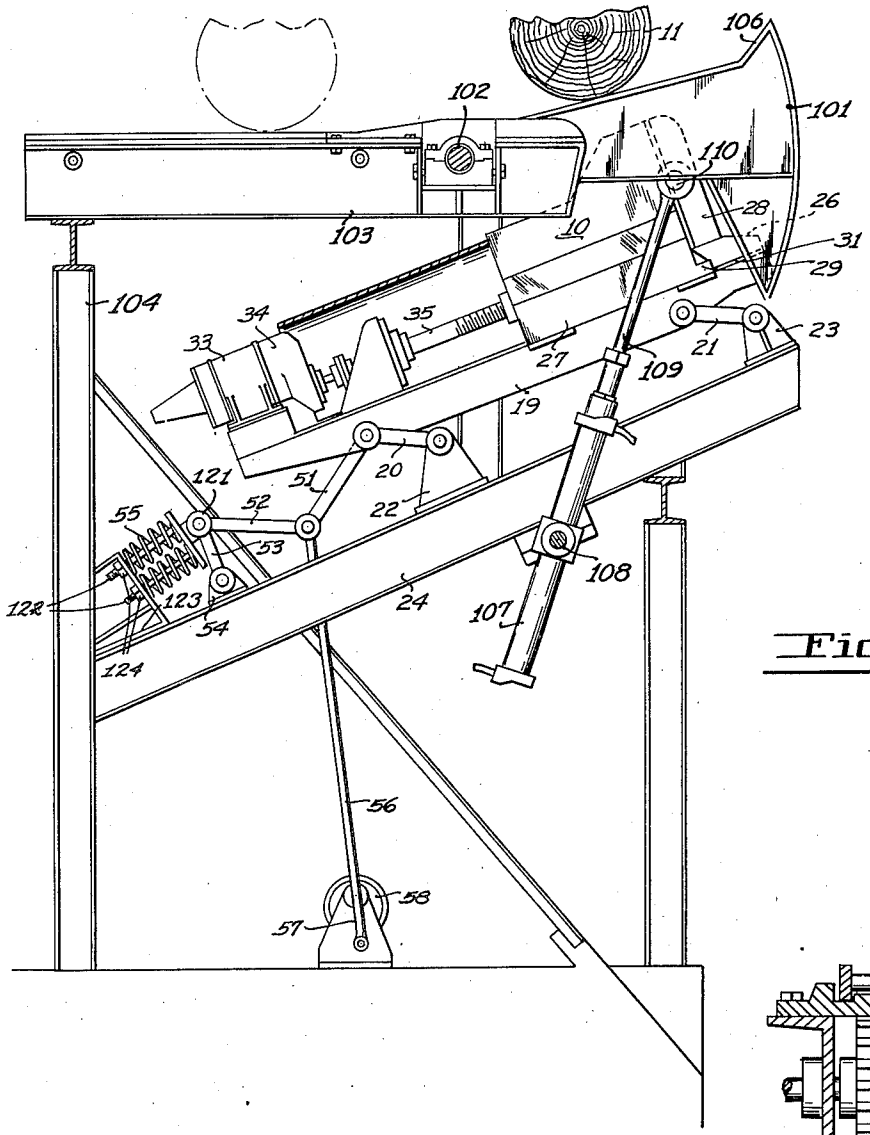


Fig. 4

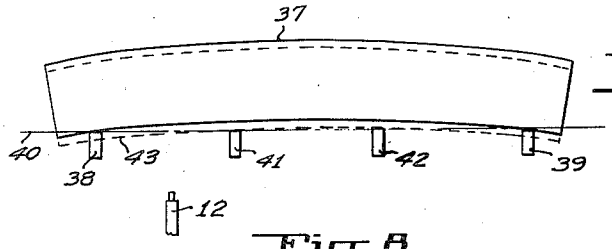


Fig. 8

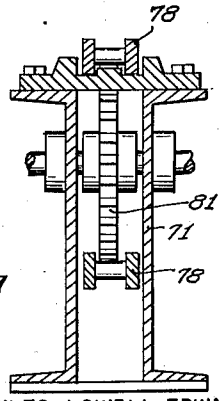


Fig. 7

MILES LOWELL EDWARDS
LESTER M. JOHNSON
DONALD K. Mac BAIN
INVENTORS

BY Harold R. Cook
ATTORNEY

Patented Mar. 12, 1946 2,396,255

UNITED STATES PATENT OFFICE

2,396,255

LOG BARKING APPARATUS

Miles Lowell Edwards and Donald K. MacBain, Longview, and Lester M. Johnson, Everett, Wash., assignors to Weyerhaeuser Timber Company, Longview, Wash., a corporation of Washington

Application July 14, 1942, Serial No. 450,836

8 Claims. (Cl. 144—208)

This invention relates generally to hydraulic log barking apparatus, and more particularly to means for supporing a lag in a predetermined position adjacent a hydraulic nozzle arrangement, and to means for loading and unloading logs relative to such supporting means.

A first step in the treatment of logs to be used in pulp manufacturing processes comprises the removal of bark from the outer surface thereof. Letters Patent No. 2,342,533, granted February 22, 1944, to Miles Lowell Edwards, for Method of removing bark from logs, discloses a method of removing bark from logs hydraulically, including the steps of forming a jet of a suitable fluid such as water, directing the jet against the surface of the log in a substantially perpendicular direction with respect thereto and under a relatively high pressure, and imparting relative movement to the log and the jet longitudinally of the log and in a line substantially parallel with respect to the log surface next adjacent the nozzle. A strip of bark of the width of the fluid jet is removed longitudinally of the log by one pass of the nozzle arrangement, after which the log is rotated slightly upon its support and a subsequent pass of the nozzle made with respect thereto, this process being repeated until complete removal of the bark from the log surface is effected.

To carry out the above referred to process in an efficient and commercially practicable manner requires the provision of a log support so designed and arranged relative to the nozzle arrangement that the entire surface of the log may be presented to the action of the jet. In order to expedite the handling of the logs it is desirable that a minimum number of adjustments be required for properly positioning the log on the support and which can be carried out within a relatively short period of time and with a fair degree of accuracy. Means must also be provided for loading logs onto the support, and for unloading therefrom the logs from which the bark has been removed.

It is a general object of the present invention, therefore, to provide a new and improved arrangement for supporting a log from which bark is to be removed in accordance with the method of the invention of the above referred to patent application.

More specifically, it is an object of the invention to provide a new and improved arrangement for supporting a log in a predetermined position with respect to a hydraulic bark removal jet arrangement.

A further object of the present invention is to provide a support for holding a log in a predetermined position with respect to hydraulic bark removal nozzle means, which support is readily adjustable for handling logs of substantially any diametrical size and by which a surface portion of logs of different sizes may readily be aligned in a predetermined plane irrespective of such variations in size.

A further object of the invention is to provide a new and improved log supporting arrangement for use in connection with hydraulic bark removal nozzle means arranged for relative longitudinal movement with respect to the log, whereby a longitudinally curved log may be so supported that the spacing between the nozzle and the log surface next adjacent thereto will vary a minimum amount throughout the length of the log.

Another object of the invention is to provide an arrangement for positioning a log in a predetermined position with respect to a hydraulic bark removal nozzle, including means for loading logs onto a support in a simple and efficient manner.

A further object of the invention is to provide a new and improved arrangement for unloading logs from a support adapted to hold logs in a predetermined position with respect to hydraulic bark removal nozzle means.

In accordance with the illustrated embodiment of the invention, the log support comprises a plurality of bracket arms adapted to support a log loosely upon an upper bearing surface thereof. The supporting bracket arms are provided with stops for engaging with one side of the log so as to prevent lateral movement of the log on the supporting brackets in the direction of the stops. The stops are so arranged for adjustment upon the bracket arms that the log may be shifted on the bracket arms to position the center of gravity thereof just slightly to the rear of the foremost ends of the bracket arms. A considerable portion of the side of the log opposite the stops can thus be made to overhang the foremost ends of the bracket arms and a lower longitudinal portion of the overhanging side can thus be made to lie substantially in a predetermined plane. In order to compensate for longitudinal curvature in a log, predetermined ones of the bracket arms spaced longitudinally of the log can be brought into a supporting engagement with respect thereto whereby the surface of the log presented to the action of the jets can be made to vary a minimum distance from a predetermined straight line parallel with the line of relative movement of the nozzle arrangement. Thus, irrespective of the

diametrical size and longitudinal curvature of the log, the lower longitudinal strip portion of each log can be made to assume a substantially predetermined position with respect to the nozzle arrangement.

For a consideration of what is believed new and novel, attention is directed to the following description taken in connection with the accompanying drawings, while the features of novelty will be pointed out with greater particularity in the appended claims.

In the drawings, Figure 1 is a side elevation illustrating an arrangement of a log barking apparatus constructed in accordance with one form of the invention; Figure 2 is a plan view of the arrangement; Figure 3 is a fragmentary view in perspective of the front end of a log support shown in Figure 1; Figure 4 is a side elevation showing particularly a log support in a retracted position, and also certain details of the log unloading means; Figures 5 and 6 are fragmentary elevational views illustrating the log loading means; Figure 7 is a cross sectional view taken along the line 7—7 of Figure 5; Figure 8 is a diagrammatic sketch illustrating operational features of the invention; and Figure 9 is an enlarged view, partly in section, of the nozzle carriage and supporting track therefor.

Referring particularly to Figure 1, the apparatus is comprised essentially of log supporting means 10 for holding a log 11 in a predetermined position with respect to a traveling hydraulic nozzle arrangement 12 mounted adjacent thereto. The supports 10 are designed to hold the log 11 thereupon in a generally horizontal position so that a longitudinally extending surface portion 13 overhanging the forward end of the supporting arrangement is exposed to the action of the hydraulic jets issuing from the nozzles 9 provided therebeneath. The nozzle arrangement comprises a nozzle carriage 14 supported for movement longitudinally of the log upon tracks 8 so that the nozzles 9 will travel in a straight line substantially parallel with the adjacent surface portion 13 of the log, as will be more fully explained.

The particular details of the hydraulic nozzle arrangement, including the supporting carriage and the means for supplying high pressure fluid thereto, form no part of the present invention, but are separately described and claimed in our copending patent application, Serial No. 540,837, entitled Log barking apparatus, filed concurrently herewith, and assigned to the Weyerhaeuser Timber Company, the assignee of the present invention.

Following one pass of the nozzle structure longitudinally of the log and the removal of a longitudinal strip of bark from the surface portion 13 of the log, the log is then rotated upon the supporting arrangement 10 through a predetermined angular increment by any suitable means such as a turning mechanism, indicated generally by the dotted lines 15. The particular details of the log turning apparatus 15 form no part of the present invention, but are separately described and claimed in our copending patent application, Serial No. 450,838, entitled Log turning apparatus, filed concurrently herewith, and assigned to the Weyerhaeuser Timber Company, the assignee of the present application. By alternately passing the nozzle arrangement longitudinally of the log and rotating the log 11 through appropriate angles, depending upon the width of the strip of bark removed by one pass of the nozzles 9, a complete removal of the bark from the surface of the log may be effected.

For loading logs onto the supporting arrangement 10 a loading mechanism, indicated generally at 16, is provided. After bark has been removed from a log positioned upon the supporting arrangement 10, the log may be removed therefrom by means of the unloading mechanism indicated generally at 17.

The log supporting means 10 will first be considered in detail. These means comprise a plurality of similar bracket arms spaced longitudinally of the log for supporting the log in a generally horizontal position. While any suitable number of such devices may be employed, the present arrangement includes four as shown more clearly in the plan view of Figure 2.

Each of the bracket arms comprises a longitudinal beam member 19 which is pivotally supported at an inclined angle upon arms 20 and 21, the lowermost ends of which arms are journaled in brackets 22 and 23, respectively, secured to the upper surface of a stationary framework member 24. The upper foremost end of the bracket arm structure, shown more clearly in the perspective view of Figure 3, is provided with a log bearing surface 26 for engaging with the under side of the log 11 and loosely supporting it thereupon. For adjusting the position of the log 11 upon the bearing surface 26 so that the log will overhang the foremost ends of the brackets and thus expose the lower surface portion 13 to the action of the hydraulic jets, each bracket is provided with an adjustable stop or knee 27 for engaging with one side of the log. The stop 27 comprises a nose piece 28 extending substantially at right angles with respect to the beam 19, and lower guide members 29 engaging around flange portions 31 extending outwardly from opposite sides of the beam 19. The portion of the beam member forming the log bearing surface 26 extends somewhat above the flanges 31 so as to protect the slide flanges from injury by engagement with the logs. The stops 27 are adapted to be adjusted longitudinally of the beam 19 by means of a suitable motor 33 mounted on the rear end of the beam and connected through a suitable gear reduction device 34 and screw 35, the foremost end of which screw is threaded in a suitable nut provided in the rear end of the stop 27. It will be observed that with the beam 19 of the bracket inclined at the angle shown, the bearing surface 26 and the nose 28 of the stop define a crotch within which the log is supported. After a log is loaded onto the brackets the knees 27 are adjusted to position the center of gravity of the log, or, in other words, the vertical center line of the log, just slightly to the rear of the foremost tip end of the bearing surface 26 of the bracket. The turning arrangement 15, which includes a chain, indicated at 36, engages with the surface of the log on the opposite side thereof with respect to the stop nose 28 so as to preclude the possibility of the log rolling off the forward end of the knees.

It will be understood that logs of different diameters will require different adjustments of the stops 27 in order that the log will, in each instance, rest in a predetermined position upon the foremost ends of the knees; which is important in order to assure that the overhanging longitudinal strip portion 13 of the log will in each instance lie in a predetermined horizontal line and be uniformly spaced throughout the length of the log from the adjacent end of the nozzles 9. This

uniformity of spacing is important since hydraulic jets operate with greatest efficiency at a predetermined distance from the nozzle orifice, the exact distance depending upon the specific characteristics of the particular nozzles 9 employed.

In the case of a straight log, it will be obvious that only two suitably spaced brackets need be employed for supporting the log to insure that the longitudinal strip portion 13 thereof will lie in the predetermined desired position relative to the path of travel of the nozzle jets. Frequently, however, logs are curved longitudinally and require special consideration in the supporting arrangement therefor. Consider, for example, the case illustrated by the diagrammatic sketch of Figure 8, in which a curved log 37 is shown supported upon bracket arms 38 and 39 arranged under the opposite ends of the log. The reference line of optimum operating distance for the hydraulic nozzles 9 is indicated at 40. It will be obvious that only the opposite end portions of the log 37 are properly spaced from the fixed line of travel of the nozzle arrangement 12, while the mid portion of the log 37 is spaced too great a distance from the nozzles 9 to effect efficient removal of bark therefrom. Under this condition it would be preferable to support the log 37 upon a closer spaced pair of bracket arms 41 and 42 which would bring the lower surface of the log 37 down to the position indicated by the dotted line 43. So supported, the lower surface of the log varies a minimum distance from the reference line 40 throughout the extent of the log. In this case the bracket arms 38 and 39 would be dropped, or retracted, to an inoperative position.

With particular reference to Figures 1 and 4, the retracting arrangement for the bracket arms 10 will be described. Extending rearwardly from the rear end of each of the bracket beams 19 are a pair of pivoted toggle arms 51 and 52, the rear end of each arm 52 being journaled in a bracket 121 mounted on the outer ends of spaced rods 122 which anchor the bracket to a plate 123 fastened to the frame members 24 and 104. Arranged between the bracket 121 and plate 123 are a plurality of buffer springs 55 which urge the bracket to the outermost position permitted by nuts 124 threaded on the rods 122 and which engage under the plate 123 to limit outward movement of the bracket 121. Also journaled in the bracket 121 is a link 53, the lower end of which is journaled in a bracket 54 mounted on the frame member 24. The toggle arms 51 and 52 are controlled by a rod 56 connected to the pivotal juncture thereof, the lower end of the rod 56 being connected to one arm of a bell crank 57, the relative angular position of which is controlled by a suitable motor 58. With the crank rotated to the upright position shown in Figure 1, the toggle arms 51 and 52 are retained in a substantially aligned position to hold the bracket 10 in the operative or log engaging position. By rotating the crank 57 through 180° the toggle arms 51 and 52 are collapsed, thereby permitting the bracket 10 to rock backwardly upon its supporting arms 20 and 21 to the lower or retracted position shown in Figure 4. The buffer springs 55 absorb shocks incident to the raising and lowering of the apparatus, as well as those resulting from loading of the logs onto the bearing surfaces thereof. It is to be understood that in the elevated position of the various brackets the bearing surfaces 26 are all substantially horizontally aligned, while the foremost tip ends thereof are also aligned with respect to a common vertical plane.

It is preferred that the brackets be separately controllable so that any two may be moved into supporting relation with the log. This may be desired when handling longitudinally curved logs. Also it may be desirable to employ different combinations of supporting brackets for any one log as it is rotated thereupon in order to adjust the surface strip portion 13 into the proper position.

The means provided for loading logs onto the supporting brackets 10, which means are indicated generally at 16, comprises a log deck 61 upon which logs are deposited by any suitable means and over which they are moved by suitable conveyor chains 62 toward the rockers 63. The rocker arms 63, of more or less conventional design, are affixed to a transverse shaft 64 suitably journaled in the stationary beams 65 supported upon the framework 66. The rocker arms may be actuated by a suitable servo-motor 67, the piston of which is connected by rod 68 to one of the arms 63 eccentrically of the supporting shaft 64, whereby the logs may be transferred one at a time from the deck 61 onto the loader proper.

The loading means further comprises a plurality of parallel beam members 71 which are all mounted for free pivotal movement about shaft 72 journaled adjacent the end of the skid 70. These beam members are provided with rollers 73 adjacent their outer ends which are arranged to be engaged by eccentric cams 74 affixed to the shaft 75, which shaft is suitably journaled in the frame member 65. The shaft 75 is connected by a chain 76 to a suitable motor 77 for rotation thereby. The various cams 74 are so mounted on the shaft 75 that upon rotation of the shaft all of the various beams 71 will simultaneously be raised or lowered as desired.

Chains 78 having one side running along the top of each beam 71, shown more clearly in the cross sectional view of Figure 7, extend around idler pulleys 79 suitably journaled in the outer end of the beams 71 and around sprockets 81 affixed to the shaft 72. The shaft 72, which serves as the pivotal support for the inner ends of the various beams 71, also serves for driving the various conveyor chains 78 provided on the respective beams, the shaft 72 being provided with a sprocket 82 over which is trained a chain 83 extending to the driving motor 84 therefor. The motor 84 is suitably mounted upon a beam 85 of the supporting frame structure of the apparatus.

Referring particularly to Figure 6, a booster arm 87 is mounted on a shaft 88 suitably journaled in bracket 89 attached to the end of the fixed support member 91. This arm normally extends beneath the upper surface of the member 91, as shown in the dotted line position, and is pivotally movable upwardly, or in the counterclockwise direction, by a pivotally mounted servomotor 93 which has its piston 94 connected to the arm 87. One or more similar arms 87 may be affixed to the shaft 88 as desired.

When it is desired to load a log onto the supports 10, a log is released from the deck 61 by operation of the rocker arms 63 through a suitable angle such as to the position shown in Figure 5, permitting one log to roll down the inclined skids 70 onto the beams 71. The beams 71 are first pivoted upwardly so that the outermost ends thereof are substantially on a level with the bearing surfaces 26 of the log supports 10, this being accomplished by the energization of the motor 77 by which the cams 74 are rotated to the position shown in Figure 5. Upon the energization of the

motor 84 the chains 78 will be driven in such a direction as to carry the log therealong toward the supports 10. Since a space exists between the ends of the beams 71 and the ends of the adjacent beams 19 of the supports 10, the booster arm 87 is then operated for boosting the log across this space and for positioning it firmly upon the supports. The arm 87 may be held in the upper position as shown to steady the log upon the supporting brackets 10, while the log turning means 15 is lowered into engagement with the corresponding side of the log and, if desired, also while the position of the log upon the supporting brackets is adjusted by means of the adjustable knees 27. The arm 87 may then be retracted to the dotted line position upon deenergization of the servo-motor 93 associated therewith. With the log firmly positioned upon the supporting brackets 10, the various beams 71 may then be lowered by further rotation of the shaft 75 and cams 74 through operation of the motor 77 associated therewith.

After the barking operation has been completed upon a log positioned upon the supporting brackets, the log may quickly be removed therefrom by manipulation of the unloading mechanism, indicated generally at 17. The unloading mechanism comprises a plurality of pivoted arms 101, one end of each being fixedly attached to the transverse shaft 102 suitably journaled in bearings mounted upon the parallel beams 103, which in turn are stationarily affixed to the apparatus framework 104. The arms 101 extend outwardly from shaft 102 a distance only very little greater than the distance between the shafts 102 and the foremost ends of the beams 19 of the supporting brackets 10 when the latter are in their upright position. The various arms 101, which are shown in a retracted or inoperative position in Figure 1, are adapted to be rotated in the counterclockwise direction as viewed in Figures 1 and 4 by means of a suitable servo-motor 107 pivotally mounted as at 108 on the frame member 24, the piston rod 109 of which may be connected as at 110 to any one of the various arms 101. Since the various arms 101 are all fixedly attached to the cross shaft 102, they will be rotated in unison upon energization of the servo-motor 107.

When it is desired to remove the log from the supporting brackets, the servo-motor 107 may be energized, whereupon the outer hook end portions 106 of the arms 101 will engage with the underneath surface of the log 11 and carry it upwardly above the upper extremities of the knees 27 of the bracket arms. If desired, the various bracket arms 10 may be shifted to the retracted position shown in Figure 4 by collapsing the toggles 51—52 through operation of the control motor 58 therefor. As the log is raised above the upper ends of the knees 27, the upper surface of the arm 101 will slope rearwardly, causing the log to roll therefrom onto the upper surface of the various beams 103. The beams 103 may be provided with conveyor chains 112 driven by motor 113 through a connecting chain 114 whereby the logs 11 may be transferred to a still further conveyor mechanism 116 for transferring the log to other points where other operations may be performed thereupon.

Having described the invention in what is considered to be a preferred embodiment thereof, it is to be understood that the various details are merely illustrative and that the invention may be carried out by other means.

We claim:

1. In a hydraulic log barking apparatus, bracket arms having upper bearing surfaces for loosely supporting a log thereupon in a generally horizontal position, means supporting said bracket arms for raising and lowering movement relative to a predetermined log supporting position, means for selectively moving each said bracket arm relative to said log supporting position, means on said bracket arms for engaging said log and for adjusting the position of the log relative to said bracket arms, said supporting means including resilient buffer means for absorbing shocks incident to the raising and lowering of said bracket arms, said bearing surfaces of said bracket arms being all horizontally aligned in the elevated position of said bracket arms.

2. A hydraulic log barking apparatus including a nozzle mounted for reciprocating movement along a horizontal line, a supporting arrangement for holding a log in a generally horizontal position and extending in the same direction as said horizontal line, means for adjusting said supporting arrangement to have the center line of said log shifted substantially into a plane parallel with said horizontal line of nozzle movement, and means on said support for varying the distance between a longitudinal strip portion of the log surface and said line of nozzle movement.

3. A hydraulic log barking apparatus, comprising a nozzle mounted for reciprocating movement along a horizontal line, a support for holding a log in a generally horizontal position extending in the direction of the path of nozzle travel, said support including a plurality of bracket arms, means on said support for shifting the center line of said log substantially into a plane common with the line of nozzle movement, said support also including means for raising and lowering said bracket arms relative to a predetermined log supporting position for moving a surface portion of said log into a plane substantially parallel with said horizontal line of nozzle movement.

4. In a hydraulic log barking apparatus, a plurality of horizontally aligned adjustable bracket arms for engaging the underneath surface of a log, an adjustable stop on each said bracket arm for engaging with one side of the log, means for adjusting the position of said stops so that a longitudinal strip portion of the surface of the log will overhang the ends of said bracket arms, an hydraulic bark removal nozzle directed at said longitudinal strip portion and arranged for reciprocal movement longitudinally of said log, means for selectively operating said bracket arms into supporting relation with said log for supporting said longitudinal strip portion in a predetermined horizontal plane substantially parallel with the path of movement of said nozzle.

5. In a hydraulic log barking apparatus, a plurality of horizontally aligned bracket arms for engaging the under side of a log, means on each of said bracket arms for so adjusting the position of the log as to cause a longitudinal strip portion of the log surface to overhang said bracket arms, a hydraulic bark removal nozzle directed at said longitudinal strip portion, means supporting said nozzle for reciprocal movement in a predetermined horizontal plane longitudinally of said log, and selectively operable means for moving selected ones of said first named means into engagement with said log for centering said longitudinal strip portion over said nozzle throughout the length of travel of said nozzle.

6. Apparatus for supporting a log adjacent a

hydraulic bark removal nozzle, said log and said nozzle being arranged for relative movement therebetween longitudinally of the log, said supporting apparatus comprising a plurality of adjustable brackets spaced longitudinally of the log, means for selectively raising and lowering said brackets into a supporting relation with respect to said log for adjusting a longitudinal surface strip portion of said log with a minimum variation from a predetermined horizontal plane, means on said brackets and movable toward and away from the free ends of the latter for engaging said log and for further adjusting the position of the log thereupon whereby said longitudinal strip portion may further be adjusted with minimum variation from a predetermined vertical plane whereby said longitudinal strip portion will be substantially uniformly spaced from said nozzle throughout the path of relative movement therebetween.

7. In a hydraulic log barking apparatus, means for unloading logs from a log supporting apparatus comprising a plurality of spaced bracket arms having bearing surfaces for loosely supporting a log thereon in a generally horizontal position and having stops extending upwardly from said bracket arms for positioning a log on said apparatus, said unloading means comprising a plurality of arms positioned adjacent and to the side of said bracket arms, each said unloading arm being pivoted at one end on the opposite side of said stops from said bearing surfaces and having a free end, means for swinging the free ends of said arms through an arc extending from below said supporting apparatus to a point above said stops for unloading a log from said apparatus, said stops being inclined in the same direction as the curvature of said arcs for facilitating removal of logs from said bearing surfaces.

8. In a log barking apparatus, means for unloading logs from a log supporting apparatus comprising a plurality of spaced bracket arms having bearing surfaces for supporting a log thereon in a generally horizontal position and having stops extending upwardly from said bracket arms for positioning said log upon the foremost ends of said bearing surfaces in a predetermined relation with respect to bark removal means arranged adjacent thereto, said unloading means comprising a plurality of parallel beams positioned adjacent and to the side of said bracket arms, each beam being pivoted at one end on the opposite side of said stops from said bearing surfaces and having a free end, means for swinging the free ends of said beams through an arc extending from below said supporting apparatus to a point above said stops for unloading a log from said apparatus, said beams in said uppermost position providing a rearwardly inclined rollway for rolling said logs away from said apparatus.

MILES LOWELL EDWARDS.
DONALD K. MacBAIN.
LESTER M. JOHNSON.