

March 28, 1950

G. M. JOHNSON
LOG BARKER HAVING WATER-JETS OSCILLATABLE
ABOUT LONGITUDINAL LOG AXIS

2,501,848

Filed April 10, 1946

5 Sheets-Sheet 1

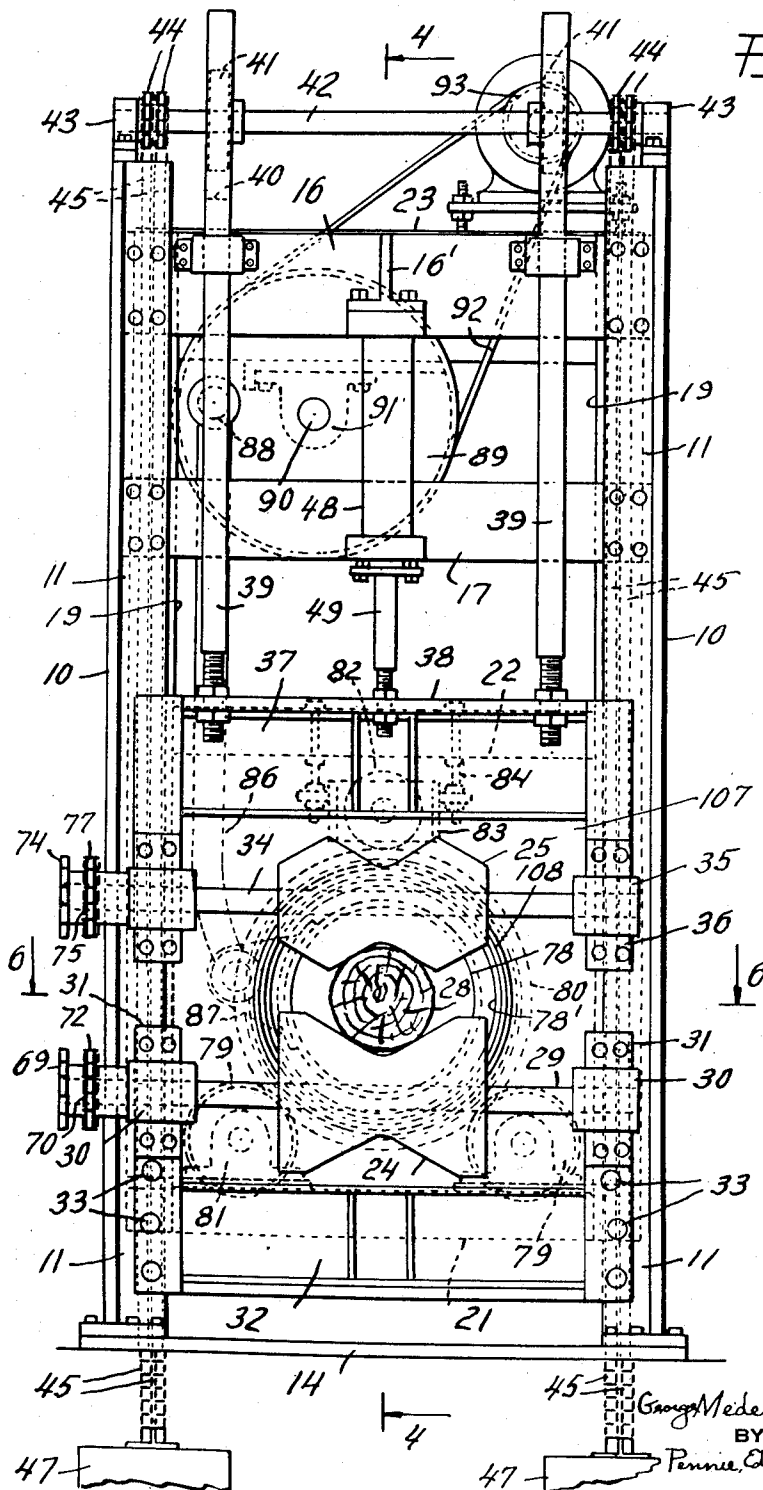


Fig. 1.

INVENTOR
G. M. Johnson
BY
Perrine, Amode, Morton-Barrows
ATTORNEYS

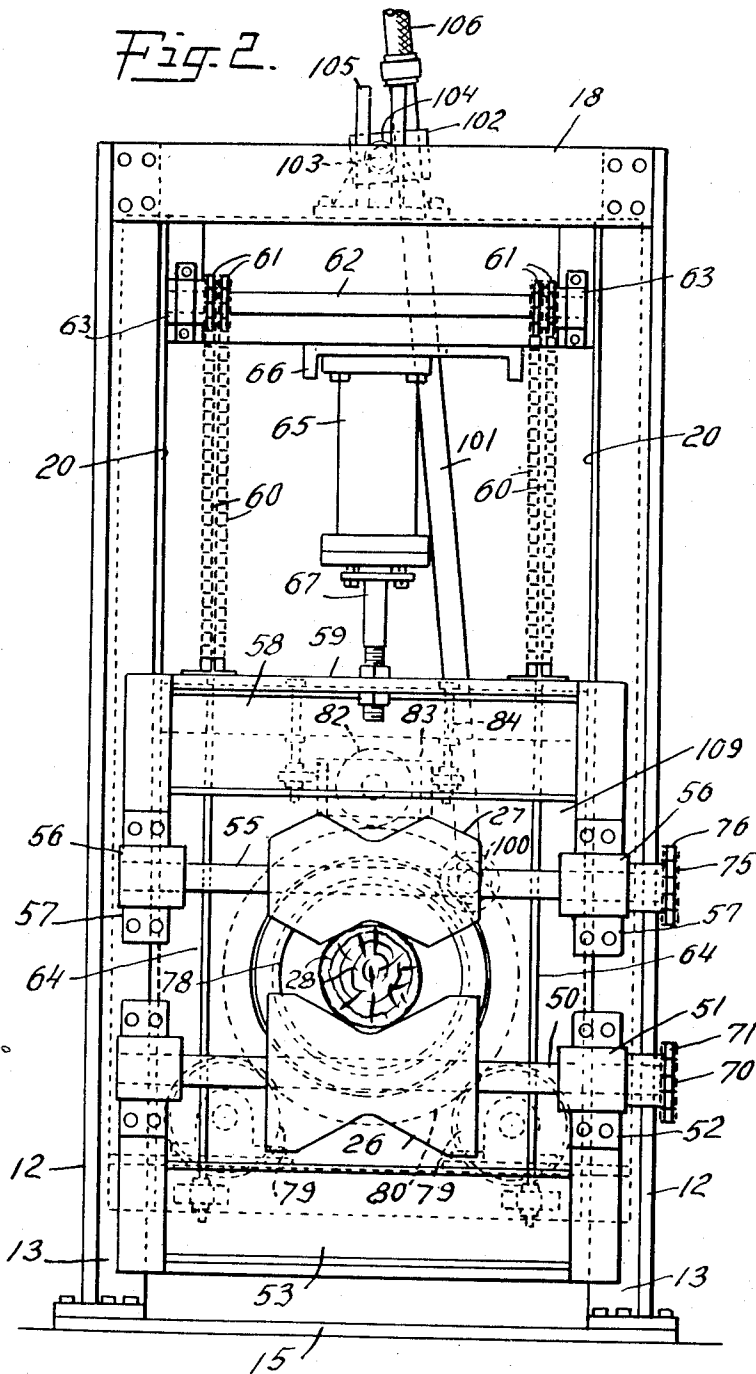
March 28, 1950

G. M. JOHNSON
LOG BARKER HAVING WATER-JETS OSCILLATABLE
ABOUT LONGITUDINAL LOG AXIS

2,501,848

Filed April 10, 1946

5 Sheets-Sheet 2



INVENTOR
George Meder Johnson
BY
Pennie, Edmonds, Morton & Barrows
ATTORNEYS

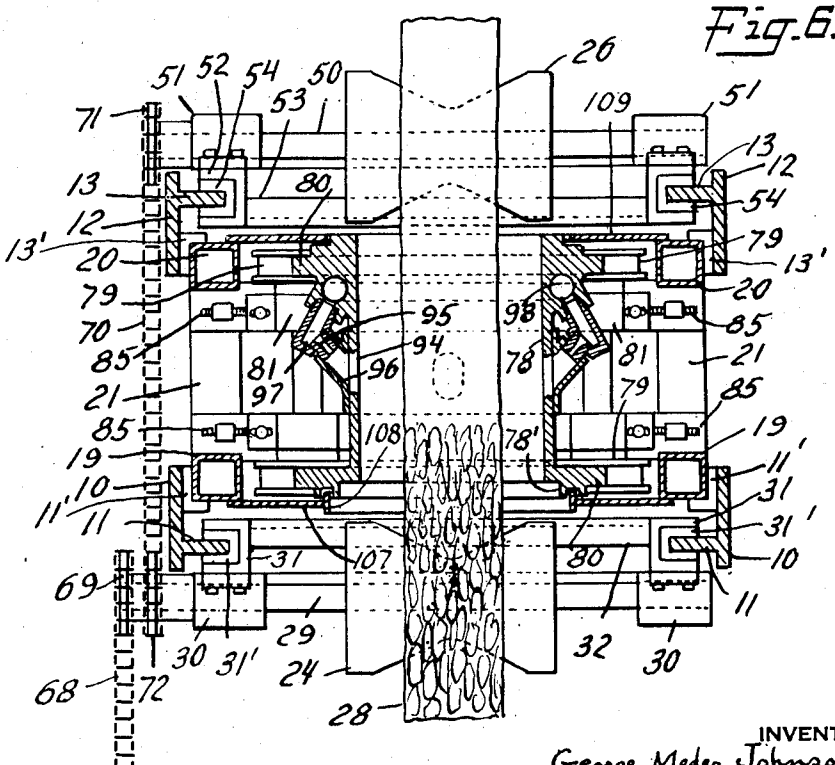
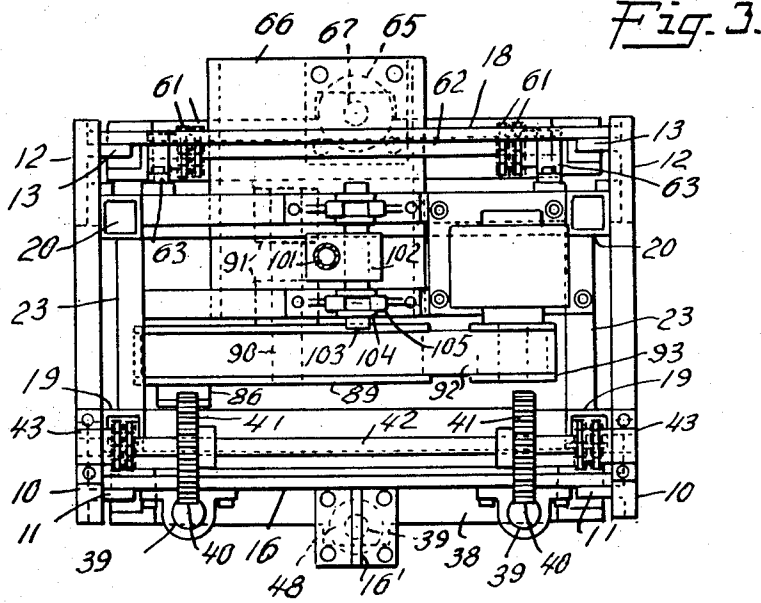
March 28, 1950

G. M. JOHNSON
LOG BARKER HAVING WATER-JETS OSCILLATABLE
ABOUT LONGITUDINAL LOG AXIS

2,501,848

Filed April 10, 1946

5 Sheets-Sheet 3



INVENTOR
George Meder Johnson
BY
Pennie, Almonds, Morton & Barrowe
ATTORNEYS

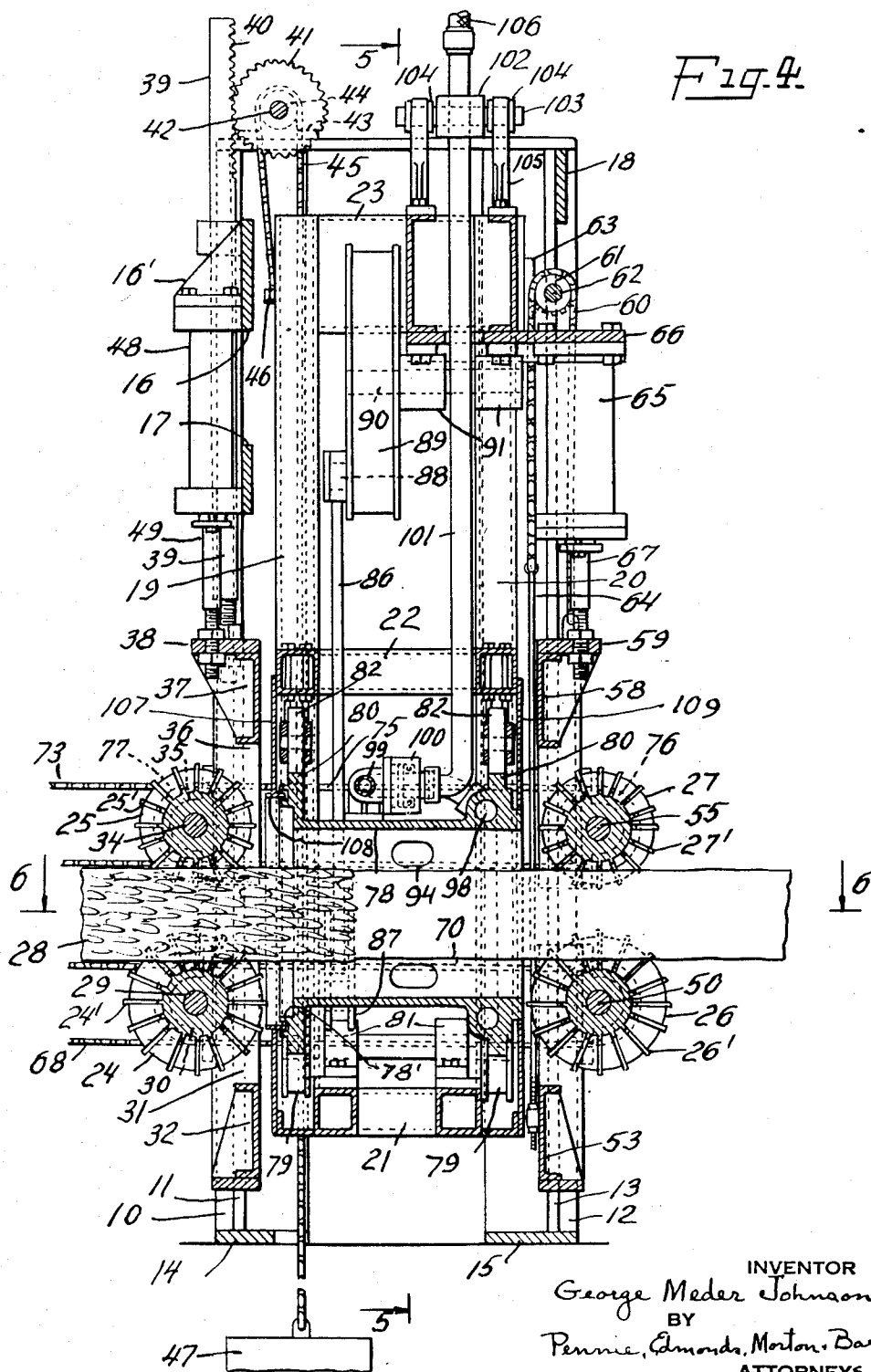
March 28, 1950

G. M. JOHNSON
LOG BARKER HAVING WATER-JETS OSCILLATABLE
ABOUT LONGITUDINAL LOG AXIS

2,501,848

Filed April 10, 1946

5 Sheets-Sheet 4



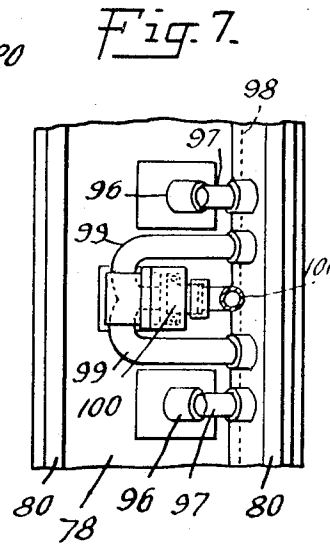
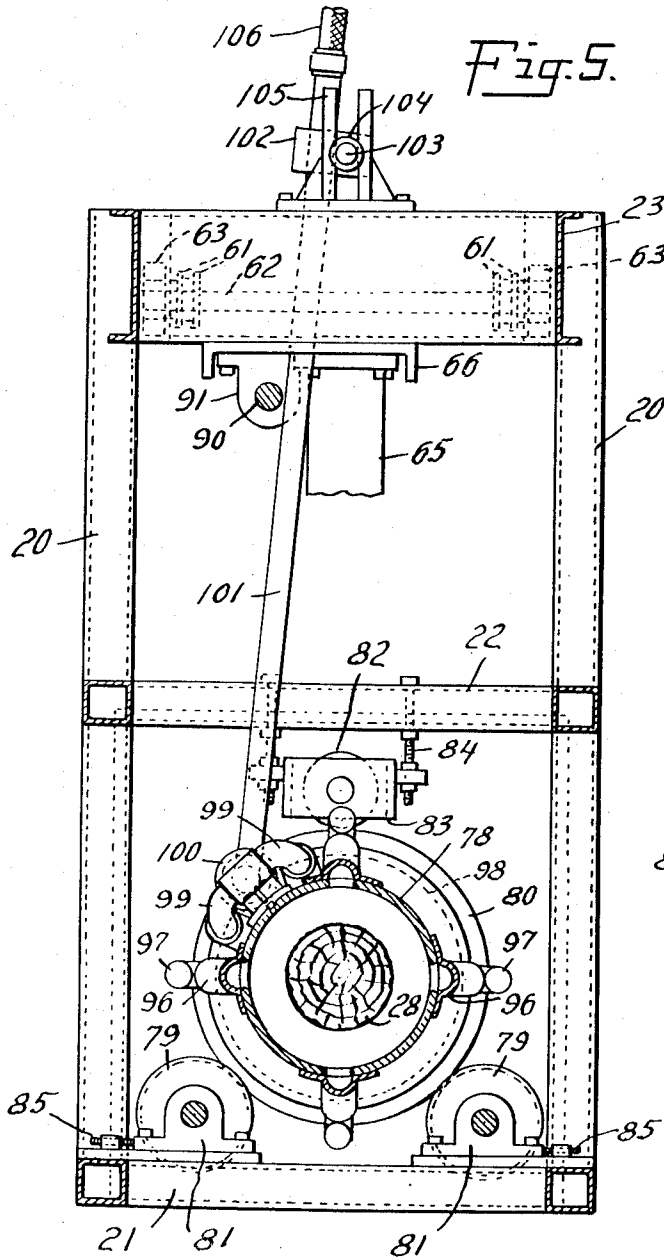
March 28, 1950

G. M. JOHNSON
LOG BARKER HAVING WATER-JETS OSCILLATABLE
ABOUT LONGITUDINAL LOG AXIS

2,501,848

Filed April 10, 1946

5 Sheets-Sheet 5



INVENTOR
George Mader Johnson
BY
Perrine, Edwards, Morton, Barrows
ATTORNEYS

UNITED STATES PATENT OFFICE

2,501,848

LOG BARKER HAVING WATER-JETS OSCILLATABLE ABOUT LONGITUDINAL LOG AXIS

George Meder Johnson, Port Angeles, Wash.,
 assignor to Rayonier Incorporated, New York,
 N. Y., a corporation of Washington

Application April 10, 1946, Serial No. 660,965

4 Claims. (Cl. 144—208)

1

This invention relates to log-barking, and has for its object the provision of an improved method of and apparatus for barking and cleaning logs. More particularly, the invention contemplates a novel and improved method of and apparatus for log barking in which high velocity water jets cut through and remove the bark from the log without removing any of the wood.

The invention is firstly characterized in that the log passes through the machine at a uniform rate without rotating the log. Secondly, as the log passes through the machine, streams of water are applied to its surface by a plurality of high velocity, radially-directed water jets arranged in a plane perpendicular to the axis of the log. And thirdly, the water jets are oscillated around the advancing log so that in striking the log they trace a pattern completely encircling the log's surface. Thus, in accordance with the method of the invention, the log passes through a plurality of high velocity water jets uniformly positioned around and spaced from the surface of the log in a plane perpendicular to the axis of the log. The water jets strike the advancing log at an angle of 30 to 90° (advantageously about 45°) with its axis, and are derived from a source of water under a pressure of 500 to 2000 pounds (advantageously about 1100 pounds) per square inch. The water jets are oscillated, preferably through an angle of 360° divided by the number of water jets, and in striking the advancing log cut through and remove the bark therefrom in a pattern completely encircling the surface of the log.

The apparatus of the invention is an hydraulic log-barker comprising suitable means, such as rolls, for advancing the log through a hollow cylindrical frame having a plurality of circumferentially spaced openings in its cylindrical wall. A plurality of circumferentially spaced nozzles are operatively secured to the cylindrical wall of the frame, approximate the openings therein, and are adapted to direct jets of water through the openings and obliquely towards the advancing log, the jet and the adjacent debarked surface forming an acute angle. The frame is oscillated or rocked through such an angle that the entire circumference of the advancing log is subjected to the jets of water projected through the openings in the frame's wall. The cylindrical frame is carried by an inner framework or carriage movable vertically within the main structural framework of the barker. This inner framework is operatively connected to the log-feeding rolls so that it is automatically centered with respect to the advancing log irrespective of its diameter.

2

The foregoing and other novel features of the invention will be best understood from the following description taken in conjunction with the accompanying drawings, in which

5 Figs. 1, 2 and 3 are front elevation, rear elevation and top plan, respectively, of an hydraulic log-barker embodying the invention,

Fig. 4 is a vertical section on the section line 4—4 of Fig. 1,

10 Fig. 5 is a vertical section, on the section line 5—5 of Fig. 4, of the vertically-movable carriage for the cylindrical frame,

Fig. 6 is a cross-section on the section line 6—6 of either Fig. 1 or Fig. 4, and

15 Fig. 7 is a development of the water inlets for the cylindrical frame and its interior circular conduit.

The main structural metal framework of the log-barker comprises a pair of spaced front uprights 10 to each of which is welded an inwardly extending guide rail 11, and a pair of spaced rear uprights 12 with inwardly extending guide rails 13. The uprights 10 (and attached guide rails 11) are appropriately secured to and are supported upon the ends of a transverse base or sole plate 14, and the uprights 12 are similarly secured to and supported upon the ends of a base plate 15. Two spaced transverse plates 16 and 17 are bolted or otherwise suitably secured to the inner face of the front guide rails 11 approximate their upper ends. The upper ends of the rear guide rails 13 are similarly secured together by a transverse plate 18.

35 An inner framework or carriage is positioned within the main framework and is mounted for such vertical movement as is required to automatically center the cylindrical frame carried thereby. The inner framework is made up of hollow members conveniently formed by two L-shaped structural metal beams on plates positioned with abutting longitudinal edges joined by welding. The inner framework thus comprises forward and rear hollow uprights 19 and 20, respectively, a hollow rectangular base 21, a similar hollow rectangular brace 22 about midway of the ends of the uprights 19 and 20, and a rectangular head frame 23. The inner framework is mounted to slide vertically in guideways 11' and 13' appropriately secured to the inner face of the uprights 10 and 12, respectively (Fig. 6).

50 A pair of cooperating lower and upper feed rolls 24 and 25, respectively, and a similar pair of cooperating lower and upper delivery rolls 26 and 27, respectively, are operatively mounted in the front and rear, respectively, of the barker for

3

supporting and advancing a log 28 therethrough. Each roll is operatively carried by a crosshead of substantially similar construction, the crosshead 32 of the lower feed roll 24 being relatively fixed or stationary, while the crossheads 37, 53 and 58 of the other three rolls are vertically movable, as hereinafter more particularly described.

The lower feed roll 24 is secured to a horizontal shaft 29 journaled in bearings 30 bolted to the upwardly extending arms 31 of the crosshead 32. Each arm 31 has a longitudinal recess of rectangular section in which is secured a liner 31' of brass or suitable bearing metal having a slot into which extends the longitudinal edge of the adjacent guide rail 11 (Fig. 6). The arms 13 are secured to the guide rails by bolts 33.

The upper feed roll 25 is secured to a horizontal shaft 34 journaled in bearings 35 bolted to the depending arms 36 of the vertically movable crosshead 37. Each arm 36 has a longitudinal recess with a liner of brass or the like, and each liner has a longitudinal slot in sliding engagement with the longitudinal edge of the adjacent guide rail 11, whereby the crosshead 37 is adapted to slide vertically on the guide rails 11.

The crosshead 37 has a top bar 38 to which are bolted the lower ends of a pair of spaced rods 39. The inner upper end of each rod 39 has gear or rack teeth 40 meshing with a pinion 41. The two spaced pinions 41 are secured to a shaft 42 journaled in bearings 43 mounted on the top of the uprights 10. A twin-gear sprocket 44 is secured to the shaft 42 between each bearing 43 and the adjacent pinion 41. The sprocket 44 has half the pitch diameter of the pinion 41, for reasons hereinafter explained. A twin-linked chain 45 secured at one end (46) to one of the forward hollow uprights 19 passes over each sprocket 44 and thence downwardly through that hollow upright and is secured at its other end to a counterweight 47. A fluid pressure actuated cylinder 48 is bolted at its top to a bracket 16' welded or otherwise suitably secured to the front face of the transverse plate 16 about midway of its ends. The cylinder has a depending reciprocatory piston rod 49 bolted at its lower end to the center of the top bar 38 of the crosshead 37.

The lower delivery roll 26 is secured to a horizontal shaft 50 journaled in bearings 51 bolted to the upwardly extending arms 52 of the crosshead 53. Each arm 52 has a longitudinal recess in which is secured a liner 54 of brass or the like having a slot in sliding engagement with the longitudinal edge of the adjacent guide rail 13, whereby the crosshead 53 is adapted to slide vertically on the guide rails 13.

The upper delivery roll 27 is secured to a horizontal shaft 55 journaled in bearings 56 bolted to the depending arms 57 of the crosshead 58. Each arm 57 has a longitudinal recess with a liner of brass or the like, and each liner has a longitudinal slot in sliding engagement with the longitudinal edge of the adjacent guide rail 13, whereby the crosshead 58 is adapted to slide vertically on the guide rails 13.

The crosshead 58 has a top bar 59 to which are bolted the lower ends of a pair of spaced twin-linked chains 60. The chains pass over cooperating twin-gear sprocket wheels 61 secured to a shaft 62 journaled in bearings 63 bolted near the upper ends of the hollow uprights 20. The depending ends of the chains 60 are secured to the upper ends of connecting rods 64, and the lower ends of the rods are adjustably secured to the crosshead 53 of the lower delivery roll 26 (Figs. 75

4

2 and 4). A fluid pressure actuated cylinder 65 is bolted at its top to the lower face of a transverse plate 66 welded or otherwise suitably secured to the underside of the head frame 23. The cylinder has a depending reciprocable piston rod 67 bolted at its lower end to the center of the top bar 59 of the crosshead 58.

The shaft 29 of the stationary lower front crosshead 32 is driven by a chain 68 cooperating with a sprocket wheel 69 on the shaft. The shaft 50 of the lower rear crosshead 53 is driven from the shaft 29 through a chain 70 cooperating with sprocket wheels 71 and 72 secured to the respective shafts. The shaft 34 of the upper front crosshead 37 is driven by a chain 73 cooperating with a sprocket wheel 74 on the shaft. The shaft 55 of the upper rear crosshead 58 is driven from the shaft 34 through a chain 75 and cooperating sprocket wheels 76 and 77 fixed to the respective shafts.

The rolls 24, 25, 26 and 27 have a generally concave central peripheral contour, and are transversely ribbed or fluted. In the particular log-barker illustrated in the drawings the rolls are 26 inches long with a minimum diameter of 10 inches. The sides of the concave contour make an angle of about 30° with the axis of the roll, and the apex of the concavity is curved on about a 3 inch radius. The concave contour of the lower rolls 24 and 26 is somewhat longer than that of the upper rolls 25 and 27 (e. g. 20 and 14 inches, respectively), and the ends of the lower rolls (beyond the concave contour) are cylindrical, while the corresponding ends of the upper rolls are conical, the fluting being extended to these end portions. The conical end portions of each upper roll permit that roll to approach nearer to its cooperating lower roll than it otherwise could, and thus decreases the operative central opening between the rolls (when closed) and thereby permits the barking of logs of smaller diameter. The flutes 24', 25', 26' and 27' are radially disposed teeth and may advantageously be about 1 inch deep and about 1¼ inches wide at the base tapering to a width of ½ inch at the periphery.

A hollow cylindrical frame 78 is positioned within the lower end of the inner framework or carriage with its axis automatically centered with respect to the feed and delivery rolls. The frame 78 is supported on flanged wheels 79 engaging circular trunnion rails 80 of the frame. The wheels 79 are mounted in bearings 81 bolted to the opposite side members of the base 21 (Fig. 5). A wheel 82 engages the top of each trunnion rail 80 and serves to hold the frame firmly on its supporting wheels 79. The wheels 82 are mounted in bearings 83 adjustably secured to the opposite side members of the base 22 by depending bolts 84 (Fig. 5). Each of the bearings 81 has an adjusting bolt 85 to permit initial centering of the frame 78 (Figs. 5 and 6). The front or leading edge of the frame has an annular recess 78' (Figs. 4 and 6) in which knives, cutters, sharp teeth or the like may be appropriately mounted, if desired, to remove limbs, knots or other obstructions on the log.

The frame 78 is rocked through an angle of 90° by a connecting rod 86 pivoted at its lower end to a bracket 87 bolted to the outside cylindrical wall of the frame approximate its forward end (Figs. 1 and 4). The connecting rod 86 is pivoted at its upper end to a crank pin 88 eccentrically mounted on the front face of a pulley 89. The pulley 89 is secured to a shaft 90 journaled in bearings 91 bolted to the underside of the

plate 66 (Fig. 4). The pulley 89 is driven by a belt 92 and cooperating pulley 93 on the shaft of an electric motor (or other suitable source of power) bolted to the top of the head frame 23.

The cylindrical frame 78 has a series of circumferentially spaced openings 94 in its cylindrical wall about midway of its ends for the admission of water from nozzles 95. The nozzles are held between flexible sealing flanges 96, secured to the wall of the frame, and couplings 97 communicating with an interior circumferential conduit 98 in the rear head of the frame. The flanges 96 may be advantageously made of oil resisting rubber of about 80 plastometer, bolted or otherwise suitably secured to the cylindrical wall of the frame. Water is fed to the conduit 98 through a bifurcated pipe 99 having a swinging joint or swivel connection 100 with the lower end of a supply pipe 101 (Figs. 4, 5 and 7). The upper end of the pipe 101 is carried in a swinging block 102. The block 102 is mounted on a transverse shaft 103 having a wheel 104 on each side of the block. Each wheel 104 rides in a bifurcated yoke 105 bolted to the upper side of the head frame 23. The swinging block 102 and the swinging joint connection 100 permit the upward and lateral movement of the pipe 101 as the frame is rocked through 90°, while permitting free supply of water without leaks to the conduit 98. The upper end of the pipe 101 is connected by a flexible hose 106 to a suitable source of water under the requisite pressure.

The inner framework or carriage is held in its vertically adjusted position in the guideways 11' and 13' by the chains 45 and counterweights 47 together with the rack 40 and pinion 41 connection to the upper front roll 25 and its crosshead 37. The counterweights 47 only partially balance the weight of the inner framework and upper roll 25 and crosshead 37. Without a counterweight, the cylinder 48 would have to lift the entire weight of the roll 25 and crosshead 37 and half the weight of the inner framework and its mechanism, due to the fact that the sprocket 44 has half the pitch diameter of the pinion 41. The cylinder 48 acts to produce only an upward pull, and may be hydraulically actuated, or actuated by steam or air. When the cylinder 48 is released, the weight of the roll 25, crosshead 37 and inner framework and its mechanism holds the roll against the log. The inner framework and mechanism are relatively heavy and all of the forces tending to hold the roll against the log, if not neutralized, would cause the roll to exert more pressure on the log than is desirable. Hence, the function of the counterweights 47 is to neutralize part of these forces and by suitably varying the counterweight, the amount of pressure exerted on the log by the roll 25 can be properly adjusted.

The rolls 26 and 27 with their cooperating crossheads 53 and 58, respectively, substantially balance one another. These rolls and their cooperating crossheads are in effect suspended from the ends of the chain 60, and when the upper roll 27 is elevated or lowered, the lower roll 26 is correspondingly lowered or raised, so that the opening between the rolls is always centered with respect to the cylindrical frame 78. The cylinder 65 is double acting so that the pressure exerted against the log by the rolls 26 and 27 is determined by the forces exerted by the cylinder. The cylinder 65 is actuated by steam, air or other elastic fluid because of the cushioning effect obtained.

In barking logs of irregular surface, it is neces-

sary that the upper feed roll 25 ride over any surface irregularity or obstruction. This is readily possible since the cylinder 48 operates only to raise the roll 25, and the use of a hydraulic cylinder is permissible. If the cylinder 65 were hydraulically operated, the inertia of the hydraulic medium might cause the rolls 26 and 27 to open too slowly when encountering a surface irregularity or obstruction and an excessive strain might be imposed on the mechanism. The cylinders 48 and 65 are manually controlled and operated. If the logs are approximately the same diameter, the operator will usually find it unnecessary to operate the cylinders 48 and 65, since the logs can be butted end to end and the fluted feed rolls 24 and 25 will climb easily from one log to the next. With logs of different diameters or logs having broken ends, it may be necessary for the operator to open the rolls, by manipulation of the cylinder 48, to receive them.

The position of the cylindrical frame 78 is adjusted by means of the chains 45 so that when the upper roll 25 is in its extreme lower position to receive a log of minimum diameter, the center axis of the frame will coincide with the longitudinal center axis of the log. When any log of a larger diameter is to be fed to the barker, the roll 25 is raised in proportion to the increase in log diameter, whereas the center axis of the log will only be raised half that distance, that is in proportion to the increase in log radius. Movement of the roll 25 upwardly (or downwardly), simultaneously moves the inner framework and the cylindrical frame 78 upwardly (or downwardly), and since the pitch diameter of the sprocket 44 is half the pitch diameter of the pinion 41, the upward (or downward) movement of the frame 78 is half that of the roll 25. Thus, the frame 78 is always centered with respect to the incoming log so long as the roll 25 is riding on the log.

The outgoing or delivery rolls 26 and 27 are positioned, with respect to the outgoing log, by the cylinder 65 which is mounted on the inner framework that carries the cylindrical frame 78. The chains 60 running over the sprockets 61 always maintain the rolls 26 and 27 at points equally distant from the central axis of the frame 78. Since the cylinder 65 is mounted on the vertically movable inner framework, this relationship is maintained regardless of the position of the incoming or feed roll 25. This is desirable since at times the outgoing rolls 26 and 27 will be carrying a different diameter of log than the incoming rolls 24 and 25.

In operating the barker the log 28 is fed there-through at a uniform rate, conveniently at about 1 foot per second, and without rotation by the fluted rolls. Thus, the log, suitably guided, is introduced between the feed rolls 24 and 25, the upper roll 25 being initially elevated, if necessary, to permit introduction of the end of the log between the rolls. With the cylinder 48 released, the weight of the upper roll holds it in operative engagement with the upper surface of the log. The rolls, rotated by their respective driving chains 68 and 73 from a suitable source of power (not shown), advance the log through the barker. When the barked end of the log reaches the delivery rolls 26 and 27, which are initially suitably separated and centered by means of the connecting chains 60 and rods 64 to receive the advancing end of the log, the rolls 26 and 27 are brought into operative engagement with the log by the cylinder 65. The log passes through the barker

at a uniform rate and without any rotary movement. The delivery rolls 26 and 27 are driven by the chains 71 and 75, respectively, and draw the barked log out of the barker after the log has advanced beyond the feed rolls 24 and 25.

The four nozzles 95 (circumferentially spaced 90° apart) direct high velocity jets of water against the surface of the advancing log at an angle of 30 to 90°, e. g. 45° (Fig. 6). The water is fed to the nozzles at a pressure of 500 to 2000 (e. g. 1100) pounds per square inch, through the supply pipe 101 and its swinging connection with the interior circular conduit 98 in the rear head of the cylindrical frame 78. As the frame is rocked, or oscillated back and forth, through an angle of 90° by the connecting rod 86, the jets of water from the nozzles 95 oscillate around the log in a plane perpendicular to the axis of the log and trace a pattern around the entire circumference of the log. In this manner the bark is effectively removed from the log with a minimum amount of water.

The frame 78 may conveniently oscillate at a frequency of from 10 to 40 complete cycles per minute, as high a frequency as is practical being usually advantageous. However, too high frequency should be avoided since it tends to impart objectionable vibration to the frame and associated mechanism. The direction of the water jets is such that practically all of the debris is ejected at the forward end of the frame 78. To prevent this debris working its way into the barker mechanism, an annular plate 107 is secured to the forward hollow uprights 19 (Fig. 6). The circular opening of the plate 107 registers with and is of slightly greater diameter than the circular opening of the frame. The central opening of the plate has a flange or ring 108 making an effective seal with the forward end of the oscillating frame. A similar annular sealing plate 109 is secured to the rear hollow uprights 20, but since little debris is ejected from this end of the frame, the seal between the plate and the oscillating frame may be comparatively simple.

While the barker illustrated in the drawings has four nozzles or water jets uniformly spaced around the advancing log, it may have two or more such nozzles, and the nozzles will oscillate through an angle of not more than 180°. The angle of oscillation is determined by the number of nozzles and will be of such a value that the pattern traced by the water jets in striking the log covers its entire surface. The log may be fed through the barker by any suitable mechanical means other than the fluted feed rolls. Water may be supplied to the nozzles through flexible hose without the use of swing joints, but is preferably supplied through the swinging joints without flexible hose as herein described and shown.

An advantage of the invention is that the logs are fed to the barker continuously, and since they are not chucked or rotated the condition of the log with respect to soundness, condition of ends, straightness or length is not important. The barker is compact, simple in construction and operation, and avoids handling high pressure water in large packing glands. The pattern traced by the water jets as the log moves through the barker is such as to remove the bark with the smallest possible amount of water. This is a very important advantage, since one of the principal items of cost in the operation of a hydraulic barker is the power and equipment required to provide the high pressure water used

by the nozzles or jets. The invention may be applied with economy and advantage to the barking of all kinds of logs, and especially to the barking of small and irregular shaped logs.

I claim:

1. A log-barker comprising a hollow cylindrical frame having a plurality of circumferentially spaced openings in its cylindrical wall, means in juxtaposition to the frame for moving a log at a uniform rate and without rotation substantially centrally through the frame, a nozzle operatively secured to the cylindrical wall of the frame approximate each of said openings and located to direct through the openings a jet of water angularly towards the advancing log, means for oscillating said frame angularly about a longitudinal axis of said log and subjecting the entire circumference of the advancing log to the jets of water directed through the series of spaced openings in the wall of the frame, a high pressure water supply pipe having a swivel connection with said frame, and means for conducting water from said supply pipe to each of said nozzles.

2. A log barker comprising a hollow frame having a plurality of circumferentially spaced nozzles, means in juxtaposition to the frame for moving a log substantially centrally through the nozzles, means for vertically adjusting said frame to center it for logs of different diameters, said nozzles being operatively secured to the frame and positioned to deliver a jet of water angularly against the surface of the advancing log, means for oscillating said frame about a longitudinal axis of said log and subjecting the entire circumference of the advancing log to the jets of water delivered by said nozzles and a pipe means with a swivel joint for supplying high pressure water to said nozzles as the frame oscillates.

3. A log barker comprising a hollow cylindrical frame mounted on a vertically movable carriage, a pair of cooperating feed rolls in juxtaposition to the frame for advancing a log substantially centrally through said frame, means for vertically moving one of said rolls to accommodate logs of different diameters, means operatively connected between said movable roll and said carriage for vertically moving the carriage through half the distance that the movable roll is moved whenever that roll is moved whereby said frame is automatically centered with respect to logs of different diameters, a plurality of circumferentially spaced nozzles operatively connected with said frame and positioned to deliver jets of water angularly towards the advancing log, means for oscillating said frame about a longitudinal axis of said log and subjecting the entire circumference of the advancing log to the jets of water delivered by said nozzles by reason of the oscillation of the frame, and pipe means with a swivel joint for supplying high pressure water to said nozzles as the frame oscillates.

4. A log barker comprising a frame, a plurality of circumferentially spaced nozzles carried by the frame, means for advancing the log to be debarked through the frame and between the nozzles, means for oscillating the frame and nozzles about a longitudinal axis of the log to subject the entire circumference of the log to jets of water delivered by the nozzles, and means for supplying water to the nozzles during oscillation of the frame and nozzles, the means for

supplying water including a swivel joint connection adjacent the frame.

GEORGE MEDER JOHNSON.

REFERENCES CITED

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

UNITED STATES PATENTS

Number	Name	Date
397,114	Dolsen	Feb. 5, 1889
817,943	Waltz	Apr. 17, 1906
1,277,808	Witham	Sept. 3, 1918
1,295,875	Eaglesfield	Mar. 4, 1919

Number
1,898,964
1,943,649
1,969,914
2,395,845
2,413,341
2,422,757
2,473,461

10

Number
241,772
35,574
67,469

Name	Date
Jinnett	Feb. 21, 1933
White et al.	Jan. 16, 1934
Swigert	Aug. 14, 1934
Bukowsky	Mar. 5, 1946
Swift	Dec. 31, 1946
Swift	June 24, 1947
White	June 14, 1949

FOREIGN PATENTS

Country	Date
Germany	Dec. 11, 1911
Sweden	Oct. 1, 1913
Sweden	June 4, 1929