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HYDRAULIC BARK-REMOVER HAVING CERTAIN NOZZLES CONTROLLED BY LOG-INTERRUPTED LIGHT-BEAM

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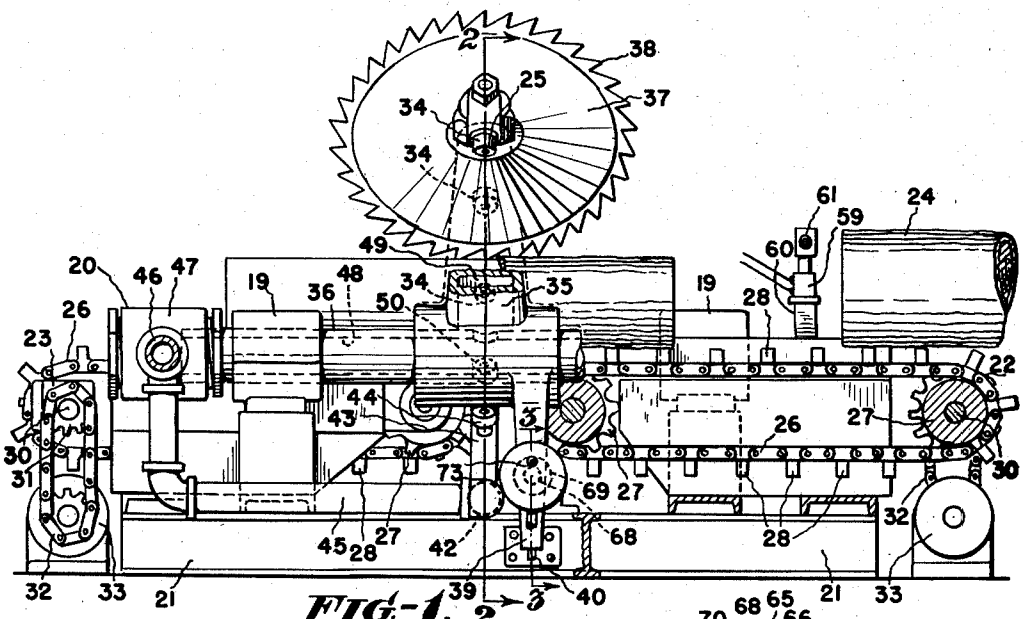


FIG. 1.

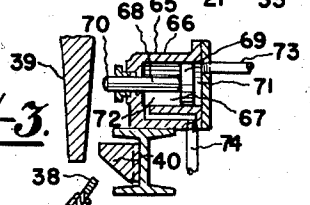


FIG. 3.

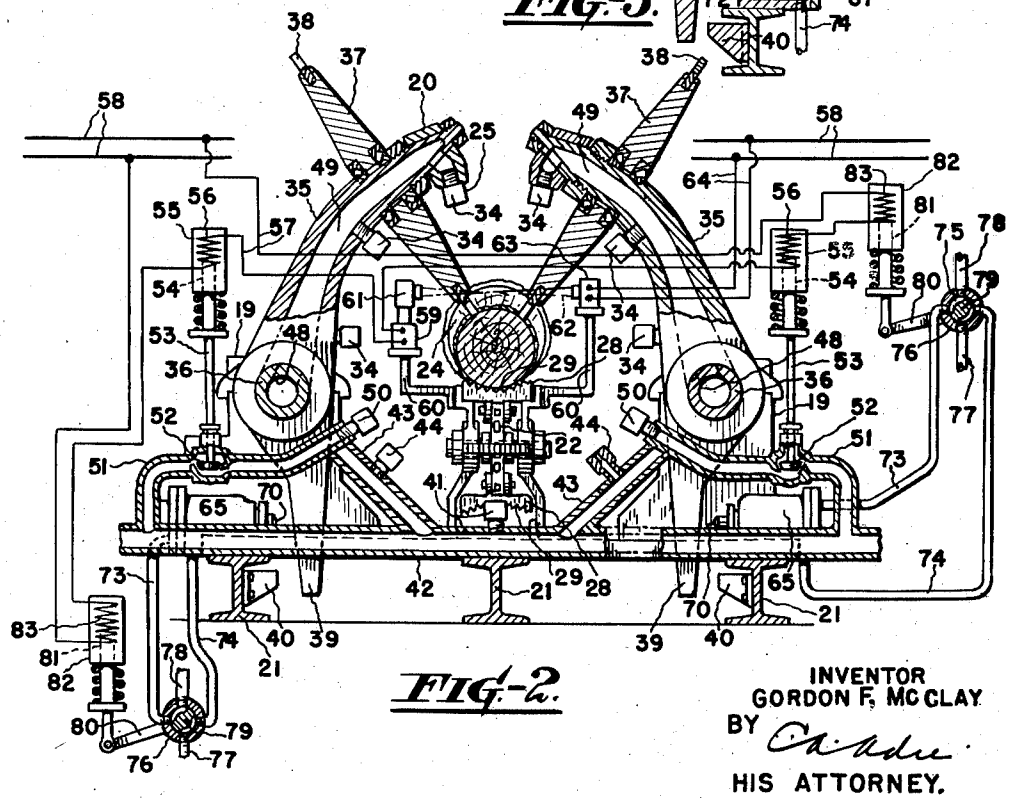


FIG. 2.

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HYDRAULIC BARK REMOVER HAVING CERTAIN NOZZLES CONTROLLED BY LOG-INTERRUPTED LIGHT BEAM

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8 Claims. (Cl. 144—208)

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This invention relates to a hydraulic log debarking device wherein a plurality of hydraulic jets issuing from nozzles arranged around the path of movement of the log are directed laterally against the log.

One object of the invention is to effect a rapid and complete removal of the bark from a log.

Another object is to maintain the lengths of the hydraulic jets substantially constant irrespective of variations in the diameter of the log.

Other objects will be in part obvious and in part pointed out hereinafter.

In the drawings accompanying this specification and in which similar reference numerals refer to similar parts,

Figure 1 is a side elevation, partly broken away, of a hydraulic log debarking device constructed in accordance with the practice of the invention,

Figure 2 is a transverse view taken through Figure 1 on the line 2—2, and

Figure 3 is a similar view taken through Figure 1 on the line 3—3 showing a detail of the invention.

Referring more particularly to the drawings, 20 designates a log debarking device which, according to the invention, comprises a frame 21, a pair of conveyors 22 and 23, for carrying a log 24 along the frame 21, and nozzles, designated 25 as a group, to direct hydraulic jets laterally against the log 24 for removing its bark.

The conveyors 22 and 23 each comprise an endless chain 26 which is trained over suitably spaced sprocket wheels 27 and carry, on alternate links, cross-bars 28 the outer surfaces 29 of which are of slightly concave shape and serrated to accommodate the log 24. The inner opposed ends of the conveyors are suitably spaced to permit the ready passage of hydraulic jets therethrough to the log, and on the shafts 30 for the sprocket wheels 27 are other sprocket wheels 31 for engagement with chains 32 mounted upon the shafts of motors 33 whereby the conveyors 22 and 23 are driven. Thus, each conveyor is driven by its own motor and the unbarked log is carried into the plane of the jets issuing from the nozzles 25 by the conveyor 22, thence onto the conveyor 23 whereby it will be removed from the machine.

As a preferred arrangement, all of the nozzles 25 lie in the same vertical plane and are positioned to direct their jets laterally through the space between the conveyors and against the log. They are preferably arranged in a circular pattern and those lying at higher elevations than the cross-bars 28, and which are designated 34,

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are threadedly connected to arms 35 pivotally mounted upon shafts 36 that extend along opposite sides of the conveyors and are supported by bearings 19 on the frame 21. The arms are inclined toward the log 24 and of such curvature that the nozzles 34 will all be at substantially the same distance from the log in the operative positions of the arms 35.

To the end that such spacing of the nozzles 34 with respect to the log may be maintained substantially constant irrespective of variations in the diameter of the log, or for logs of different sizes, each arm is provided with a wheel 37 that is rotatable on the arm and has teeth 38 at its periphery for engagement with the log. The wheels 37 are rotatable on the free end portions of the arms 35 so that their weight and much of the weight of the arms may be applied to the log and serve to hold it immovable upon the conveyors.

The wheels are inclined with respect to each other and engage the log on opposite sides of its top center, thereby preventing the log from rolling off of the conveyors. Each arm 35 is provided with an extension 39 that depends from the bearing portion of the arm for engagement with a stop member 40 on the frame to hold the wheels at a point suitably spaced from the conveyors to permit an approaching log to move thereunder.

The remaining nozzles occupy fixed positions with respect to the log. One of these, designated 41, also directs its jet between the conveyors 26 and lies beneath the path of movement of the log and is threadedly connected to a supply conduit 42 on the frame 21 and is so spaced with the underside of the log 24 that its jet will be substantially of the same length as those issuing from the nozzles 34. On opposite sides of the nozzle 41 are inclined branches 43 of the conduit 42 and each branch has a nozzle 44 which is spaced substantially the same distance from the log as the nozzle 41 and so positioned that its jet will flow through the space between the conveyors and against the log at points between the points of impact of the jets issuing from the nozzle 41 and the lowermost nozzles of the group designated 34.

The water supply for the nozzles 41 and 44 is conveyed to the conduit 42 by a conduit 45 extending longitudinally of the frame 21 and leading to a conduit 46 which leads from a suitable source of supply (not shown) and opens into a water box 47 on the end of the adjacent shaft 36, there being a passage 48 in said shaft which

is in constant communication with a passage 49 in the arm 35 mounted thereon for supplying water to the nozzles 34.

A conduit similar to that designated 45 may also extend from the opposite end of the conduit 42 to a water box similar to and lying directly opposite the water box 47 for supplying water to the shaft 36 for the other arm 35, said shaft and said other arm also having suitable passages for supplying water constantly to the associated nozzles 34.

In order to assure an adequate number of hydraulic jets against the surface of logs of large diameter presenting comparatively large areas for debarking, additional nozzles are provided between those designated 44 and the lowermost nozzles 34. These nozzles, designated 50, are threaded into the ends of conduits 51 that rest at one end upon the upper ends of the branches 43 and open at their other ends into the conduit 42.

The conduits 51 are provided with valves 52 of the poppet type for controlling the flow of water to the nozzles 50, and the stems 53 of the valves are connected to spring-pressed armatures 54 of solenoids 55 the coils 56 of which are connected in series in an electrical circuit 57 leading from mains 58. The energization of the solenoids 55 is effected by well known devices comprising a sensitive relay 59 in the circuit 57 and supported by a bracket 60 on one side of the conveyor 22. The sensitive relay is controlled by a photo-electric cell 61 superimposed thereon to receive a beam of light 62 directed thereto by a light-source 63 located on the opposite side of the conveyor 22. The light-source 63 is also supported by a bracket 60 and derives its electrical current from the mains 58 through an electrical circuit 64.

The photo-electric cell 61 and the light-source 63 are so positioned relatively to each other that the light beam 62 will be cast horizontally above the path traversed by logs of small and medium diameters but will be interrupted by logs of greater diameter having correspondingly greater areas of bark and will, in consequence, require the application thereto of a greater number of hydraulic jets for debarking it.

As has been previously intimated, the arrangement of the extensions 39 and the stop members 40 is such that when they engage each other the wheels 37 will be positioned at points above the plane of the conveyors suitable to assure their correct engagement with logs of small and medium diameters. Such spacing of the wheels with respect to the conveyors will, however, be unsuited for their engagement with a log of large diameter as for example, one requiring the operation of the nozzles 50, since then the leading end of the log would initially engage the wheels at a high point on their peripheral surfaces and impart severe thrusts to the arms. In view of the foregoing, means are provided to selectively elevate the wheels 37 to a position better suited for correct engagement with the larger log. To this end the debarking device is provided with actuators 65 which are positioned on the opposite sides of the frame 21 outside of and in the same transverse plane as the extensions 39.

Each actuator comprises a casing 66 having a piston chamber 67 and a piston 68 reciprocable therein for engagement and disengagement with the extension 39. The piston comprises a head 69 and a stem 70 which extends slidably through the end of the casing 66 for engagement with the extension 39 and is of a length that when the piston is in its retracted position sufficient clearance will exist between the free end of the stem 70 and the extension 39 to permit the latter to seat against the stop member 40.

Pressure medium, as for example water, is admitted into the outer and inner ends 71 and 72, respectively, of the piston chambers 67 through conduits 73 and 74 that lead from diametrically opposed points of the valve chambers 75 in casings 76 having connected thereto supply and discharge conduits 77 and 78, respectively. The conduits 77 and 78 also communicate with the valve chambers 75 at diametrically opposed points and at right angles to the points of communication of the conduits 73 and 74 with said valve chambers.

Communication of the supply conduits 77 with the conduits 73 or 74 and between the latter conduits and the discharge conduits 78 is controlled by valves 79 in the valve chambers 75. The valves 79 are rotatable in the chambers and have levers 80 that are pivotally connected to the armatures 81 of solenoids 82 having their coils 83 connected in series with the coils of the solenoids 55. Thus, according to the described arrangement, when the solenoids 55 are energized, for causing water to be ejected from the nozzles 50, the valves 79 are rotated at the same time to place the conduits 73 in communication with the supply conduit 77 for actuating the pistons 68 and thereby tilt the arms 35 outwardly.

In the operation of the device, and with the conveyors 22 and 23 operating at the same speed, a log carried by the conveyor 22 moves through the zone of convergence of the hydraulic jets issuing from the nozzles 34, 41 and 44 and, after being debarked by the jets, is transferred onto the conveyor 23 whereby it is removed from the machine. Immediately prior to its entrance into the jet zone the log engages the lower portions of the wheels 37 and causes the arms 35 to be tilted outwardly, as required, to enable the wheels 37 to roll onto the surface of the log. Thereafter, the wheels will roll upon the log and rise and fall in accordance with variations in its diameter so that the distance from the nozzles 34 to the log will at all times be substantially constant.

Inasmuch as the distance from the outlet end of the nozzle 41 to the underside of the log is invariable the length of the hydraulic jet ejected by said nozzle will also remain constant, and the jets issuing from the nozzles 44 will vary in length only in an inconsequential degree since variations in the diameter of the log, or between different logs, do little to vary the distance between the nozzles 44 and the points on the log against which their jets strike.

Whenever a log, or a portion thereof, of a diameter greater than the distance between the crossbars 28 and the light beam 62 moves into the transverse plane of the photo-electric cell it will interrupt the light beam 62 and the sensitive relay 59 will then cause the solenoids 55 and 82 to become energized. In consequence, all of the armatures will be retracted and those designated 54 will open the valves 52 to permit the discharge of hydraulic jets from the nozzles 50 against the log. At the same time, the armatures 81 will rotate the valve 79 to admit water, under pressure, into the outer ends 71 of the piston chambers 67. The water thus admitted will drive the pistons 68 against the extensions 39 and tilt the arms 35

outwardly, thereby elevating the wheels to positions for engagement with the surface of the log.

The valves **52** and **79** will remain in the positions described as long as the log lies across the path of the light beam **62**. But, when a log, or a portion of larger diameter thereof, moves out of the plane of the light beam, said light beam is again immediately established and, by action of the sensitive relay **59**, the solenoids **55** and **82** are again deenergized. The valves **52** will then return to their closed positions to cut-off the flow of water to the nozzles **50** and the valves **79** will be rotated to place the conduits **73** into communication with the discharge conduits **78** and to establish communication between the supply conduits **77** and the conduits **74**. Water will then enter the inner ends **72** of the piston chambers **67** and return the pistons **68** to their initial positions so that their stems **70** will be out of the path of movement of the extensions **39**.

In practice, the present invention has been found to function in an usually efficient manner. By utilizing the log as a means for tilting the arms **35** the length of the jets issuing from the nozzles carried by the arms will remain substantially constant, irrespective of the variations in the diameters of the work. Moreover, by varying the number of hydraulic jets in accordance with variations of the areas requiring debarking a considerable saving in power expenditure may be effected.

I claim:

1. A log debarking device comprising a frame, a pair of endless conveyors arranged in tandem fashion for conveying a log along the frame and being spaced relatively to each other, a liquid conveying conduit pivotally connected to the frame and having a nozzle positioned to direct a hydraulic jet into the space between the opposed ends of the conveyors and against the log, and a wheel on and rotatable about the conduit and bearing against the log to hold the log against the conveyors and to maintain the nozzle at a substantially uniform distance from the log irrespective of variations in the diameter of the log.

2. A log debarking device comprising a frame, a pair of endless conveyors arranged in tandem fashion for conveying a log along the frame and being spaced relatively to each other, liquid conveying conduits pivotally connected to the frame at the opposite sides of the conveyors and having nozzles positioned to direct hydraulic jets into the space between the opposed ends of the conveyors and against such log, and wheels on and rotatable about the conduits and rolling on the surface of the log to hold the log against the conveyors and to impart tilting movement to the conduits in accordance with variations in the diameter of the log for maintaining the nozzles at substantially uniform distances from the log.

3. A log debarking device comprising a frame, a pair of endless conveyors arranged in tandem fashion for conveying a log along the frame and being spaced relatively to each other, shafts on opposed sides of the conveyors having liquid conveying passages, arms pivotally mounted upon the shafts in the transverse plane of the space between the conveyors and having passages in communication with the passages in the shafts, nozzles on the arms positioned for directing hydraulic jets into the space between the conveyors and against such log, and wheels on and rotatable about the arms and engaging the log to hold the log against the conveyors and to impart tilting movement to the arms in accordance with variations in the diameter of the log for maintaining

the nozzles at substantially uniform distances from the log.

4. A log debarking device comprising a frame, a pair of endless conveyors arranged in end to end relation to each other for conveying a log along the frame and having their opposed ends spaced with respect to each other, a plurality of nozzles arranged in a circular pattern around such opposed ends of the conveyors to direct hydraulic jets laterally between the conveyors and against such log, conduit means for constantly supplying fluid to some of the nozzles, valve means for selectively controlling the supply of liquid to others of said nozzles, electro-responsive means for actuating the valve means, a photo-electric cell for controlling the energization of the electro-responsive means, and a light-source positioned to direct a beam of light to the photo-electric cell in a plane traversed by logs of and above a given diameter and out of the plane traversed by logs of diameters smaller than such given diameter.

5. A log debarking device comprising a frame, a carrier for conveying a log along the frame, a liquid conveying conduit pivotally connected to the frame and having a nozzle to direct a hydraulic jet against the log, means on the conduit to engage the log for maintaining the nozzle at a substantially uniform distance from the log, pressure fluid actuated means for selectively imparting pivotal movement to the conduit, valve means for controlling the supply of pressure fluid to the fluid actuated means, electro-responsive means for actuating the valve means, a photo-electric cell for controlling the energization of the electro-responsive means, and a light-source to direct a beam of light to the photo-electric cell in a plane traversed by the log.

6. A log debarking device comprising a frame, a pair of endless conveyors arranged in endless fashion for conveying a log along the frame and being spaced relatively to each other, shafts on opposed sides of the frame having liquid conveying passages, arms pivotally mounted on the shafts having passages in constant communication with the passages in the shafts, groups of nozzles on the arms positioned to constantly direct hydraulic jets into the space between the conveyors and against the upper and side surfaces of the log, wheels on and rotatable about the arms and in engagement with the log to impart tilting movement to the arms in accordance with variations in the diameter of the log for maintaining the nozzles at substantially uniform distances from the log, and a group of stationary nozzles positioned to constantly direct hydraulic jets into the space between the conveyors and against the underside of the log.

7. A log debarking device comprising a frame, a pair of endless conveyors arranged in end to end and in spaced relation to each other for conveying a log along the frame, shafts on opposed sides of the frame having liquid conveying passages, arms pivotally mounted on the shafts having passages in constant communication with the passages in the shafts, groups of nozzles on the arms positioned to constantly direct hydraulic jets into the space between the conveyors and against the upper and side surfaces of the log, wheels rotatable on and about the arms and in engagement with the log to impart tilting movement to the arms in accordance with variations in the diameter of the log for maintaining the nozzles at substantially uniform distances from the log, a group of stationary nozzles positioned to constantly direct hydraulic jets into the space

between the conveyors and against the underside of the log, nozzles between the first and second mentioned groups of nozzles to direct hydraulic jets between the conveyors and against the log, and means for selectively supplying water to the last mentioned nozzles in accordance with the variations in the diameters of the logs passing through the barking device.

8. A log debarking device comprising a frame, a carrier for conveying a log along the frame, liquid conveying conduits pivotally connected to the frame on opposed sides of the carrier and each having nozzles to direct hydraulic jets against the log, wheels rotatable on the conduits and in engagement with the log to impart tilting movement to the conduits in accordance with variations in the diameter of such log for maintaining the nozzles at substantially uniform distances from the log, stationary nozzles for directing other hydraulic jets against the log, pressure fluid actuated means for selectively imparting pivotal movement to the conduits, valve means for controlling the supply of pressure fluid to the stationary nozzles and the fluid actuated means, electro-responsive means for actuating

both valve means, a photo-electric cell for controlling the energization of the electro-responsive means, and a light-source to direct a beam of light to the photo-electric cell in a plane traversed by the log.

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REFERENCES CITED

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

UNITED STATES PATENTS

Number	Name	Date
1,300,748	Lombard	Apr. 15, 1919
1,874,080	Brislin	Aug. 30, 1932
2,238,872	Mather	Apr. 15, 1941
2,289,967	Johnson	July 14, 1942
2,395,845	Bukowsky	Mar. 5, 1946
2,422,757	Swift	June 24, 1947
2,473,461	White	June 14, 1949

FOREIGN PATENTS

Number	Country	Date
35,574	Sweden	Oct. 1, 1913