Oct. 2, 1956 C. M. RIDDELL ET AL 2,765,012

OSCILLATABLE BARK-REMOVING JET CONTINUOUSLY DIRECTED TOWARD AXIS OF A PASSING LOG

Filed Aug. 30, 1954

3 Sheets-Sheet 1

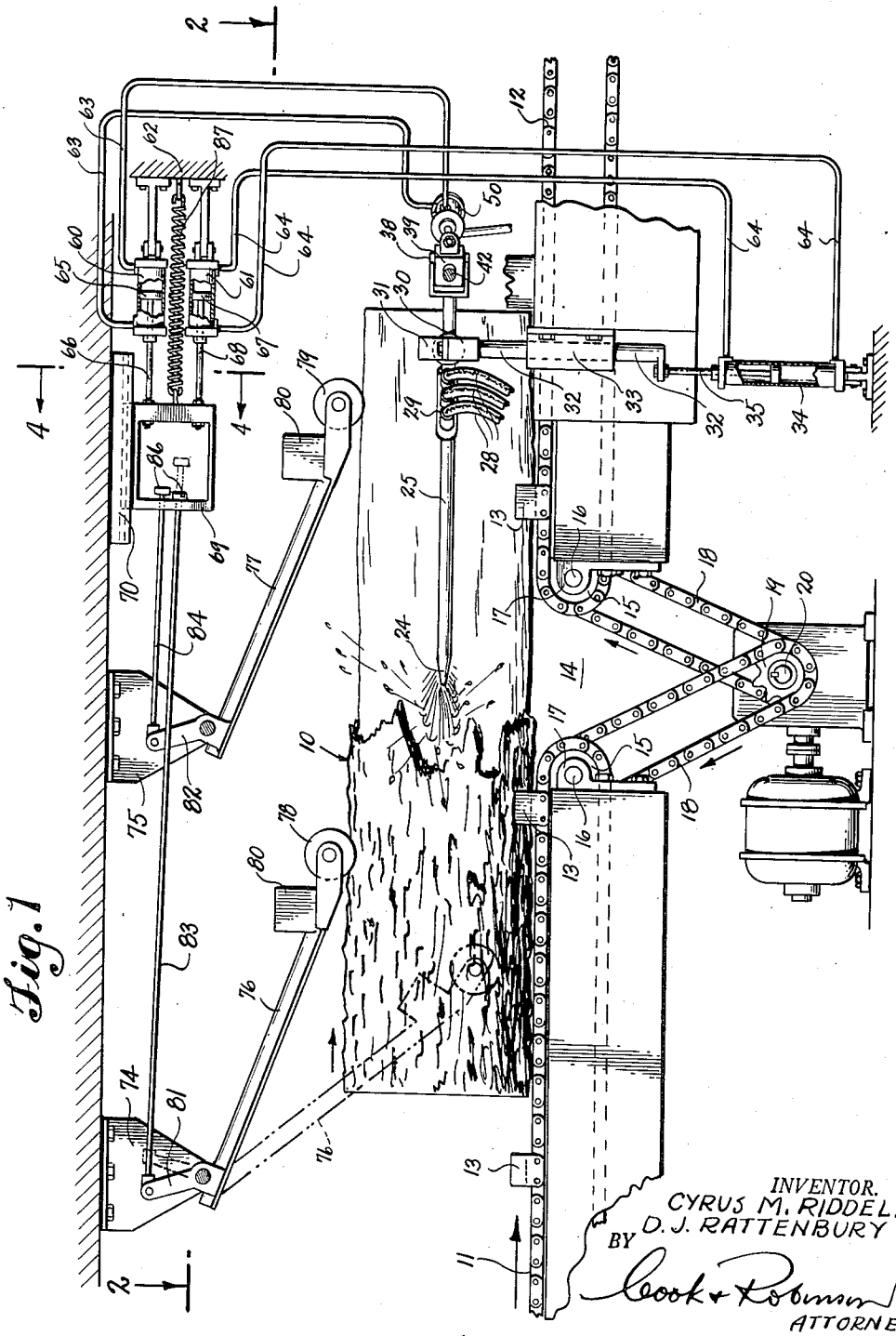


Fig. 1

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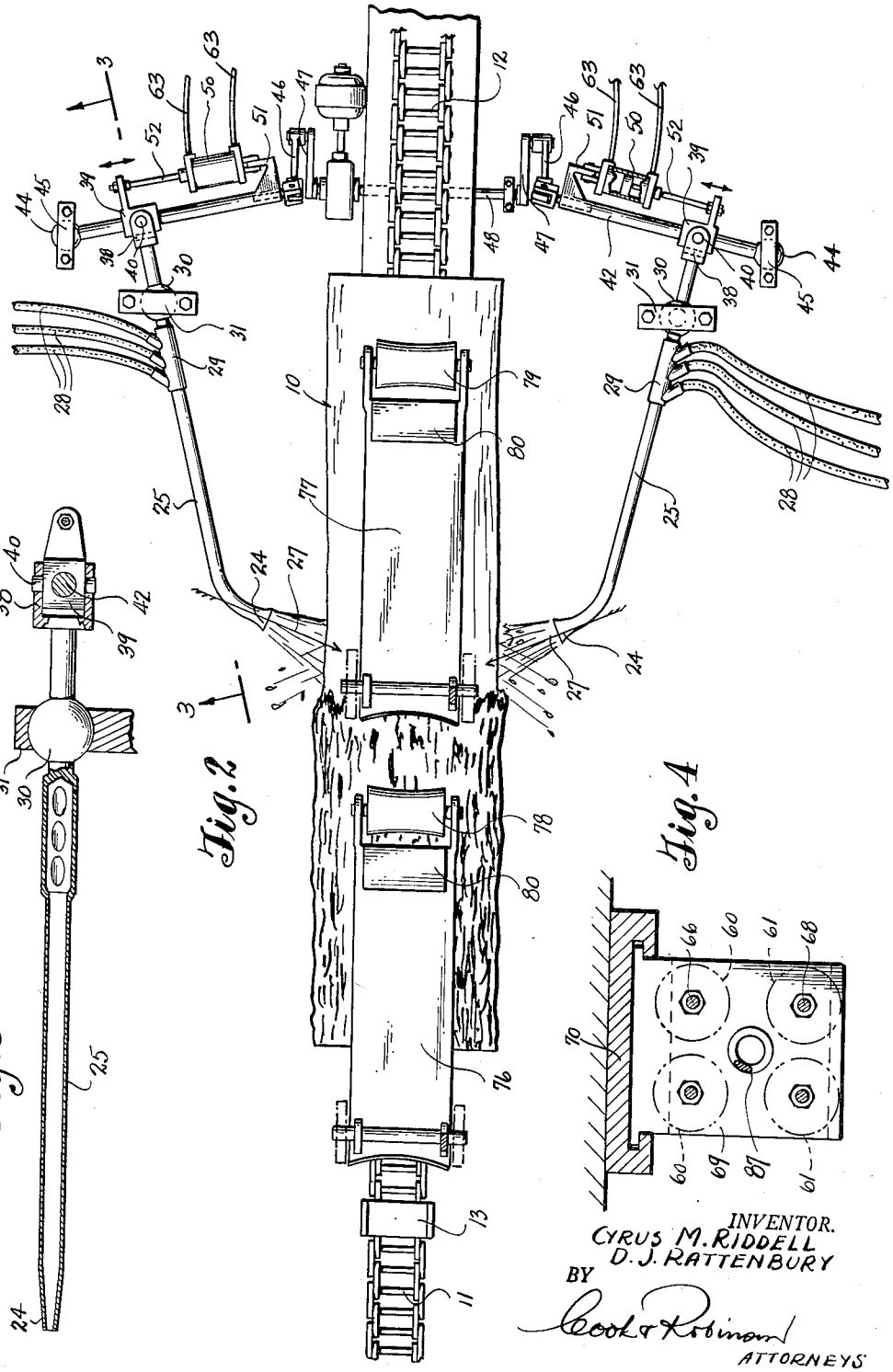


Fig. 2

Fig. 3

Fig. 4

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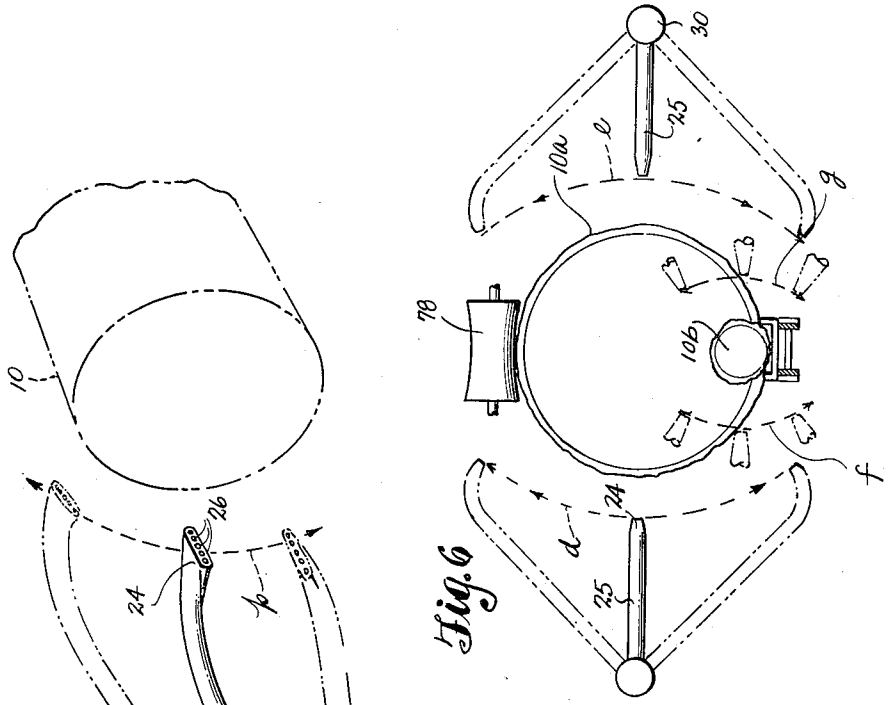


Fig. 6

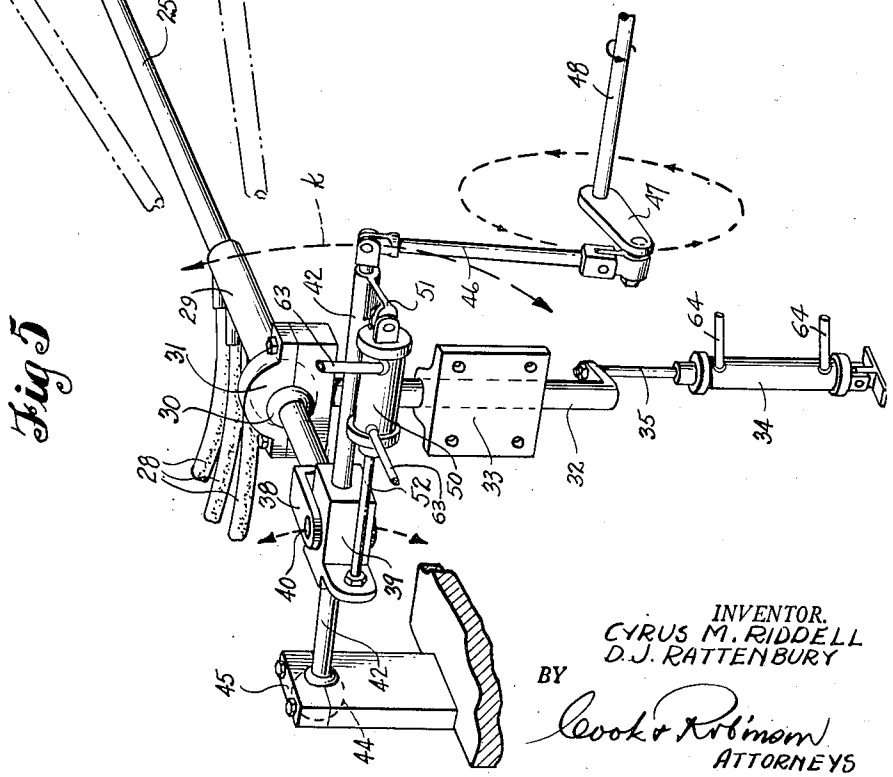


Fig. 5

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OSCILLATABLE BARK-REMOVING JET CONTINUOUSLY DIRECTED TOWARD AXIS OF A PASSING LOG

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7 Claims. (Cl. 144—208)

This invention relates to log debarking means, and it has reference more particularly to hydraulic means for debarking logs of various sizes that are advanced past the debarking apparatus.

It is the principal object of this invention to provide a hydraulic debarker which does not require that the logs be rotated for the debarking operation; which will operate to debark a log as it is advanced past the apparatus and without any interruption in the travel of the log; that employs a high pressure nozzle at each of the opposite sides of the log which nozzles are carried by swing pipes through which they are supplied with water under high pressure and are caused to oscillate in substantially vertical arcs, that extend from top to bottom sides of the log, and closely approximate the same radius as the log being debarked.

It is a further object of the invention to provide a debarker as above stated including devices that are controlled by each log in passing, to automatically adjust the radius and establish the limits of the arc of travel of each nozzle, and also to adjust the height of the nozzle in accordance with the height of the log as carried past the nozzles by the conveyor chains.

Further objects and advantages of the present invention reside in the combination of parts embodied in the apparatus; in the relationship of the parts to the log and to each other and in the mode of operation of the apparatus for the debarking of logs of varying diameters and lengths as they are moved in succession past the apparatus.

In accomplishing these, and other objects of the invention, we have provided the improved details of construction, the preferred forms of which are illustrated in the accompanying drawings wherein:

Fig. 1 is a side view, parts being broken away and shown in section, of a hydraulic debarking apparatus embodying the improvements of the present invention therein; and showing it in a log debarking operation.

Fig. 2 is a top, or plan view of the apparatus and log, certain parts being omitted and certain parts being shown in section.

Fig. 3 is a longitudinal section of one of the nozzles and its swing pipe as equipped with ball-bearing support and oscillating means; this section being taken substantially on the line 3—3 in Fig. 2.

Fig. 4 is an enlarged cross-section taken on line 4—4 in Fig. 1.

Fig. 5 is a perspective view of one of the nozzles and its swing pipe, together with the pipe-oscillating means and devices for effecting the automatic adjustment of parts in accordance with the size of log to be debarked.

Fig. 6 is a transverse sectional view through the log slip, showing the arcs of travel of the two nozzles for the debarking of logs of large and small diameters.

Referring more in detail to the drawings:

In Figs. 1 and 2, a log, represented as being one of substantial diameter, is designated by reference numeral 10, and it is shown as being supported by and advanced

along a log slip by the top runs of aligned conveyor chain belts 11 and 12 on which it is longitudinally disposed. These conveyor chains are here shown to be equipped at intervals there-along with cross flights 13 to advance the log and to aid in holding it properly on the conveyor chains as it is advanced. It is further shown in Fig. 1 that the aligned chain belts 11 and 12 have adjacent ends spaced to provide an open gap of several feet in length between them across which each log moves; the gap, as thus provided, allowing water as discharged from the nozzles, to properly debark the bottoms of the logs; this gap is designated at 14 in Fig. 1.

While the means of support for and the devices for driving the conveyor chains 11, 12 are of no particular significance insofar as the debarking operation is concerned, we have shown them in Fig. 1 to be extended about driving sprocket wheels 15 that are fixed on rotatably supported cross-shafts 16, 16 these being suitably supported in bearings 17 fixed to frames of the slip structure as shown. These two cross-shafts are driven in unison by chain belts 18, 18 operating about sprocket wheels on the cross-shafts, and about other sprocket wheels 19 fixed on a motor driven shaft 20.

It is to be understood that the debarking mechanism can be located at any place along a log slip, either adjacent the upwardly inclined run or a horizontal portion thereof, but preferably adjacent the latter.

The debarking apparatus of this invention comprises two high pressure nozzles 24, 24 that are directed laterally from the ends of swing pipes 25, 25, respectively; these pipes being located at opposite sides of the slip and log-conveying means, as has been shown in Fig. 2. The nozzles are of such design as to discharge the jets of water in such direction as to give best debarking results. It is desirable also that the nozzle jets be directed angularly against the advancing log as indicated by the direction arrows 27, 27 as drawn across the nozzles in Fig. 2.

Water for the debarking operation is brought to each of the swing pipes from a source of supply under high pressure, through a plurality of hose lines 28 which connect to the pipes through fittings designated at 29.

Each of the swing pipes 25 is equipped near its supported end, that being the end opposite the nozzle-equipped end, with an encircling ball-shaped bearing 30 that is pivotally fitted in a bearing block 31 fixed on the upper end of a vertical slide or post 32. This post is vertically adjustable in a bearing block 33 that is fixed in the base frame structure of the slip. This post is adapted to be vertically adjusted by means of a hydraulic cylinder 34 which is shown in Fig. 1 to be pivotally mounted at its lower end on the stationary base structure, and to have the outer end of its piston rod 35 fixed to the lower end of the post 32.

At their ends, which are opposite the nozzles, the swing pipes 25 are equipped with yokes 38, each of which embraces and is pivoted to a block 39 by a vertically directed pivot pin 40. Each block 39 is slidably mounted for travel along a rod 42 which is substantially horizontally disposed and also is directed substantially at a right angle to the direction of travel of the log. The relationship of the rods 42 to the corresponding swing pipes 25 and to the line of travel of the log 10 will be best understood by reference to the showing of these parts in Figs. 2 and 5.

At their outer ends, each of the rods 42 is equipped with a ball bearing 44 which is pivotally contained in a fixedly mounted bearing block 45. At their inner ends, each rod has a pivotal connection with the upper end of a pitman rod 46 that, in turn, is mounted at its lower end on a crank 47. The two cranks 47, 47 for the two swing pipes 25, 25, are fixed on the opposite ends of a cross-shaft 48 that extends horizontally beneath the

conveyor chain 12 and to opposite sides thereof, as seen in Fig. 2 and is rotatably mounted and is adapted to be rotatably driven by a motor such as shown at 49. As the shaft 48 is rotated, the two cranks 47, 47 cause the rods 42, 42 to be oscillated in unison in vertical arcs centered in the corresponding ball-bearing supports 44 for the rods. With the oscillating of these rods, the two swing pipes 25, 25 are caused to oscillate in unison about their ball-bearing supports 30, 31 by reason of their end connections with the blocks 39, 39 which are mounted on the rods 42, 42.

It is required in the use of the present nozzles that they be kept relatively close to the log and also that the extent of their travel be such that both sides of the log, from top to bottom, will be subjected to the force of the water therefrom and be completely stripped of bark. This particular requirement applies to all logs regardless of diameter. For example, we have shown, in Fig. 6, two log sizes, designated at 10*a* and 10*b*, respectively. The arcs of travel of the nozzles, as adjusted to accommodate the log of larger diameter, are designated respectively by the arcuate dash lines *d* and *e*, while the arcs of travel of the nozzles as adjusted to accommodate the logs of small diameter are designated at *f* and *g*. The change in position of nozzles as required to best accommodate logs of different diameters and height, is effected by the raising and lowering of the blocks 31 through the use of the hydraulic cylinders 34 and by the shifting of the blocks 39 along the rods 42, 42.

The change in position of the blocks 39 along the rods 42, 42 is effected by means of hydraulic cylinders 50 which are pivotally supported at their inner ends from brackets 51 fixed on the oscillating ends of the rods 42 and which cylinders have their piston rods 52 extended along the rods 42 and connected with the blocks 39 in such manner as to provide for shifting them inwardly or outwardly along the rods.

It will be understood that with the parts in the particular relationship in which they are shown in Fig. 5, the rotation of cross-shaft 48 and the cranks 47 thereon, causes the free ends of rods 42 to oscillate vertically as along the dash line arc *k*, and, by reason of this, the swing pipes 25 are oscillated about the ball bearings 30, 31 and the nozzles 24 at their ends are caused to follow along dash line arcs as designated at *p*. With the blocks 39 held against movement along the rods 42, 42, and the blocks 31 supported at a fixed elevation, the arcs which the nozzles 24, 24 follow will be definitely established and the arcs will center substantially in the axial line of the log being acted on.

The length of the arcs *p* along which the nozzles swing can be increased or decreased by shifting the blocks 39 on the rods 42 away from or toward the ball joints 44, and this shifting also will cause the radius of the arc along which the nozzles travel to be lengthened or shortened. Thus, it is possible by adjusting the blocks 39 along their respective rods 42, toward the corresponding ball joints 44, to move the nozzles toward each other and a log passing between them as required for the debarking of a log of lesser diameter than that for which the nozzles may be set, and by this same adjustment, to shorten the length of the arc.

It is also possible by lowering or by rasing the blocks 31, 31 from one position of adjustment to another, to keep the arcs centered in the axial line of the passing logs. It is desirable, in the use of the present barker, to so adjust the level of the ball joints 30 that the nozzles, when half way between the end limits of their arcs of travel will be at the horizontal diameter of the log being debarked.

In order that the adjustments as made by the two hydraulic cylinders 34 and 50 as employed in connection with each swing pipe may be automatically accomplished by the individual logs as they pass along the conveyor slip through the debarking station, we have provided the control devices for the cylinders as diagrammatically shown in Fig. 1. In these views, we have shown a pair of hydraulic cylinders 60 and 61 supported from a fixed member, designated at 62, above the level of the passing logs. Cylinder 60 has pipe lines or conduits 63—63 (only one pair being shown in Fig. 1) connecting its opposite ends with opposite ends of each hydraulic cylinder 50. Likewise, cylinder 61 has pipe lines 64—64 (only one pair being shown in Fig. 1) connecting its opposite ends with the opposite ends of each cylinder 34. The cylinder 60 contains a piston 65 equipped with extended piston rod 66. Likewise, cylinder 61 is equipped with a piston 67 with extended rod 68. The outer ends of the rods are fixed to a slide 69 mounted for reciprocal travel by a supporting guide 70. When the slide is moved, the two pistons move accordingly, and their movement, through the hydraulic pressure medium employed in the cylinders and pipe connections effects required movements of the pistons in the cylinders 34 and 50 for purposes previously explained.

Swingingly suspended from supporting brackets 74 and 75 that are fixed to the overhead frame structure above the log conveyor, are levers 76 and 77. These levers extend downwardly and in the direction of travel of the logs, and at their lower ends are equipped with rollers 78 and 79 that are adapted to roll on top of the passing logs. The levers are weighted, as at 80, and under these weights will be swung down, as noted in the dotted line showing of lever 76, when unsupported by a passing log.

Extended upwardly from the pivoted ends of the levers 76 and 77 are lever arms 81 and 82. Pivotally connected to these arms are the ends of links 83 and 84 which have their other ends slidable through holes in an end member of the slide 69. At these ends, the links are equipped with nuts 86 which provide a holding connection for pulling the slide in one direction. A coiled spring 87 is attached under tension to the slide 69 and to the frame member 62 to pull the slide toward the cylinders as permitted by the links connected thereto.

Assuming the parts to be so arranged, it will be understood that when a log is advanced along the slip by the conveyor chains, it first contacts the roller 78 on lever 76 and subsequently contacts the roller 79 on lever 77. With the first contact, the lever 76 will be swung upwardly and by reason of this movement will cause link 83 to pull the slide 69 to the left, in reference to the showing in Fig. 1. This movement shifts the pistons in the cylinders 60 and 61 to effect adjustment of the pistons in cylinders 34 and 50 to establish the proper elevation of the swing pipe bearings 31 and the proper position of blocks 39 along the rods 42, 42 to adapt the nozzles to the log size.

It will be understood that when the log engages roller 79 the lever 77 and its connecting link 84 operate to hold the adjustment after the log has passed the roller 78 and before the next log has come into position. It would be possible, however, to operate with only the lever 76, with satisfactory results.

Attention is called to the fact that the positions of the swing pipes at opposite sides of the logs corresponding at all times. When a change in setting of one is made, the other is changed accordingly by the same control means.

It is further to be noted that, as the swing pipes are oscillated about a transverse axis to cause the nozzles to swing up and down through the vertical arcs, such as designated at *p* in Fig. 5, the swing pipes 25 are simultaneously oscillated about their longitudinal axes by reason of their yoke connections 38 with the blocks 39. For example, when the arm 42 is swung upwardly by the crank 47 and the rod 46, the block 39 moves upwardly along an arcuate path centering on ball 44 to simultaneously raise the yoke 38 and turn it counterclockwise (as viewed in Fig. 5), such compound movement of the yoke 38 simultaneously depressing the nozzle 24 and turning it counterclockwise. Conversely, as the yoke 38 descends, it will simultaneously raise and turn

the nozzle 24 clockwise, so that the nozzles are always directed toward the axial line of the log, as will be understood by reference to the full line and dotted line positions of the nozzles in Fig. 6.

Thus, the arcuate travel of the nozzles in a direction circumferentially of the log as represented by the dash line *p* in Fig. 5 varies in accordance with arcuate movements of the blocks 39, to which the inner ends of the swing pipes are connected.

Apparatus of this character is relatively simple to construct and operate, and it is comparatively inexpensive. However, it will accommodate logs of a wide range of diameters.

Having thus described our invention, what we claim as new therein and desire to secure by Letters Patent is:

1. A log-debarking apparatus comprising, in combination, means for the endwise conveyance of a log through a debarking station, a swing pipe mounted at one side of the path of travel of such a log and extended in the general direction of said path of travel, and adapted to receive water under pressure therein, a nozzle mounted by the swing pipe at its discharge end and directed angularly therefrom and toward a log for the discharge of water against such a log for bark removal, means for oscillating the swing pipe to swing the nozzle back and forth in a direction transversely of such a log, and means for effecting directional adjustment of the nozzle as it swings in opposite directions to maintain the water stream therefrom directed against such a log and toward its axis.

2. A log-debarking apparatus comprising, in combination, means for the endwise conveyance of a log through a debarking station, a swing pipe located at one side of the path of travel of such a log and extended therealong, means pivotally supporting said swing pipe at one end for oscillation, means for supplying water under pressure to the swing pipe, a nozzle on the oscillating end of the swing pipe, directed laterally therefrom toward the log path, for the discharge of water therefrom against a log for bark removal as such a log progresses through the debarking station, and an oscillating means for oscillating the swing pipe to cause said nozzle to swing in an arc that is substantially centered in the axial portion of a passing log, and to automatically effect a rotatable adjustment of the pipe about its axial line in opposite directions as it oscillates to maintain the nozzle directed toward the axial line of a passing log.

3. In a log-debarking apparatus, in combination, means for the horizontal, endwise conveyance of a log without rotation through a debarking station, a swing pipe located at one side and extending along the path of travel of such a log, means pivotally supporting said pipe at a point spaced inwardly from its outer end for oscillation, and permitting an axial rotatable adjustment of the pipe therein, means for admitting water under pressure to the pipe, a nozzle at the oscillating end of the pipe, directed angularly therefrom for the discharge of water against a passing log in a direction for the removal of bark therefrom, an actuating shaft extended substantially at a right angle to the swing pipe at the outer end thereof, means pivotally connecting the adjacent outer end of the swing pipe to said shaft between its ends; said shaft having a fixed pivotal mounting at one end and there being power-operated means connected with the shaft for causing vertical oscillation thereof and the transmission of arcuate oscillatory motion to the nozzle-carrying end of the swing shaft and to effect its automatic rotary adjustment whereby the nozzle is maintained in a direction pointed toward the log axis.

4. Apparatus as recited in claim 3 wherein the means for connecting the end of the swing pipe to the actuating shaft comprises a bearing that is adjustable along said shaft, to change the position of the swing pipe relative to a passing log, and to change the radius and length of the arc along which the nozzle is oscillated.

5. Apparatus as recited in claim 4 wherein means is provided for effecting an automatic adjustment of the bearing along the actuating shaft in accordance with the diameter of such a passing log.

6. Apparatus as recited in claim 4 wherein said bearing is slidingly adjustable along said actuating shaft and a hydraulic cylinder is fixedly mounted on said shaft and is operatively connected with said bearing for effecting and retaining its adjustment.

7. Apparatus as recited in claim 4 wherein said bearing is slidingly adjustable along said actuating shaft as a means of changing the radius and extent of the arc of oscillation of the nozzle, and wherein a hydraulic cylinder is mounted on said shaft and is operatively connected with said bearing for its adjustment, and wherein a means is operatble by each log in passing through the de-barking station to control the operation of the hydraulic cylinder to adjust the arc of oscillation of the nozzle in accordance with and to suit the diameter of such a passing log.

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