Jan. 5, 1954 H. A. SIMONS 2,664,929

HYDRAULIC LOG-BARKER HAVING LOG-HOLDDOWN ROLLERS AND CONFRONTING ROTARY SPRAY HEADS

Filed March 17, 1953 4 Sheets-Sheet 1

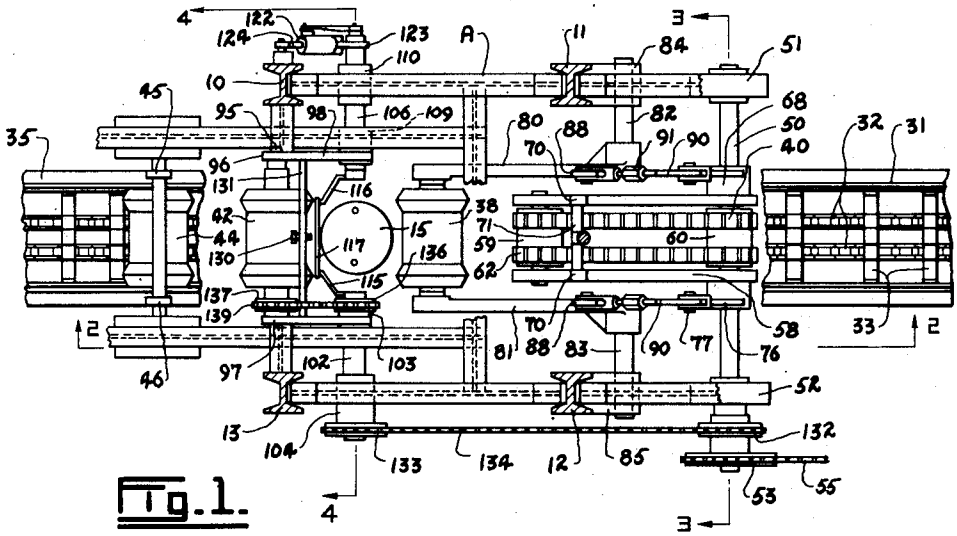


Fig. 1.

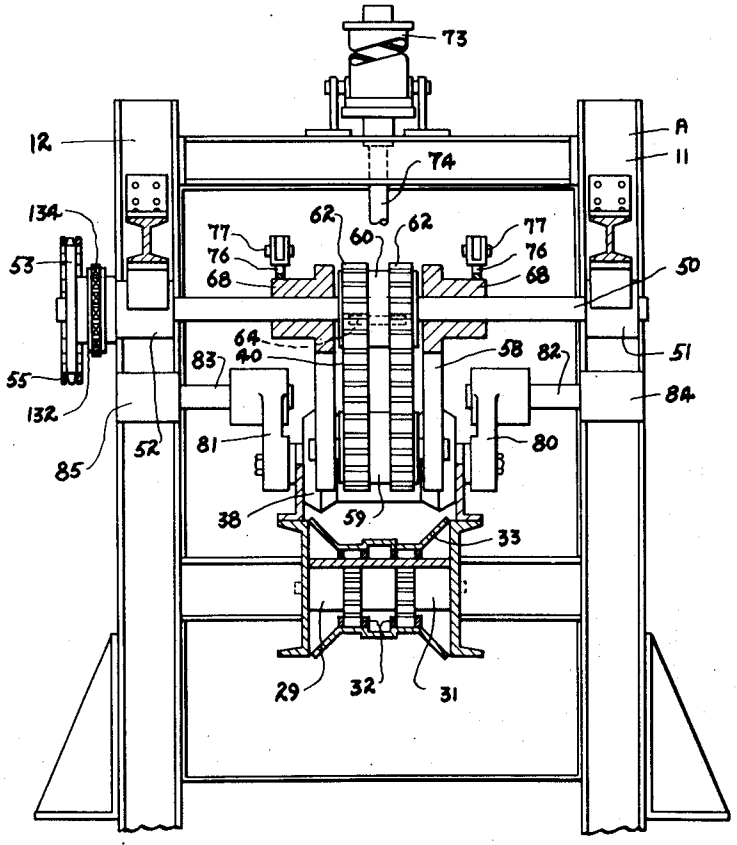


Fig. 3.

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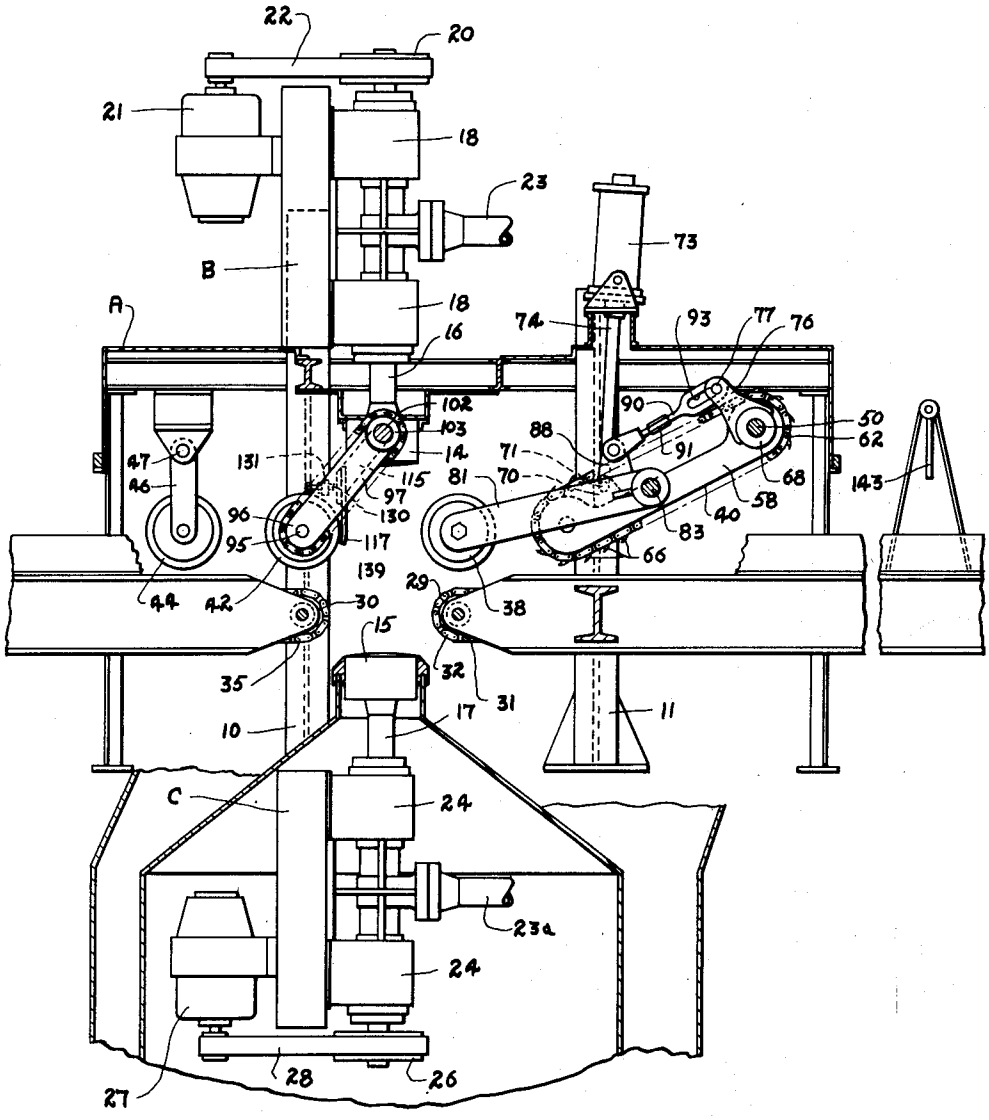


Fig. 2.

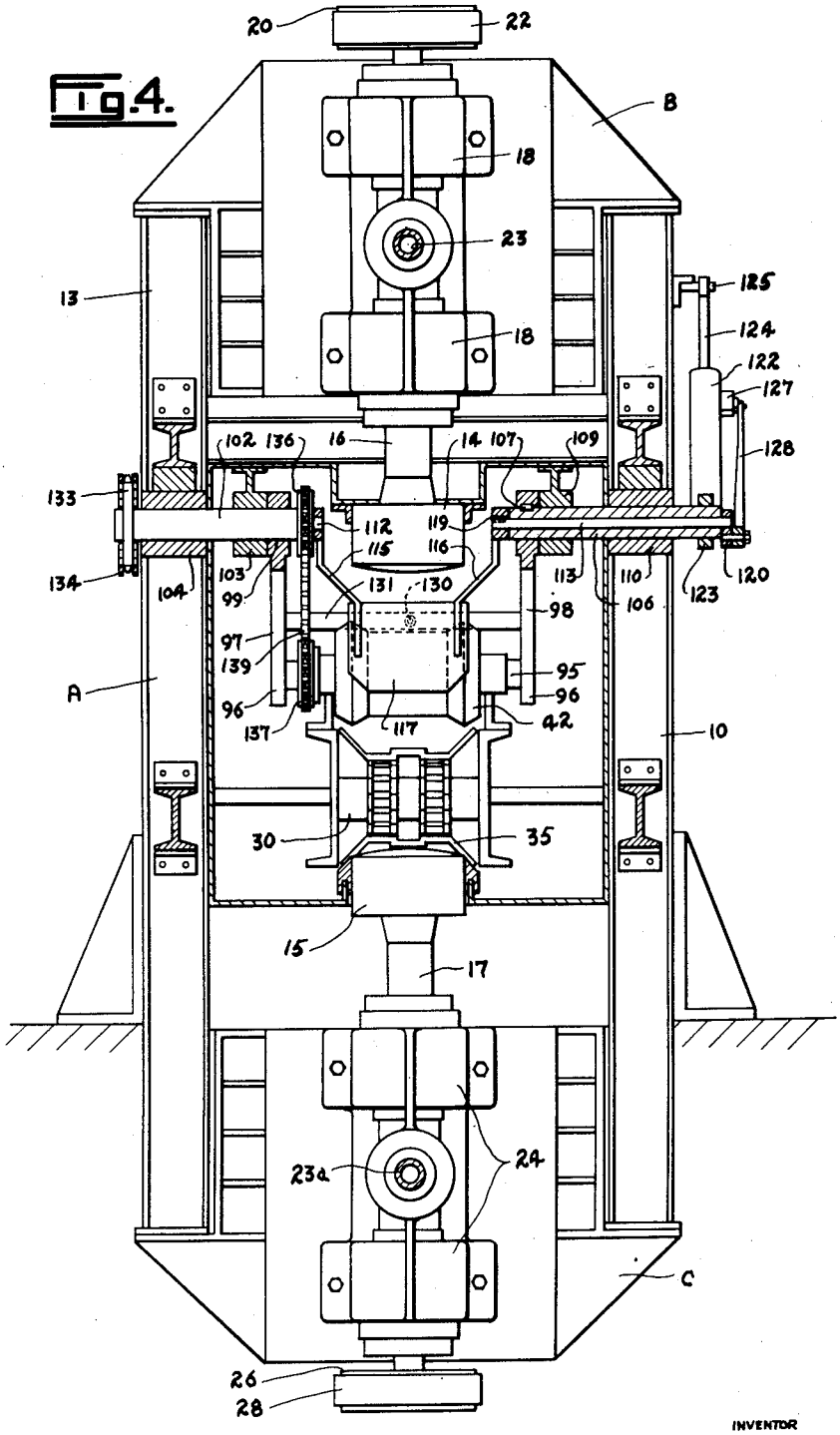
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Fig. 4.



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Filed March 17, 1953 4 Sheets-Sheet 4

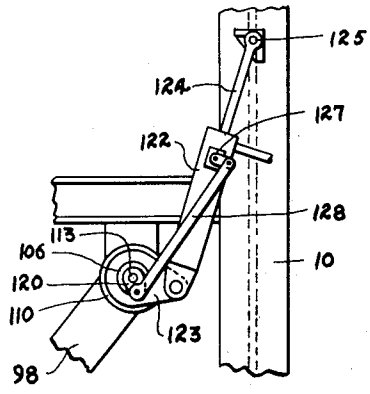


Fig. 5.

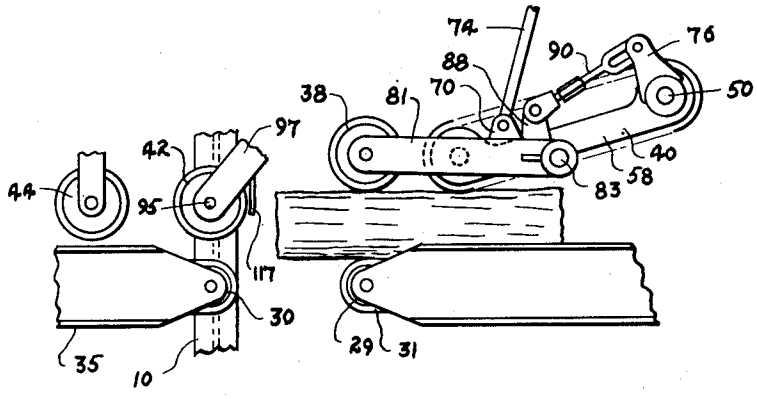


Fig. 6.

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UNITED STATES PATENT OFFICE

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HYDRAULIC LOG-BARKER HAVING LOG-HOLDDOWN ROLLERS AND CONFRONTING ROTARY SPRAY HEADS

Howard Allan Simons, Vancouver, British Columbia, Canada

Application March 17, 1953, Serial No. 342,867

17 Claims. (Cl. 144—208)

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This invention generally relates to a device for removing bark from logs by feeding the logs past jets of water under high pressure. Such devices are termed "hydraulic barkers" and this term will be used herein. More specifically, the invention relates to a hydraulic barker especially designed for the treatment of small logs, by which I mean a log having a diameter of about one and a half feet or less, and a length of about six feet or less.

The debarking of small logs presents a special problem since the small logs lack the inertia which is relied upon in the case of larger logs to steady them against the rolling and tilting tendencies applied thereto by the impingement of the high pressure jets. The conveying and supporting mechanism which carries the logs past the water jets must, of course, be able to accommodate logs of widely differing diameters, just as in the case of larger log barkers, but this common problem is aggravated in the case of small log barkers by the greater need to steady these logs against the forces of the jets. Since the small logs must be debarked at high speeds, if the barker is to be commercially attractive, and since a log of, say, 18 inch diameter may be immediately followed by a log of appreciably smaller diameter, yet each log must be securely steadied against rolling or tilting as it is carried past the high pressure jets, it can readily be seen that severe demands are made upon the small log barker. The demands are, in fact, so severe that, as far as I am aware, no small log hydraulic barker has found any significant market in industry.

I have devised a barker for small logs which is fully satisfactory in that it conveys logs past the jets at high speeds, adequately steadies the logs as they are carried past the jets, and automatically adjusts itself to accommodate logs of greatly different diameters fed thereto in immediate succession. My new barker may be generally defined as comprising a main frame, two axially aligned oppositely disposed rotary spray heads facing each other and spaced apart a distance slightly greater than the diameter of the largest log for which the apparatus is designed, means for feeding water under pressure to said spray heads, means for rotating said spray heads at high speeds, a pair of horizontally aligned rollers rotatably mounted in said main frame and disposed on opposite sides of said spray heads with their axes of rotation parallel, an ingoing conveyor leading to one of said rollers, an outgoing conveyor leading from the other of said rollers, a third roller rotatably mounted above the roller

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adjacent the ingoing conveyor with its axis of rotation parallel to that of the latter roller, a log advancing means vertically swingably mounted in said main frame above the ingoing conveyor, said third roller being mounted for generally vertical movement in sympathy with the swinging of said log advancing means, and a fourth roller rotatably mounted above the roller adjacent the outgoing conveyor with its axis of rotation parallel to that of the latter roller, said fourth roller being mounted for vertical swinging to accommodate logs of different diameter. Preferably, a fifth roller is rotatably mounted above said outgoing conveyor and is suspended from the main frame for vertical swinging to accommodate logs of varying diameters.

It will be seen that with the arrangement described there are two horizontally spaced pairs of vertically spaced rollers which grip the log from above and below and steady it as it is carried past the spray heads; and a single roller (the fifth roller) which bears against the upper forward surface of a log and steadies the log when the after end thereof has cleared the first vertical pair of rollers but is still being acted upon by the sprays. The log advancing means, in addition to its main function of advancing the log, plays a role comparable to that of said fifth roller, in that it bears against the upper surface of the after end of a log when its forward end has passed through the first vertical pair of rollers (and is being debarked) but has not as yet been received by the second vertical pair of rollers.

At the risk of stating the obvious, to avoid any possibility of a misunderstanding, I would like to point out that the "first vertical pair of rollers" consists of the rollers which, in the preceding statement of invention, are termed the "third roller" and "the roller adjacent the ingoing conveyor"; whereas the "second vertical pair" consists of the "fourth roller" and the "roller adjacent the outgoing conveyor."

The log advancing means drives the logs through the two pairs of roller. All the rollers may be idly mounted except the upper roller of the second vertical pair, which is driven to assure feeding of the debarked log onto the outgoing conveyor. The weight of the three upper rollers is relied upon to hold the logs without resort (at least in my presently preferred embodiment of the invention) to any auxiliary means for downwardly biasing these rollers; and for this reason these rollers should be of appreciable weight.

I will now illustrate my invention by describing

the presently preferred embodiment thereof with the aid of drawings illustrating this embodiment. In these drawings:

Figure 1 is a top plan view of the apparatus with the hood removed;

Figure 2 is a section on the line 2—2 in Figure 1;

Figure 3 is a section on the line 3—3 in Figure 1;

Figure 4 is a section on the line 4—4 in Figure 1;

Figure 5 is a fragmentary side elevation of lifting mechanism for the fourth roller, as seen from the right hand side of Fig. 4; and

Figure 6 is a diagrammatic side elevation showing log entering barking area of the apparatus.

In the drawings, reference character A generally indicates the main frame of the machine. This main frame A basically consists of four vertical columns in the form of H-columns 10, 11, 12 and 13 mounted on bases and connected by an upper bridge B and a lower bridge C, and by suitable cross members and bracing members. There are two axially aligned, oppositely disposed rotary spray heads. These spray heads are arranged vertically one above the other, and the upper spray head has been labeled 14, while numeral 15 has been applied to the lower spray head. Sprays heads 14 and 15 are carried by vertically aligned shafts 16 and 17, respectively. Shaft 16 is rotatably mounted in bearings (not shown) mounted within a housing 18 carried by the main frame. Shaft 16 has a pulley 20 at its upper end, which is driven by an electric motor 21 through a belt 22. Shaft 16 is hollow, and water under pressure may be fed along the shaft to the rotary spray head 14, after entering the shaft through the inlet labelled 23. The arrangement of shaft 17 is similar to that of shaft 16. Shaft 17 is carried by two bearings mounted within a housing 24, and has a pulley 26 driven by electric motor 27 through a belt 28. Shaft 17 is hollow and water under pressure may be fed through an inlet 23a to the interior of the hollow shaft and therealong to the rotary spray head 15. The rotary spray heads 14 and 15 face one another, and are spaced apart a distance slightly greater than the diameter of the largest log for which the machine is designed.

The motors 21 and 27 should be capable of driving the shafts 16 and 17 at speeds of about 600 R. P. M., and I have found 20 H. P. motors suitable.

Two horizontally aligned rollers 29 and 30 are disposed above and on opposite sides of spray head 15. These rollers 29 and 30 are rotatably mounted in the main frame, with their axes of rotation parallel. A horizontal conveyor 31 leads to roller 29. This conveyor may be of any designed construction. In this example, the conveyor consists of a pair of chains 32 extending around sprockets with transverse saddles 33 carried thereby. The conveyor may terminate short of roller 29, or, as shown, said roler may have cog teeth thereon around which the conveyor chains extend. Conveyor 31 is designed to deliver logs to the apparatus, and will therefore henceforth be termed the "ingoing conveyor." A second similar conveyor, which has been labeled 35, leads from or includes roller 30 to carry debarked logs away from the apparatus, and will therefore henceforth be termed the "outgoing conveyor."

A third roller 38 is rotatably mounted above the roller 29 with its axis of rotation parallel to that of roller 29. A log-advancing means generally indicated by numeral 40 is vertically swingably mounted in the main frame at a point above the ingoing conveyor. The nature of the log-advancing means and the manner in which it is mounted will be described in greater detail later on in this specification. Roller 38 is mounted for generally vertical movement in sympathy with the swinging of log-advancing means 40. Details of the mounting of this roller will also be given later on in the specification.

A fourth roller 42 is rotatably mounted above roller 30, with its axis of rotation parallel to that of the latter roller. Roller 42 is also vertically swingable, to accommodate logs of differing diameter, and the mounting of this roller and the provisions made for causing the roller to accommodate the log will also be described in detail later on herein.

A fifth roller, which has been labeled 44, is rotatably mounted above the outgoing conveyor 35. The shaft of roller 44 is rotatably mounted in arms 45 and 46, which depend from the frame A and are pivotally connected thereto, as indicated at 47 in Figure 2. Due to this suspension of roller 44, it will be realized that as a log emerges from between the rollers 30 and 42 and is received on the outgoing conveyor 35, the forward end of the log will contact roller 44 and cause this roller to swing upwardly and away from the pair of rollers 30 and 42, permitting the log to pass under roller 44 and along the conveyor 35. At the same time, the full weight of roller 44 will bear upon the log holding it down on conveyor 35, and preventing tipping thereof, despite the fact that the spray heads will be directing water under high pressure on to the end of the log while it is still held between rollers 30 and 42, but has been released by rollers 29 and 38.

The structure of, and the means for mounting the log-advancing means will now be described in greater detail. A shaft 50 extends transversely across the frame A of the machine in parallel relation with the five rollers described, and is freely rotatably mounted in pillow blocks 51 and 52 bolted to the frame, as best seen in Figure 1. The shaft 50 is provided at one of its ends with a sprocket 53, whereby the shaft may be driven through a chain drive 55 connected with the mechanism (not shown) employed for driving the ingoing conveyor 31 or to any other suitable source of power. The log-advancing means proper consists of a frame work 58, an idler sprocket 59, a driven sprocket 60 (best seen in Figure 3), and a plurality of endless chains 62 trained over the sprockets 59 and 60. The driven sprocket 60 is keyed to the driven shaft 50, as indicated at 64 in Figure 3. Each of the chains 62 is provided with a plurality of log gripping spars 66. The framework 58 of the log-advancing means 40 is rigidly secured to bearings 68, both of which are shown in Figures 1 and 3, and one of which is visible in Figure 2. These bearings 68 are freely mounted on the shaft 50, so that they, in effect, pivotally mount the log-advancing means with respect to the shaft 50, and rotation of this shaft has no effect upon the framework 58. A pair of lugs 70 extend upwardly from the framework 58 and are connected by a rod 71. A cushioning air cylinder 73 is mounted on the main frame A above the log-advancing means, and a rod 74, constituting the piston rod of the piston thereof, is pivotally connected at its lower end to the rod 71. A second pair of lugs 76 are rigidly attached

to the bearings 68 which, as previously mentioned, pivotally mount the log-advancing means. Lugs 76 are bifurcated at their upper ends, and a pin 77 is mounted in the bifurcated portions and extends transversely thereacross. The purpose of these lugs and pins will be explained hereinafter.

As a log is carried along conveyor 31, its forward end is gripped by spurs 66 on the chains 62 and thereby positively forced towards the rollers 29 and 38. The log-advancing means 40 will be raised by the log to varying degrees depending upon its diameter, the frame 58 pivoting about the shaft 50. As the log-advancing means 40 is raised by the log, piston connecting rod 74 rises in cushioning cylinder 73, displacing air therein so that when the after end of the log clears the inner end of log-advancing means 40, the latter does not drop suddenly towards its initial position, but rather has a cushioned descent controlled by the piston rod 74.

Roller 38 moves in sympathy with the log-advancing means due to the arrangement of parts which will now be described. Roller 38 is rotatably mounted between two parallel arms 80 and 81, best seen in Figure 1. The ends of arms 80 and 81 are rigidly secured to trunnions 82 and 83, respectively. Trunnion 82 is rotatably mounted in a pillow block 84 secured to column 11 and trunnion 83 is rotatably mounted in a pillow block 85 secured to column 12. Lugs 88 extend upwardly from arms 80 and 81 at oppositely disposed points intermediate the roller 38 and the trunnions. Link arms 90 (of adjustable length, as indicated at 91) connect the lugs 88 on the roller-supporting arms 80 and 81 to the lugs 76 on the bearings 68 of the log-advancing means 40. One end of each link arm 90 is connected to each lug 88 through a simple pivotal connection, but the connection of the opposite ends of the arms to the bifurcated lugs 76 is somewhat more complicated, since it is desired to provide a lost motion at this point, whereby the log-advancing means 40, after lifting roller 38 to accommodate one log, can drop to engage the next log brought up by conveyor 31, despite the fact that the preceding log is still under roller 38. To this end, each link arm 90 is provided with an elongated slot 93 (see Figure 2), and the pins 77, which pass through the bifurcated ears of the lugs 76, ride in the slots 93. Relative sliding of the pins and slots gives the desired lost motion permitting limited independent movement of the roller 38 and log-advancing means 40.

The mounting of roller 42 will now be described with particular reference to Figures 1, 4 and 5. Roller 42 is rigidly secured to a shaft 95, and shaft 95 is rotatably mounted in bearings 96 attached to the ends of two roller-supporting arms 97 and 98. Roller supporting arm 97 is freely mounted (as shown at 99) on a horizontally disposed shaft 102 which is rotatably mounted (in parallel relation to roller 42) in bearings 103 and 104 secured to cross members of the frame A. Roller supporting arm 98 is keyed to a tubular sleeve 106 as indicated at 107. Tubular sleeve 106 is horizontally disposed in axial alignment with shaft 102 and is rotatably mounted in bearings 109 and 110 secured to cross members of the frame A.

The reduced end 112 of shaft 102 and a shaft 113, the latter being rotatably mounted within sleeve 106, carry cranked arms 115 and 116 which carry a feeler plate 117, holding this plate in front of roller 42 with the lower edge of the plate lying below the axis of the roller. Cranked arm 116 is keyed to shaft 113 as indicated at 119. Shaft 113, at its outer end, carries an eccentric 120. A servo piston cylinder 122 is pivotally connected at its lower end to the outer end of an arm 123 which is connected to and projects from the sleeve 106. A piston rod 124 extends upwardly from the cylinder and is pivotally connected to the column 10 at 125. The operating mechanism 127 of the servo piston is connected by a link 128 to the eccentric 120. An adjustable stop member 130, attached to a member 131 rigidly secured at its opposite ends to the arms 97 and 98, is located between roller 42 and feeler plate 117, and this stop member imposes a limit upon movement of the plate 117 towards said roller 42. When a log being advanced through the apparatus is of sufficient diameter to contact feeler plate 117, the plate is moved upwardly and to the left (as viewed in Figure 2) carrying arms 115 and 116 in a clockwise direction. Arm 116 turns shaft 113 and eccentric 120, thereby actuating the operating mechanism 127 of servo piston 122 through link 128. This servo piston is such that as long as the feeler plate is moving oil is pumped into the cylinder on the upper side of the piston therein so that the cylinder moves upwardly. As soon as the plate stops moving, the cylinder stops, and when the plate swings back to its normal vertical position, the oil is released from the cylinder so that the latter drops to its lowermost position. This type of hydraulic equipment is well known in the art and does not need to be described in detail herein. When the cylinder moves upwardly, arm 123 rotates sleeve 106 which, in turn, swings the supporting arm 98 to lift roller 42. Consequently, the roller is lifted by the servo piston as long as the feeler plate is swung upwardly. Actually, the roller is raised sufficiently to permit the log to engage it below the horizontal axis thereof. Further movement of the log raises the roller onto its upper surface, at which time the feeler plate is free of the log and can pivot towards its normal position. If a log of larger diameter than the first one immediately follows the latter, the second log will engage the feeler plate to cause the roller 42 to be raised the required distance. Should the second log be of lesser diameter than the first, the roller will merely drop on to said second log.

The raising of roller 42 to accommodate a log of such small diameter that it strikes the roller at a point substantially below its axis of rotation is a relatively simple matter. In such a case, feeler plate 117 is not actuated, and roller 42, upon being struck by the log, swings upwardly and outwardly, carrying roller supporting arms 97 and 98 in a clockwise direction (as viewed in Figure 2), arm 97 turning freely on the shaft 102, and arm 98 carrying sleeve 106 around with it.

While it is preferred to have the feeler plate and its associated mechanism included in the apparatus, it is possible to omit them. In this case, the roller 42 would be subjected to considerable abuse, or the maximum size of logs that might be handled would be reduced.

As previously mentioned, roller 42 is positively driven. This is accomplished as follows. Shaft 50, driven by chain drive 55 and sprocket 53, carries a second sprocket 132 which is mounted on the shaft at a point adjacent sprocket 53. Shaft 102 carries a sprocket 133 at its outer end, and a chain 134 is trained over sprockets 132 and 133. Shaft 102, at its inner end, carries a sprocket 136; and the shaft 95 which carries roller 42 is provided with a sprocket 137. A chain 139 is

trained over sprockets 136 and 137. With this driving arrangement, the drive mechanism for the ingoing conveyor, through chain 55, drives not only the log-advancing mechanism 40, but also the roller 42 (through intermediate chains 134 and 139).

In the event that a log of a diameter greater than the 18 inch maximum for which the machine is designed should be fed towards the log-advancing means 40, a trigger plate 143, positioned above the ingoing conveyor 31, will be tripped by the large diameter log. Movement of this trigger plate actuates a suitable mechanism (not shown) which breaks the electric circuit of the motor driving the ingoing conveyor. The too-large log may then be removed, after which the trigger plate swings back to its normal position so that operations may be resumed.

What I claim as my invention is:

1. A hydraulic barker for small logs comprising a main frame, two axially aligned oppositely disposed rotary spray heads facing each other and spaced apart a distance slightly greater than the diameter of the largest log for which the apparatus is designed, means for feeding water under pressure to said spray heads, means for rotating said spray heads at high speeds, a pair of horizontally aligned rollers rotatably mounted in said main frame and disposed on opposite sides of said spray heads with their axes of rotation parallel, an ingoing conveyor leading to one of said rollers, an outgoing conveyor leading from the other of said rollers, a third roller rotatably mounted above the roller adjacent the ingoing conveyor with its axis of rotation parallel to that of the latter roller, a log-advancing means vertically swingably mounted in said main frame above the ingoing conveyor, said third roller being mounted for generally vertical movement in sympathy with the swinging of said log-advancing means, and a fourth roller rotatably mounted above the roller adjacent the outgoing conveyor with its axis of rotation parallel to that of the latter roller, said fourth roller being mounted for vertical swinging to accommodate logs of different diameter.

2. A hydraulic barker as defined in claim 1, in which a fifth rotatably mounted roller is vertically swingably suspended from said main frame at a point above said outgoing conveyor.

3. A hydraulic barker as defined in claim 1, in which said fourth roller is positively driven and the remainder of said rollers are idly mounted.

4. A hydraulic barker as defined in claim 1, in which a fifth rotatably mounted roller is swingably suspended from said main frame above said outgoing conveyor, and in which said fourth roller is positively driven, and the remainder of said rollers are idly mounted.

5. A hydraulic barker as defined in claim 1, and means for cushioning the vertical swinging of the log-advancing means.

6. A hydraulic barker as defined in claim 1, in which a driven shaft is rotatably mounted in said main frame above said ingoing conveyor and one end of said log-advancing means is pivotally mounted on said shaft.

7. A hydraulic barker as defined in claim 1, in which a feeler member is pivotally mounted in front of said fourth roller and depends to a point below the axis of said roller, said feeler member being operatively connected to a mechanism arranged to raise said roller when said member is pivoted by the forward end of a log being fed through the apparatus.

8. A hydraulic barker as defined in claim 1, in which a driven shaft is rotatably mounted in said main frame above said ingoing conveyor, in which said log-advancing means includes a framework, an idling sprocket, a driven sprocket, and a plurality of endless chains trained over said sprockets, said driven sprocket being secured to said driven shaft, said chains each being provided with a plurality of log-gripping spurs, and in which a drive connection is provided between said fourth roller and said driven shaft whereby said fourth roller rotates whenever said shaft is driven.

9. A hydraulic barker as defined in claim 1, in which a driven shaft is rotatably mounted in said main frame above said ingoing conveyor, and in which said log-advancing means includes a framework, an idling sprocket, a driven sprocket, and a plurality of endless chains trained over said sprockets, said driven sprocket being secured to said driven shaft, said chains each being provided with a plurality of log-gripping spurs.

10. A hydraulic barker as defined in claim 9, in which said third roller is carried in a pair of arms pivotally mounted in said frame, and in which link arms, pivotally connected to said roller carrying arms at points intermediate the third roller and pivotal axis of the arms, are pivotally connected to the framework of said log-advancing means.

11. A hydraulic barker as defined in claim 10, in which said link arms are adjustable in length.

12. A hydraulic barker as defined in claim 10, in which a measure of lost motion is provided for in the pivotal connection between said link arms and said framework of the log-advancing means.

13. A hydraulic barker as defined in claim 12, in which lugs, extending upwardly from said framework, carry pins which are parallel to the axes of said rollers, and in which each link arm is provided with an elongated slot extending generally longitudinally therein, said pins passing through said slots to give said pivotal connection and being slidable in said slots to give said lost motion.

14. A hydraulic barker for small logs comprising a main frame, two axially aligned oppositely disposed rotary spray heads facing each other and spaced apart a distance slightly greater than the diameter of the largest log for which the apparatus is designed, means for feeding water under pressure to said spray heads, means for rotating said spray heads at high speeds, infeed and outfeed aligned rollers rotatably mounted in said main frame and disposed on opposite sides of said spray heads with their axes of rotation parallel, a third roller rotatably mounted above the infeed roller with its axis of rotation parallel to that of the latter, and a fourth roller rotatably mounted above the outfeed roller with its axis of rotation parallel with those of the other rollers, said third and fourth rollers being mounted for vertical swinging to accommodate logs of different diameter, and being adapted to steady logs moving through high pressure spray from the rotating heads.

15. A hydraulic barker as claimed in claim 14 in which the fourth roller is positively driven, and including means for positively moving each log between the third and infeed rollers until it is between the fourth and outfeed rollers.

16. A hydraulic barker as claimed in claim 14 in which a feeler member is movably positioned in front of the fourth roller and extends below the axis thereof, said feeler member being oper-

atively connected to a mechanism arranged to raise said roller when the member is moved by the forward end of a log being fed through the apparatus.

17. A hydraulic barker as claimed in claim 14 including a feeler plate hingedly suspended in front of the fourth roller and depending to a point below the axis theerof, a hydraulic cylinder operatively connected to said roller for swinging the latter upwardly, and control means for the cylinder operatively connected to the feeler plate, whereby movement of the plate by the forward end of a log being fed through the apparatus

operates the control means to cause the cylinder to raise the fourth roller until said plate swings back to its normal position.

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