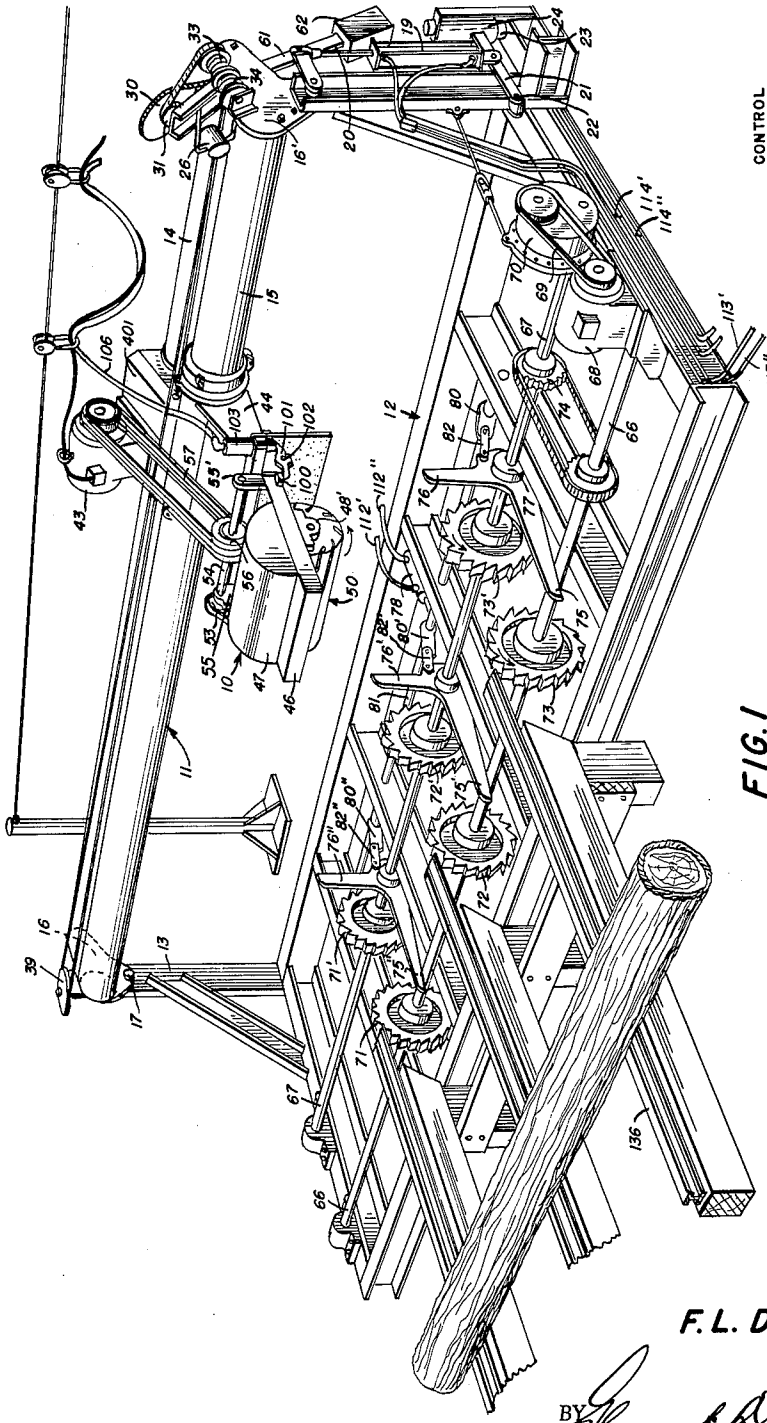
March 26, 1963 F. L. DILLINGHAM 3,082,801

LOG DEBARKING MACHINE

Filed April 23, 1959 7 Sheets-Sheet 1



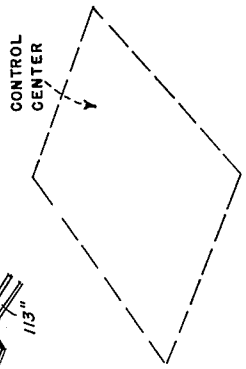


FIG. 1

INVENTOR
F. L. DILLINGHAM

BY Glascock Downing & Seebold
ATTORNEYS

March 26, 1963 F. L. DILLINGHAM 3,082,801

LOG DEBARKING MACHINE

Filed April 23, 1959 7 Sheets-Sheet 2

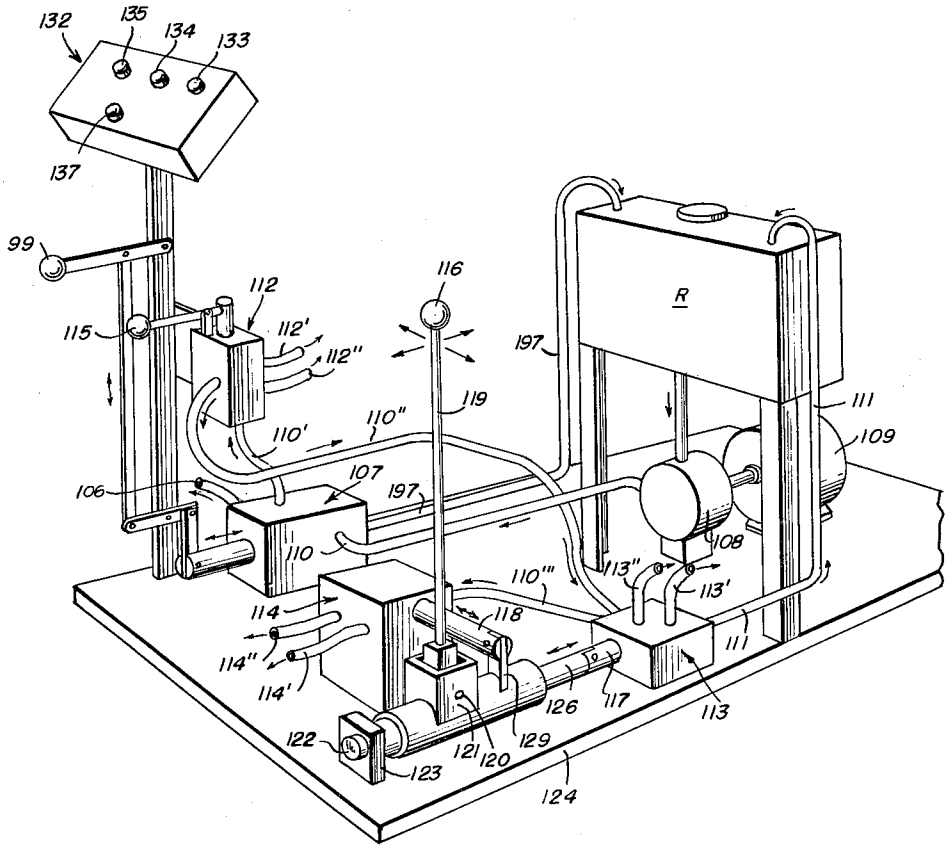


FIG. 1A

INVENTOR

F. L. DILLINGHAM

BY Glascock Downing Seebold

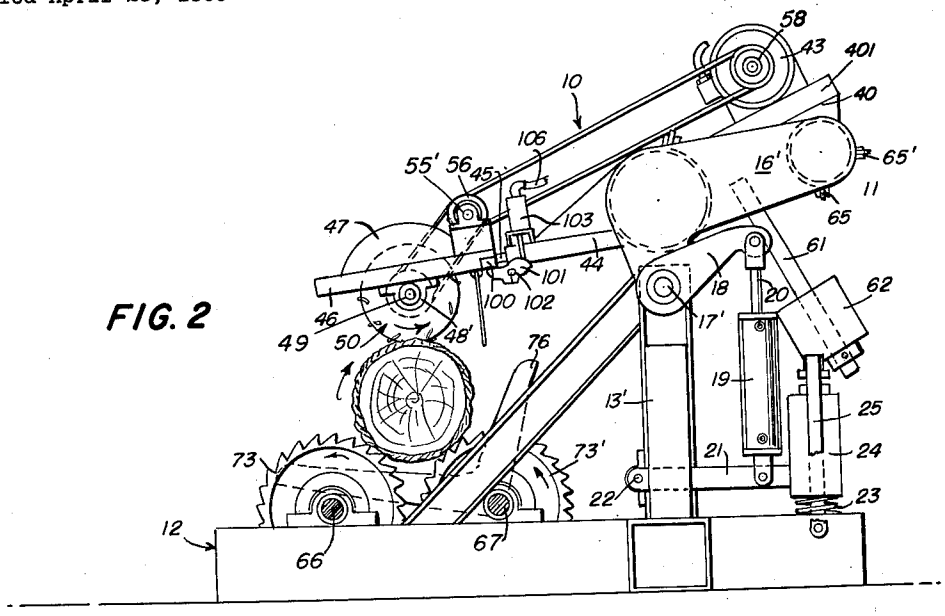
ATTORNEYS

March 26, 1963 F. L. DILLINGHAM 3,082,801

LOG DEBARKING MACHINE

Filed April 23, 1959 7 Sheets-Sheet 3

FIG. 2



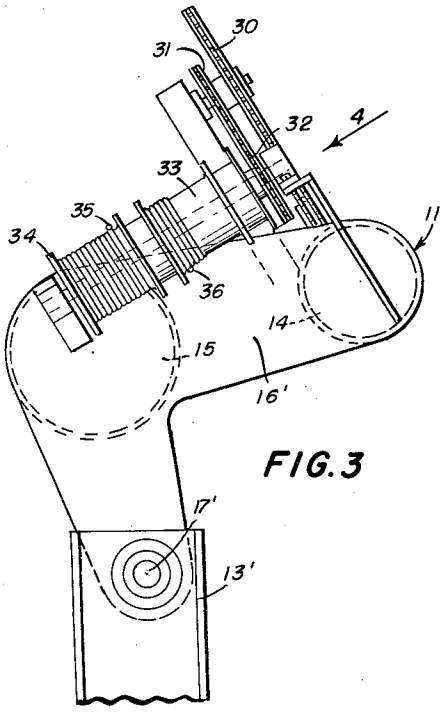


FIG. 3

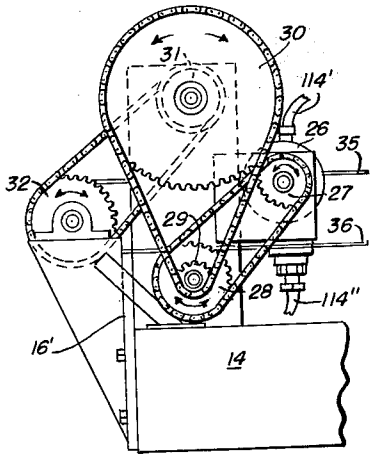


FIG. 4

INVENTOR

F. L. DILLINGHAM

BY Glascock Downing Seebold

ATTORNEYS

March 26, 1963 F. L. DILLINGHAM 3,082,801

LOG DEBARKING MACHINE

Filed April 23, 1959 7 Sheets-Sheet 4

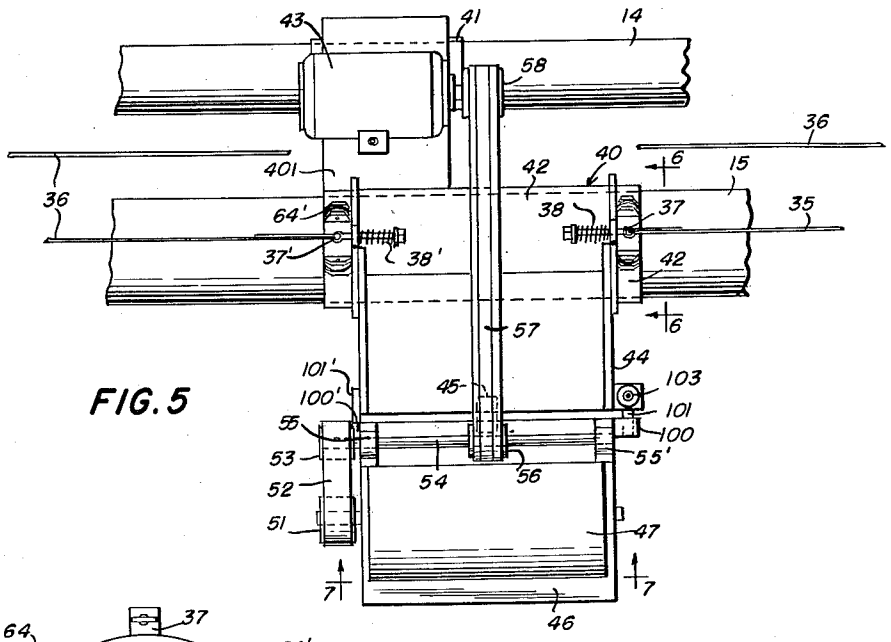


FIG. 5

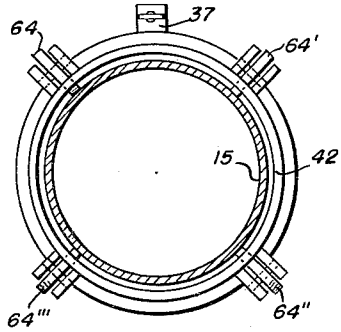


FIG. 6

FIG. 7

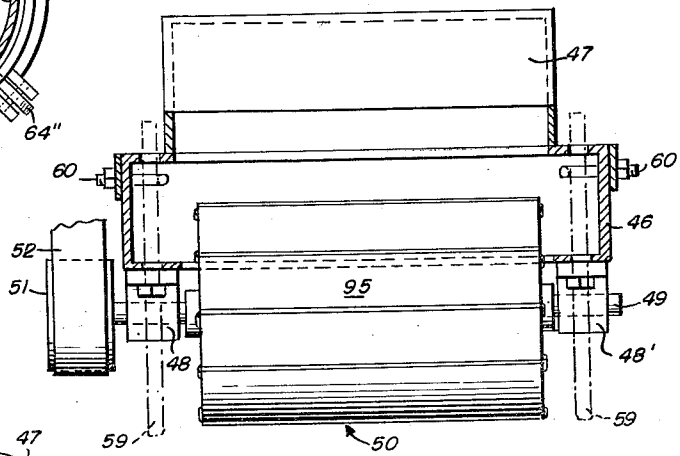
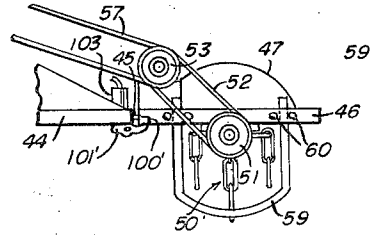


FIG. 8



INVENTOR

F. L. DILLINGHAM

BY Glascock Downing & Seebold

ATTORNEYS

March 26, 1963 F. L. DILLINGHAM 3,082,801

LOG DEBARKING MACHINE

Filed April 23, 1959 7 Sheets-Sheet 5

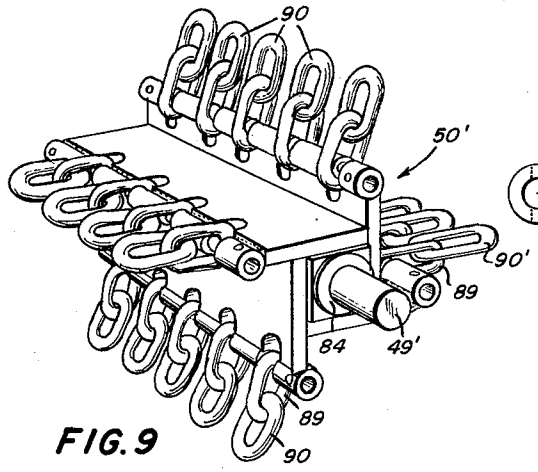


FIG. 9

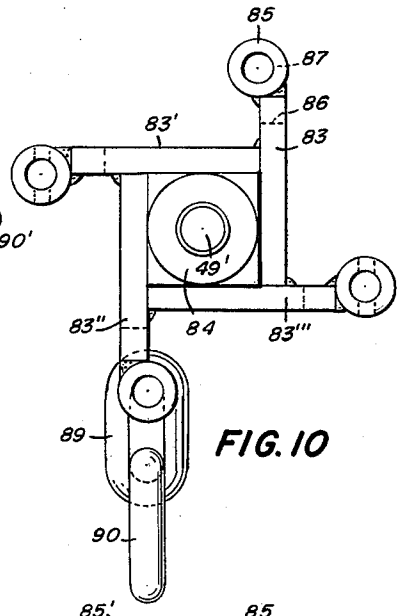


FIG. 10

FIG. 11

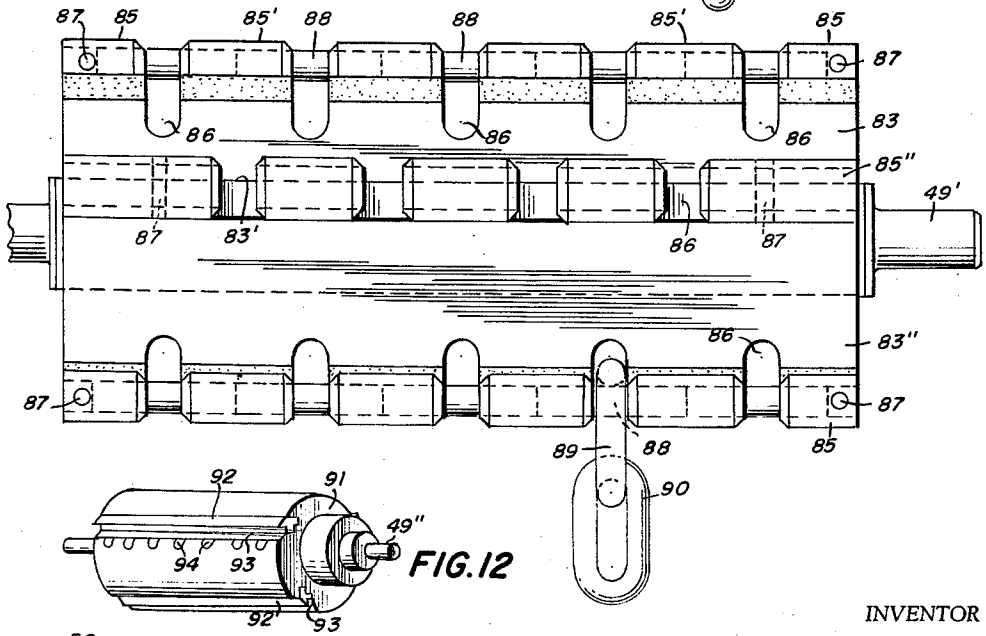


FIG. 12

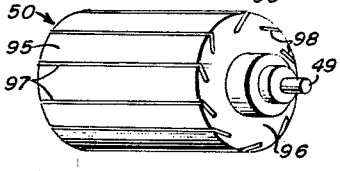


FIG. 13

INVENTOR

F. L. DILLINGHAM

BY Glascock Downing Seebold

ATTORNEYS

March 26, 1963 F. L. DILLINGHAM 3,082,801

LOG DEBARKING MACHINE

Filed April 23, 1959 7 Sheets-Sheet 6

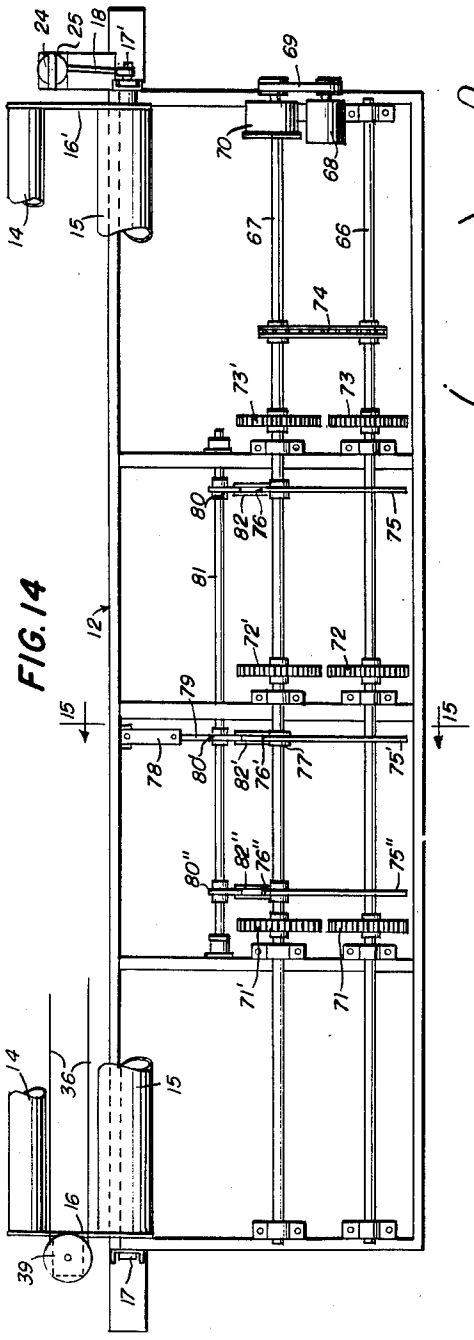


FIG. 14

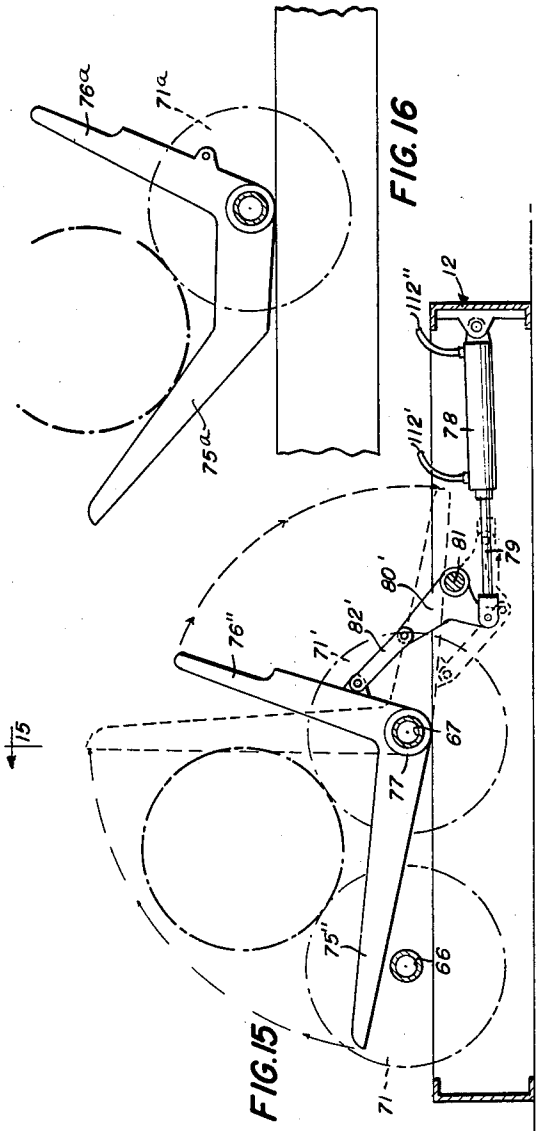


FIG. 16

FIG. 15

INVENTOR

F. L. DILLINGHAM

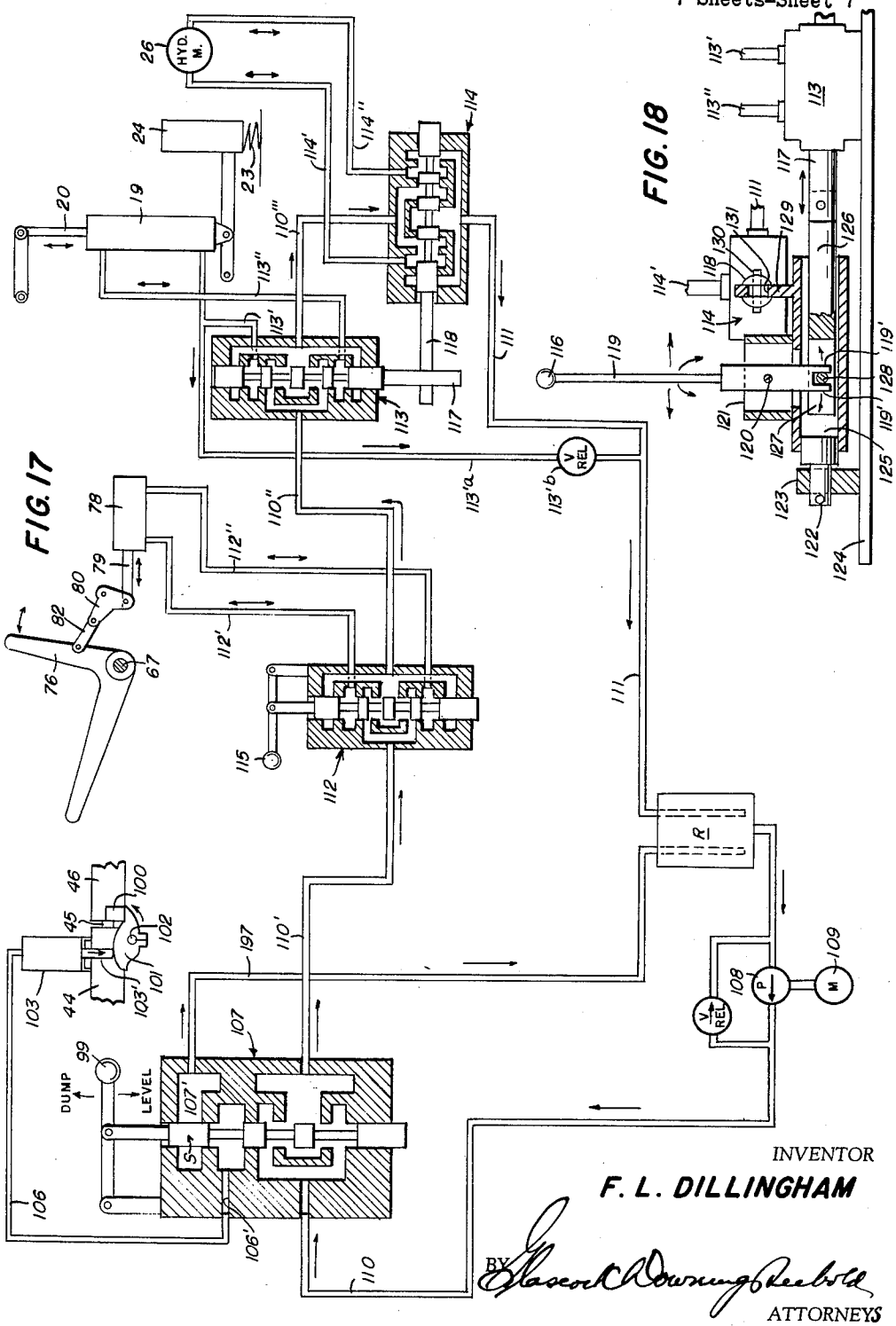
BY Glascock Downing & Seebold

ATTORNEYS

March 26, 1963 F. L. DILLINGHAM 3,082,801

LOG DEBARKING MACHINE

Filed April 23, 1959 7 Sheets-Sheet 7



INVENTOR

F. L. DILLINGHAM

BY Glascock Downing & Seebold

ATTORNEYS

United States Patent Office 3,082,801 Patented Mar. 26, 1963

3,082,801

LOG DEBARKING MACHINE

Frederick Laurence Dillingham, Munford, Ala., assignor to Soderhamn Machine Manufacturing Company, Talladega, Ala.

Filed Apr. 23, 1959, Ser. No. 808,367
12 Claims. (Cl. 144—208)

The present invention relates to the art of removing bark from logs and more particularly, this invention relates to a log debarking machine constructed and arranged to debark logs of varying sizes and types.

While many types of log debarking machines have been devised, this invention is directed to certain improvements in that type of debarking machine which includes a supporting means for a log to be debarked, a guideway extending parallel to the axis of such a log, a carriage traversable along said guideway and bark removing means carried by such carriage for operation on such logs.

In log debarking machines of this type, the log supporting means are sometimes in the form of bull wheels and either the carriage carrying the bark removing means, or a frame carried thereby, or even the longitudinal guideway itself is mounted for movement toward and away from a log to be debarked. In this connection, the bull wheels are usually serrated or toothed wheels arranged in transversely aligned pairs on laterally spaced parallel shafts that extend in parallelism with the guideway.

It is, therefore, an object of the present invention to provide a relatively inexpensive, efficient and easily operated log debarking machine of the foregoing type that is capable of operating on all sizes and types of logs.

In debarking machines presently known in which logs to be debarked are placed on bull wheels by which the logs are supported and rotated, it is usual to load the logs on the bull wheels from the front of the debarker, and to unload them from the bull wheels toward the rear of the debarker, and under a longitudinal trackway or guideway along which a carriage carrying a debarker head moves parallel to the log. This trackway is elevated in order to provide space therebelow for passage of the logs thereunder. A debarker head mounted on an arm pivoted on a carriage on such an elevated trackway cannot descend vertically on a log on the bull wheels, but is brought down in an arc from a pivot on the carriage against the front side of the log, away from said trackway, so that the debarking head tends to force the log over the rearward set of bull wheels. In order that the operation of the debarking head on the log will not force the log over the rear bull wheels, the rear bull wheels are elevated with respect to the front bull wheels. This expedient is costly, and again reduces the clearance to the rear of the debarking machine under the trackway that was increased by raising the trackway. The effective pivot of the arm of the debarking head in the device of the present invention is located at about the level of the top of an average size log on the bull wheels, so that the tangent to the arc of descent of the debarking head as it comes into operation on a log is substantially vertical, so that there will be a minimum of thrust on the log tending to throw it over the rear bull wheels.

It is, therefore, a further object to provide a debarking machine of the aforegoing type in which the debarking head operates from vertically above the log being operated on to obviate the need for the rear bull wheels to be elevated, which need also requires greater lift by a kicker to eject a log from the machine.

Kicker means on debarking machines such as described above comprise an arm extending radially of and rotatably mounted on the shaft of the rear bull wheels, and provided with a dog clutch to be engaged when it is desired to eject the log. It is at once apparent that engagement of such a dog clutch, to eject a heavy log places a sudden very heavy load on the drive for the bull wheels. Moreover, the kicker, requiring room to swing a full circle around the shaft of the rear bull wheels, not only precludes having a kicker far longer than the distance between the shafts of the bull wheels, but also precludes the provision of stop means to prevent a log from rolling over the back set of bull wheels.

A yet further object of the invention is to provide a log debarking machine which includes a kicker device that will preclude a log being placed on the machine from rolling over the rear set of bull wheels and which also may be used to partially support the log during the debarking operation.

A still further object of the invention is to provide a debarking machine including a longitudinally movable carriage, a log-supported bed disposed to one side of the path of movement of the carriage and including pairs of bull wheels arranged on parallel shafts for supporting logs in a horizontal plane, a guideway for such longitudinally movable carriage, vertical supports for the guideway and a pivot connection between the guideway and the vertical supports constituted and arranged so that the guideway is spaced upwardly from the plane of said bull wheels a distance such as to provide sufficient clearance for logs to be ejected under the guideway while retaining all of the desirable features of guideways that are located at approximately the same level as the log to be debarked.

It is a further object of the invention to provide such a debarking machine with simplified control means whereby the operator can readily control the operation of the bull wheels, the combined kicker and log supporting means, the traversable carriage, the rotation of the debarking means and the movement of the debarking means toward and away from a log to be debarked.

It is a specific object of the invention to provide a debarking machine of the type described with a combined electric and hydraulic driving system having the controls thereof located at a single control station.

In connection with the controlling of the various driving means for the debarking machine, it is a further object to provide a simplified hydraulic system which includes a single handle and combined valve control arrangement capable of at least controlling the movement of the debarking tools toward and away from a log to be debarked and also traversing the carriage structure longitudinally along the guideway in either direction.

Further and more specific objects and advantages will be apparent from the following description taken in connection with the accompanying drawing in which like reference characters refer to similar parts and in which:

FIGURE 1 and FIGURE 1A constitute a perspective view of the debarking machine of this invention,

FIGURE 2 is an end elevation of the machine as viewed from the right hand end in FIGURE 1, with the traversing drive for the carriage and the drive for the bull wheel supporting shafts removed for purposes of clarity,

FIGURE 3 is a fragmentary end elevation on an enlarged scale illustrating the traversing drive for the carriage,

FIGURE 4 is a fragmentary rear elevation of the structure of FIGURE 3 as viewed along viewing line 4,

FIGURE 5 is a fragmentary top plan view illustrating the debarking head and its drive as mounted on the carriage,

FIGURE 6 is a cross-sectional view on an enlarged

scale taken along line 6—6 of FIGURE 5 and illustrating only the means that support the carriage on the track or guideway,

FIGURE 7 is a fragmentary cross-sectional view on an enlarged scale taken along line 7—7 of FIGURE 5,

FIGURE 8 is a side view of the debarking head, and a portion of its supporting structure including chain flails and rider bar means,

FIGURES 9, 10, and 11 are, respectively, a perspective and end elevation with some of the chains removed, and a front elevation with most of the chains removed, of the chain flail head of FIGURE 8,

FIGURE 12 is a perspective view of a cutter head,

FIGURE 13 is a perspective view of an abrader head,

FIGURE 14 is a plan view of the log supporting and manipulating bed,

FIGURE 15 is a cross-sectional view of the bed on an enlarged scale and taken on line 15—15 of FIGURE 14 and illustrating the kicker structure,

FIGURE 16 is a fragmentary view showing a modified kicker structure requiring only one bull wheel,

FIGURE 17 is a diagrammatic view illustrating the hydraulic system for the debarker of FIGURE 1, and

FIGURE 18 is a view partly in elevation, and partly in section and illustrating the handle and operating linkage for the traversing motor valve and valve for the guideway pivoting cylinder.

Referring to FIGURES 1 and 2, where the machine is seen in its entirety, it will be noted that there is a carriage assembly designated broadly at **10**, a guideway designated broadly at **11**, and a log handling bed designated broadly at **12**.

In FIGURE 2 a log is shown on the bed of the machine of FIGURE 1. This log is placed on the bull wheels of the machine from the front, that is, the left-hand, side in FIGURES 1 and 2. The debarking head **50** carried by carriage **10** can traverse along guideway **11** in either direction, the direction of movement of carriage **10** being immaterial, as the debarking head is operative for debarking in either direction.

Upon completion of debarking any log the same will be discharged to the rear of the machine beneath the guideway **11**. Discharging of logs to the rear of the machine has been used by others, but its use has been accompanied by the introduction of undesirable features in the machine as explained above. The structure of the present invention eliminates the undesirable features caused by pivoting a debarker to an elevated carriage while retaining the desirable ability to discharge logs to the rear of the machine. In fact, the structure of the present invention introduces the desirable feature of lowering the effective pivot of the debarking head support by the same structure that facilitates the rearward discharge.

The guideway **11** is supported at each end of the bed of the machine by vertical supports **13, 13'**, that, of course, are suitably braced. The guideway comprises two parallel pipes **14** and **15**, which may, but need not, be of the same diameter, but which must be of sufficient size to provide the necessary rigidity. Pipes **14** and **15** are secured at each end to an L-shaped swing frame **16, 16'**, the foot of the L extending downwardly.

The swing frame **16, 16'** at each end of the guideway **11** is pivotally mounted on the vertical supports **13, 13'** in pivots **17, 17'** carried thereby. Pivotal movement of the guideway **11** about the axis of aligned pivots **17, 17'** is effected by an arm **18** fixed to pivot **17'** and extending outwardly thereof. The piston rod **20** of a hydraulic motor is pivotally connected to the free end of arm **18**. The cylinder **19** of this motor is mounted on a lever **21** that is pivoted at one end at **22** to a vertical support **13'**. The other end of lever **21** is spring supported from the machine frame by a spring **23** which may be enclosed in a housing **24**. A hold-down **25** prevents upward movement of lever **21** beyond its normal operating position.

When hydraulic pressure is diverted to the lower end of cylinder **19** to rock the guideway to lower the head **50** against a log, the head stops its downward motion upon striking the log. Further pressure to cylinder **19** compresses spring **23**. This spring gives the desired resilient pressure for head **50** riding on the log. It is evident that since the diameter of a log is greatest at its butt end that the pressure of the head against the log will be greatest at the butt end, which is the desired condition, as the bark at the butt end requires more pressure for its removal. This desired variation of pressure is, therefore, automatic.

At one end of guideway **11** there is mounted, a hydraulic motor and reduction gear drive assemblage, for traversing the carriage along the guideway, see FIGURES 3 and 4. This assemblage comprises a hydraulic motor **26**. This motor is, of course, reversible. A reversible electric or other motor could, of course, be used in its place. Motor **26** drives a pair of drums **33, 34** mounted on a common shaft by means of a sprocket and chain speed reducing means including sprockets **27, 28, 29, 30, 31** and **32**, and chains trained thereover. Other speed reducing means could, of course, be used. A cable **35** is wound around drum **34** and a second cable **36** is wound around drum **33**. Cable **35** leaving drum **34** from the top extends along the ways to the carriage assembly **10** to which it is secured by a bolt **37**, FIGURE 5. A spring **38** around bolt **37** holds the cable **35** taut and cushions a sudden stoppage or sudden movement of the carriage as it is traversed along a log. Cable **36** leaving drum **33** from the bottom extends the full length of the guideway, passes the carriage assembly, to a sheave **39**, where its direction is reversed and it extends back along the guideway to the carriage assembly where it is secured by bolt **37'** cushioned by spring **38'**.

Carriage assembly **10** comprises a main carriage frame **40** including two pipe lengths one of which, **41**, loosely encircles pipe **14**, and the other pipe length **42** loosely encircles pipe **15**, these pipe lengths being connected together by a platform **401** on which an electric motor **43** is mounted.

From the side of the guideway facing toward the front of the machine, an arm means **44** connected to pipe length **42** extends outwardly to overhang the log handling bed. Arm **44** carries a pair of spaced bushings having their aligned axes lying in a vertical plane normal to the length of the guideway. A pivot **45** in these bushings pivotally mounts a head frame **46** for rocking movement relative to arm means **44**. A shield **47** extends upwardly from, and covers head frame **46**. The structure of the bushings and the connection of the head frame to the arm means is shown in my prior Patent 2,795,320 granted June 11, 1957.

On the lower side of head frame **46** are a pair of bearings **48** and **48'** accommodating shaft **49** carrying a debarking means or head **50**. Any one of several debarking heads may be used, as will be explained at length below in connection with FIGURES 7 through 13. On one end of shaft **49** is a pulley **51**. A belt **52** engaging pulley **51** to drive debarking head **50** is, in turn, driven by a pulley **53** mounted on an intermediate shaft **54** carried by bearings **55, 55'** mounted on the top of frame **46** adjacent its connection to arm means **44**. At or near the plane of pivot **45** a pulley **56** is keyed to shaft **54**, and a belt **57** engaging pulley **56** and pulley **58** on the shaft of motor **43** thus drives shaft **49**.

It will be noted from FIG. 2 that the pulley **56** is above the axis of pivot **45**, and that pulley **58** is even further above the axis of pivot **45**. If, then, head frame **46** turns on pivot **45**, there is a torque developed by the pull of belt **57** on pulley **56** tending to return head frame **46** to its normal horizontal position. Conventional rider bars **59, 59'** may be adjustably clamped to head frame **46** by U-bolts **60** if a chain flail head is used, see FIGURE 8.

In FIGURE 2 there is seen a bar **61** that is welded

to swing-frame 16' and carries a weight 62. This weight 62 compensates for the weight of the carriage and guideway which weight is spaced substantially above pivots 17, 17'. Weight 62 does not operate to pivot the carriage about pivots 17, 17' but merely to bring the center of gravity of the entire device that is pivoted at 17, 17' to near the center of these pivots. A chain, not shown, may be secured to weight 62 or bar 61 and to the bed frame of the machine to prevent the debarking head 50 from being lowered so far to strike the log handling equipment.

FIGURE 6 illustrates how the pipe element 42 of the carriage may be mounted for easy movement along pipe 15. As seen in FIGURE 6, and also in less detail in FIGURES 1, 2 and 5, a plurality of small wheels 64, 64', 64'' and 64''' are mounted at spaced points about each end of pipe 42 to hold the inside surface of pipe 42 free of, and to provide for a rolling contact against, pipe 15. Similar rollers are seen at 65, 65' in FIGURE 2 between pipe 14 and its surrounding pipe length 41.

The vertical supports 13, 13' are at the rear of the log handling bed 12. The debarking head 50, on the end of arm 44, is positioned over the log handling means. The log handling means, as is best seen in FIGURES 1, 2, 14 and 15, comprises two spaced parallel shafts 66 and 67. These shafts are rotated by a motor 68 by way of a belt 69 and a reducing gear 70. A plurality of pairs of bull wheels 71, 71' and 72, 72' and 73, 73' are mounted on the shafts 66 and 67. These bull wheels are serrated and support and rotate a log when it is placed on the log handling bed. Sprocket and chain means 74 connected between shafts 66 and 67 cause both shafts and all the bull wheels to rotate at the same speed and in the same direction. The direction of rotation is such that the tops of the bull wheels are moving forward so that a log resting thereon will rotate with its top moving toward the rear of the machine.

The debarking head 50 rotates in the same direction as the bull wheels. Arrows on the bull wheels, log and debarking head in FIGS. 1 and 2 illustrate the directions of rotation.

Logs may be placed on the log handling bull wheels from a loading platform or ramp 136 extending along the front of the log handling bed. From such a platform or ramp a log may be rolled onto the bull wheels where it will be rotated about its longitudinal axis. With a log on the log handling means, the carriage 10, being at one or the other end of the machine, the guideway and carriage may be tilted forward about pivots 17, 17' by means of hydraulic cylinder 19 operating on arm 18 until the debarking head 50 comes into debarking engagement with the log. Then, as the debarking head removes the bark from the log, the carriage may be traversed along the pipes 14, 15 by means of the hydraulic motor 26 and its traversing means, explained above, until the carriage reaches the other end of the guideway and the entire log is debarked. It then becomes necessary to remove the log from the log handling device so that another log may be debarked.

Logs are removed from the debarking machine by means of kickers, as seen in FIGS. 14 and 15. The kickers of the present invention comprise a generally L-shaped combination kicker arm 75 and back arm 76. Each L-shaped kicker is mounted on shaft 67 by a bushing 77 so that shaft 67 can rotate freely, to drive bull wheels 71', 72' and 73', and kicker and back arm 75, 76 can be rotated about shaft 67, by means of hydraulic cylinder 78 and piston rod 79 operating to rotate bell crank 80. Bell crank 80 is keyed to a shaft 81 on which other bell crank levers 80' and 80'' are also keyed to operate kickers 75', 76' and 75'', 76'' spaced from kicker 75, 76 toward either end of the machine. Each bell crank 80, 80' and 80'' is connected by a link 82, 82' and 82'' to kickers 75, 76; 75', 76'; and 75'', 76'', respectively.

In FIGURE 15 it will be noted that the log would be placed on the log handling device from the left. At the time the log is placed on the bull wheels 72 the kicker bar 75 is in its normal position (shown in full lines) lying below the position the log will assume. The back arm 76 extends upwardly to prevent a log, rolling from the left onto the bull wheels, inadvertently rolling past them.

Upon completion of the debarking operation the hydraulic cylinder 78 may be operated to rotate the kickers into the position shown in dotted lines in FIGURE 15 so that the log is forced over the top of the rear bull wheels 71', 72' and 73'. The back arms 76, 76', 76'' move back out of the way as the log is lifted over the rear bull wheels. It will be noted that if the kicker were operated by being clutched to the shaft of the rear bull wheels it would be necessary that the bull wheels turn in the opposite direction.

It will be further noted that, due to the hydraulic operation of the kickers, they may be elevated to bear against and help support the log. A small, short log, for instance, that is supported only by bull wheels 71, 71' and 72, 72' and does not quite reach bull wheels 73, 73' if unsupported at its right-hand end would need to be supported in some manner at this end to prevent the downward thrust of the debarking operation from tilting the log endwise. The kicker 75 would provide such support.

In this connection, the modification shown in FIGURE 16 may be used to eliminate one row of bull wheels. Here we see that the log is supported by bull wheel 71*a* and by kicker arm 75*a*. Back arm 76*a* acts in this case just as back arm 76 acts in the device of FIGURES 1, 2, 14 and 15.

In FIGURES 9, 10 and 11 there is seen a debarking head 50' of the chain flail type that may be used in place of debarking head 50 shown in FIGURE 1, and in detail in FIGURE 13, and which will be described below.

Debarking head 50' comprises several swept-back vanes or arms 83, 83', 83'' and 83'''. These swept-back vanes differ from each other only in that the spacing of the links on successive vanes are staggered so that the entire surface of a log under treatment will be subjected to the impact of the chain links.

The term "swept-back" is used to describe the structure where the vanes 83, and so on, are not radial but are, rather, tangential to a cylinder, or shaft, 84, and the end of the vanes trail, as the head is rotated in use, behind the point of its tangency to the shaft 84. Extensions 49' at each end of the shaft 84 correspond to shaft 49 of FIGURE 7.

At the outer end of each arm or vane of the flail head 50' there are provided a plurality of spaced, aligned tubular elements such as 85, 85', 85''. Between these elements the vanes are notched out as at 86 to provide space for the chain links. At each end of each series of tubular elements, provision is made for a lock pin 87 to be driven diametrically across the end tubular elements. These lock pins 87 retain a plurality of identical hardened pins 88 in place within the tubular elements 85'. The lengths of these hardened pins 88 is such that, when in place, the midpoint of each pin comes opposite a notch 86. Two links 89 and 90 that are linked together are secured in each notch 86 by a pin 88 extending through link 89 and between adjacent tubular elements 85, 85', 85'' and so forth. Pins 88 fit fairly loosely in the tubular elements 85, 85', 85'' to allow the pins to roll instead of slide when the chain links flex out of radial alignment due to striking the log.

It has been found that the use of short lengths of rod to form pins 88 reduces the incidence of breakage of the chain retaining pins under the impact loading to which they are subjected. The use of the simple drive pins 87, that may be a pin, sold under the name "Roll Pin" by the Elastic Stop Nut Corporation of America, obviates the

need for tools other than a hammer and punch to remove and replace chain links 89, 90 from the head. And it has been found that, due to the swept-back arrangement of vanes 83, 83', 83'' and 83''', the loose bark from the log is thrown to the rear of the machine and the rebound of the chain is subdued by centrifugal force so rubber padding on the body of the debarking head is not required, as is required in the prior art devices. The entire head may be case-hardened to further increase its life.

The valve handle 99 seen in FIGURE 1A is for use with the chain flail head 50'. As the rider bars 59 (see FIG. 8) support the head at the correct distance from the log, it is apparent that when one of the bars runs off the end of the log, the head will tip over, causing the end of the log to strike the head body. Handle 99 is to lock the head rigid so it can be supported by only one rider bar, and must be used when coming off the end of a log; also when getting on to the following log, so it will be left locked between logs. Pushing down on the handle locks the head rigid. Pulling up releases the head to allow it to follow the contour of the log being debarked.

The leveling device is seen in FIGURES 1, 2, 5 and 8 where lugs 100, 100' are seen one on each side of head frame 46 adjacent arm 44. Levers 101 and 101' are mounted rigidly on arm 44 at each side on a shaft 102 that may turn on its axis. A hydraulic cylinder 103 which is selectively provided with hydraulic fluid under pressure via pipe 104, is provided with a ram 105 which may bear against lever 101 so that when hydraulic pressure is supplied to cylinder 103 to actuate both levers 101 and 101' the forward ends of the levers will rise. If either lug 100 or 100' is below the level of the lower surface of arm 44, it will be pushed up by the lever 101 or 101' as the case may be. Hydraulic pipe 104 is connected via connection 106 to a valve 107 at the control station of the machine so as to be operable by the operator at any time by handle 99.

This leveling means is provided with hydraulic fluid under pressure from a hydraulic system to be described below. Valve 107 is such as to provide fluid under pressure to cylinder 103, hold such fluid therein or dump it.

In FIGURE 12 a different head is shown that comprises a generally cylindrical body 91 along the periphery of which are a plurality of cutting blades 92 seated in a groove 93 and secured in place by a plurality of recessed set screws 94. This head is provided with a shaft 49'' by which to mount this head in bearings 48, 48' and it corresponds to shaft 49 of head 50.

The debarking head seen in FIGURE 13 is the same as that shown in FIGURES 1, 2 and 7, and may be designated as an abrading head. This head comprises a drum 95 having end walls 96, mounted on a shaft 49. On the outer wall of drum 95 are a plurality of generally axially extending lines 97 of a single pass of hard weld. These lines of hard weld perform the abrading function of the head. At each end of the head, on the end walls 96, there are provided short lines of weld 98 in such a direction that as the end wall hits, for instance, a protuberance on the log the vector of force between the protuberance and welds 98 will force the drum away from the log. Without these short lines of weld 98 it is necessary to use rider bars 59 when using an abrader head to avoid having the head dig into the log. With these welds 98 on the ends of the abrader head the head will follow the contour of the log as it is traversed along the log.

As noted above, the kicker, the means to raise and lower the debarker head, and the traversing motor are all hydraulically operated. Control of the hydraulic operation of the device has been simplified, see FIGURE 1A, and all the valves and control equipment are mounted at a control station as seen in FIGURE 1A. There are only three handles that need be manipulated, one for the head lock, one for the kicker, and one for both the traversing and the tilting means to raise and lower the head.

Diagrammatically the hydraulic circuit is shown in FIGURE 17. A pump 108 driven by a motor 109 subjects pipes 110, 110', 110'', and 110''' to a flow of hydraulic fluid through the several valves. Valve 107 serving the head leveling device described above; valve 112 serving the kicker mechanism, and valves 113 and 114 serving the head tilting cylinder and the hydraulic traversing motor respectively. The hydraulic fluid flows back to the fluid supply reservoir R via line 111 which cannot be put under pressure.

These valves are shown in diagrammatic section in FIGURE 17. The valves 112, 113 and 114 are identical and, it will be noted that when in cnetral or neutral position as seen in valves 112, 113, the discharge of the pump flows directly through valve 107 and each of valves 112, 113 in succession. Upon movement of any one of the control members for these three valves, the hydraulic fluid will be deflected to one or other of the outlets of the valve to actuate the device controlled by that valve. Valves 112 and 113 serving double acting cylinders 78 and 19 respectively can only be operated momentarily as the hydraulic fluid used by these cylinders is limited by the displacement of the cylinders. Valve 114, however, serves hydraulic motor 26 and may be held in open position to operate the motor as long as required to move the carriage 10 along the guideway 11.

The specific structure of valves 107, 112, 113 and 114 is not material so long as they perform as required.

As noted above, the hydraulic fluid flows through each valve. Valve 107, includes a spool valve body or slide S having a plurality of axially spaced lands separated by reduced portions to provide annular passages operating in a bore 107' connecting the several valve chambers. Pipe connection 106 extends from one chamber to cylinder 103. The main inlet and outlet pipes are shown at 110 and 110', and a dumping pipe connection 197 is also provided to return hydraulic fluid from the head leveling cylinder 103 to the supply tank or reservoir R. When handle 99 is depressed, the hydraulic fluid entering by pipe 110 is blocked from flowing to pipe 110' and is deflected into pipe connection 106 to flow to cylinder 103. When the handle 99 is returned to center position, the hydraulic fluid can again flow from pipe 110 through the valve body to pipe 110' and thence to valve 112. Fluid in pipe 106 and cylinder 103 however cannot flow back through the valve 107 until the handle 99 is raised. The hydraulic fluid in cylinder 103, and pipe 106 is then vented to dumping connection 197 by which it is returned to the reservoir R. When this valve handle 99 is raised above neutral, the cylinder 103 may be subjected to pressure by tilting of the head frame 46 because if either lug 100 or 101' presses on lever 101 or 101', then lever 101 will press the piston rod 103' into cylinder 103.

If handle 99 is again moved downward, below the neutral position, valve 107 will again deflect hydraulic fluid into cylinder 103 which will actuate levers 101 and 101' to raise lug 100 or 100' to again level the head frame 46. It will be noted that the entire system is maintained full of hydraulic fluid because the end of the dumping connection 107'' is lead into reservoir 111' at the bottom.

Valves 112, 113 and 114 are identical, each valve having three positions, a central, neutral position as shown diagrammatically in FIGURE 17, as regards valves 112 and 113 and two operating positions, one to each side of the neutral position. Valve 114 is shown deflected to one of the operating positions and illustrates the flow path of the hydraulic fluid, because the valves are symmetrical about the axis of the inlet and outlet connections 110''', 111, for instance.

It will be noted that if control handle 115 for valve 112 were depressed, hydraulic line 112' would be put under pressure and hydraulic line 112'' would be connected through the valve 112 to line 110'', and the kicker 75, 76 would be actuated to eject a log from the machine. Raising handle 115 above the neutral position would return the kicker 75, 76 to its normal position to receive a log on the machine. It is clear that the kicker 75, 76

may be located, by manipulation of the valve handle **115**, at any position between its extreme positions so that it may bear against, or, as seen in FIGURE 16, support a log in the machine.

Valves **113** and **114** are operated by a common handle **116** such as seen in FIGURE 18 which will be explained below. In this connection, FIGURE 17 shows the valves **113** and **114** in positions that are displaced as regards their actual positions which are shown in FIGURES 1 and 18.

Valve **113** is operated by a valve stem **117** and hydraulic lines **113'** and **113''** are so connected to valve **113** that as the handle **116** is moved toward the operator to the left in FIGURE 18 and downwards in FIGURE 17, line **113'** is subjected to pressure to activate cylinder **19** to lower the debarking head, and movement of handle **116** in the opposite direction causes line **113''** to be subjected to pressure to raise the debarking head.

As was described above, resilient pressure of the debarking head against the log is maintained by spring **23**. There will be, however, times when motion of the debarking head beyond the amount that is provided by spring **23** will need to be taken into account. For this reason a branch line **113'***a* is provided to return hydraulic fluid to return line **111** through a pressure relief valve **113'***b* before the hydraulic pressure in cylinder **19** builds up to a dangerous level. Valve **113'***b* is, in effect, a cushioning valve to cushion the effect of unexpected loads on the debarking head.

Valve **114** is operated by a valve stem **118**, and hydraulic lines **114'** and **114''** are connected to valve **114** in such a manner that motion of handle **116** to the right of the operator subjects line **114'** to hydraulic pressure to make motor **26** run in a direction to traverse carriage **10** to the right. Movement of handle **116** to the left subjects line **114''** to hydraulic pressure to run motor **26** to traverse carriage **10** to the left. When either of the lines **114'** or **114''** is subjected to pressure the other line is connected to the return line **111**.

Handle **116** is at the end of operating lever **119** that is pivoted at **120** to a housing **121**. Housing **121** is pivotally mounted by stub shaft **122** extending through a boss **123** on base **124**. A bore **125** extends coaxial with stub shaft **122**. Valve **113** is mounted with its valve stem **117** aligned with bore **125** and stub shaft **122** and is connected to a valve operating rod **126** that slidingly fits in bore **125**. Rod **126** is slotted at **127** and is provided with a pin **128** extending across the slot. Lever **119** extends beyond pin **120** and is bifurcated at its end at **119'** and **119''** so that it can straddle pin **128**. Valve stem **117** may be rotated in valve **113** so the valve **113** acts as a bearing along with boss **123**.

It is clear that motion of handle **116** in any plane intersecting the axial center of valve **113** will move valve stem **117** inwardly or outwardly of valve **113**. Motion of handle **116** in a direction lying in a plane normal to the axis of valve **113** will have no effect whatever on valve **113**.

A boss **129** is mounted on housing **121**. Valve **114** is mounted so that its valve stem **118** intersects boss **129** at right angles when both boss **129** and stem **118** are in a neutral or center position. Stem **118** is slotted and a pin **130** extends across the slot. Boss **129** is provided with an elongated opening **131** embracing pin **130**. Pivoting housing **121**, therefore, about the axis of valve **113** and stub shaft **122** by moving handle **116**, will have no effect on valve **113**, but will actuate valve **114**.

As seen in FIGURE 1, therefore, an operator standing in front of the operating station where the control panel **132** is located can start, stop, and control the entire machine as follows:

The operator will start the hydraulic pump by pushing the right top starter button **133** on the control panel **132**.

Now the operator will push forward on the control stick or handle **116**, which will cause the carriage tubes to rock upward, raising the head **50**. As soon as raising is complete, the operator will allow the stick to return to center position.

Now the operator will retract the kicker arms by pushing down on the valve handle **115** located under the control panel push button station. This will allow a log to be rolled into the barker later.

Now the operator pushes the center top button **134** which starts the head **50** to rotating.

Next, the operator pushes the top left button **135** and the bull wheels **71**, **72**, **73**, **71'**, **72'**, **73'** will run. When all motors are running, a log may now be rolled into the barker. It will be noted that the log does not change direction of rotation during the whole debarking cycle. It rolls down the infeed ramp **136**, is rotated during barking and is ejected from the barker, all without reversing the rotation of the log.

After the log is supported and rotated by the bull wheels **71**, **72**, etc., the operator will move the carriage, by moving handle **116** to his right or left, so as to position the carriage **10** along the guideway **11** at a location where the debarking head is directly above the place where barking is to begin (in most cases at one end of the log).

Having positioned the carriage so the head is directly above the position desired to start barking, the operator will lower the head by pulling control handle **116** toward him. As soon as the head is in contact with the log, the operator will allow the stick to return to center position. If the head **50** is not removing the bark (in case of the abrader head), more pressure must be applied by very quickly moving the handle **116** toward the operator and allowing it to return to center position. This must be done very rapidly with a snap action or too much pressure will be applied, slipping the belts.

If too much pressure is applied, the operator will release same by snapping the handle **116** forward and returning it to center. This will require some practice to judge the correct amount of pressure required. (The pressure gauge on the panel indicates system pressure and does not indicate how much pressure is being applied to the log.)

The head and carriage is moved along the log right or left by moving the control handle **116** right or left as required. The operator will regulate the speed by pushing the control stick just far enough either way so that the head will cut an overlapping spiral around the log being debarked. The head **50** should move along continuously whlie debarking.

After the head **50** has removed the bark by traversing the length of the log, the operator will raise the head by pushing forward on the control handle **116**. Now the operator will push down on the valve handle **115** located beneath the control push button panel. This will cause the kickers **75** to raise and the log will spin out of the debarker, pass beneath the guideway and roll on down the outfeed ramp (not shown).

The bull wheels **73** etc. should be running whenever a log is ejected from a machine, so that the bull wheels help the kicker make the logs roll out of the machine under the ways **14**, **15**.

There is a reverse button **137** on the control panel push button station. This is to assist in getting problem logs into the machine and is rarely used. It will not be necessary to push the stop button to reverse and jog the bull wheels.

The stop buttons for the motors are shown under the respective starter buttons **133**, **134** and **135**.

It is to be pointed out that FIGURE 17 is a diagrammatic showing of the hydraulic system and the hydraulic motors controlled thereby. Obviously, the relationship of the valve control handles and levers and the relationship of the direction of movement of the reciprocable motors **78** and **19** can be varied as desired, it being understood of course that pipe connections will be altered accordingly so that the desired traversing movement of

the clutch and up and down swinging movement of the debarking head can be effected.

What is claimed is:

1. In a debarking machine, a log handling bed for supporting a log and rotating it about its own axis, a vertical support at each end of the log handling bed and transversely spaced from the axis of rotation of a supported log, pivot means on each said support and disposed at approximately the height of the top of an intermediate size log supported by said bed, a guideway extending the length of said log handling bed and located above said pivot means, said guideway having a substantial extent transversely of the bed so as to provide a strong and rigid guideway, a downwardly extending arm of substantial length mounted on each end of said guideway, each arm having at its lower end complementary pivot means cooperating with said first-mentioned pivot means on said supports whereby said guideway is supported generally above the horizontal level of the axis of any log on said log handling bed and is pivotable about an axis approximately at the level of the top of such intermediate size log on said log handling bed, a carriage movable along said guideway, an arm means on said carriage extending laterally therefrom and beyond the axis of rotation of a supported log, a debarking head rotatably mounted on said arm means for rotation about an axis parallel to the axis of such a log, said debarking head including a component extending below said arm means and said head being located along said arm means at a distance from said guideway such that a plane tangent to the circle of movement of the axis of said debarking head about said first pivot means substantially coincides with the vertical plane through the axis of each of substantially different size logs on said log handling bed, and said arms depending to an extent below a horizontal plane at the level of the guideway so that a maximum size log can be debarked and discharged laterally beneath said guideway with a limited fixed transverse distance between a vertical plane passing through said pivot means and a vertical plane passing through the center of a supported log.

2. In a debarking machine, a bed, two parallel shafts extending along said bed, means for rotating said shafts in the same direction at the same speed, a plurality of longitudinally spaced, log supporting bull wheels keyed to each said shaft, whereby a log supported on said bull wheels is rotated about its own axis, a vertical support at each end of said bed and positioned in a plane parallel to, but spaced laterally from, said shafts, a pivot means at the top of each said support at a height approximately that of the top of an intermediate size of log to be debarked, a guideway comprising a pair of spaced, parallel, elongated elements, an L-shaped end plate at opposite ends of said elongated elements and interconnecting said elements, each end plate having an arm extending downwardly therefrom, complementary pivot means on the lower end of each downwardly extending arm for respectively engaging the pivot means on each said vertical support, a carriage mounted for longitudinal movement along said guideway, means to traverse said carriage along said guideway, an arm means extending from said carriage and overlying said bull wheels, the outer end of said arm means comprising a debarking-head-frame, said debarking-head-frame being pivotally mounted for limited pivotal movement about the axis of said arm means, a shaft mounted on said debarking-head-frame parallel to said guideway, a debarking head on said shaft, said debarking head being located along said arm means and extending down below said debarking-head-frame a distance such that upon pivoting said guideway on said pivot means at the top of said supports said debarking head will approach a supported log from above such log without applying undue lateral forces thereto and maximum size logs can be discharged from said bull wheels to pass freely beneath said guideway, motor means on said carriage, pulley means mounted on said debarking-head-frame in the plane of said pivotal mounting of said debarking-head-frame on said arm, means to drive said debarking head from said pulley means, belt means between said pulley means and said motor, means to drive said pulley means from said motor and whereby, upon pivoting of said debarking head with respect to said arm, a torque will be developed to return said debarking-head-frame to its normal position by tension in said belt means, and hydraulically operated kicker means mounted for rotation on one of said parallel shafts whereby a log on said bull wheel may be removed therefrom.

3. In a debarking machine, a log supporting means for receiving a log to be debarked, and turning it about its axis, adjacent said log supporting means and to one side thereof, a pair of spaced vertical uprights disposed in a vertical plane substantially parallel to the vertical plane containing the axis of a supported log, said uprights being spaced apart a distance in excess of the length of a log to be debarked, a guideway assembly extending between said uprights and including at each end a depending arm, pivot means operatively associated between said depending arm and the respective uprights at a location approximately at the level of the upper surface of an intermediate size log to be debarked, a carriage traversable along said guideway, an arm means embodied with said carriage and extending outwardly thereof to overhang a supported log, rotatable bark removing means carried by said arm means for rotation about an axis parallel to the axis of a supported log, means for tilting said guideway about said pivot means to raise and lower said arm means and the debarking means carried thereby, relative to a supported log, the length of said arm means and the location of the axis of said debarking means thereon being so related to the vertical height of said pivot means htat during debarking of such an intermediate size log, the axis of the debarking means and the axis of said pivot means are on a substantially common level and the axis of the debarking means lies in a vertical plane passing approximately through the center of such a supported log, and the length of said depending arms providing space between said pivot means and the elevation of said guideway above said pivot means being such that an extremely large size log can be debarked and still pass freely beneath said guideway after debarking with a limited transverse distance being provided between vertical planes passing through said pivot means and the center of such log.

4. In a debarking machine as claimed in claim 3 in which said log supporting means comprises rotatable means engaging the log to turn the same in a direction opposite to the direction of said rotatable means and in which said debarking means rotates in the same direction as said rotatable means.

5. A guideway assembly for a debarking machine, comprising spaced vertical supports, two pipes lying in parallel spaced relation to each other, a plate element at each end of said pipes to which said pipes are secured, each plate element including an arm extending downwardly a substantial distance from said pipes, pivot means on each arm of said plate element for pivotal mounting of said guideway assembly to said supports, said arm extending downwards from one of said pipes, a carriage mounted for movement along said pipes, said carriage including a loosely fitting sleeve encircling each said pipe, roller means mounted on said sleeves to contact said pipe to provide rolling contact to facilitate movement of said carriage along said pipe ways, and said carriage being adapted to support a debarking device in transverse spaced relation to said pivot means for generally vertical arcuate movement about said pivot and for movement longitudinally of a log to be debarked whereby said debarking means may be placed in operative contact with a log to be debarked.

6. A log debarking machine including longitudinally

spaced, laterally aligned pairs of bull wheels for supporting and rotating various size logs to be debarked, longitudinally aligned, upright support means spaced transversely from said bull wheels, a guideway assembly extending between said upright support means and including transversely spaced parallel pipes, plate means connecting the adjacent ends of said pipes together, each plate means including a depending portion, horizontal pivot means connecting said depending portions to said upright support means to allow said guideway assembly to swing an axis parallel to said bull wheels, a carriage means mounted on said guideway for traversing movement therealong, an arm means carried by said carriage means, extending transversely of said guideway assembly and overlying said bull wheels, a rotary debarking means carried by said arm means, said horizontal pivot means being located at a height above said bull wheels that is approximately level with the upper surface of an intermediate size log to be supported on said bull wheels, said rotary debarking means being located on said arm means at a position laterally displaced from said horizontal pivot means with regard to the height of said pivot means and above said bull wheels a distance such that a horizontal plane bisecting the arc of movement described by the axis of the rotary debarking means in moving between a position for debarking a minimum size log to a position for debarking a maximum size log, is normal to the vertical plane passing through the axis of such logs, the said arc lying on the side of said vertical plane remote from said pivot means, and the location of said horizontal pivot means being below a plane passing horizontally through said guideway assembly so as to insure free passage of a maximum size log beneath the guideway assembly with a limited fixed transverse distance between vertical planes respectively passing through said pivot means and the periphery of the adjacent bull wheels.

7. A log debarking machine as claimed in claim 6 and said pipes being disposed relative to each other so that when said arm means is substantially horizontal said pipe remote from said arm means is elevated above the other said pipe.

8. A debarking machine as claimed in claim 6 and means for traversing said carriage along said pipes, said means including a pair of drums mounted adjacent one said plate element, means to simultaneously rotate said drums in either direction, a first flexible means having one end secured to one said drum wrapped therearound in one direction and having its other end secured to one side of said carriage, a second flexible means having one end secured to the other drum and wrapped therearound in the opposite direction from said first flexible means, a sheave mounted on the other said plate, and the other end of said second flexible member extending from its associated drum passing around said sheave and being secured to the other side of said carriage at a point opposite the other end of said flexible means, whereby upon rotation of said drums in one direction said carriage is pulled in one direction and upon rotation of said drums in the other direction said carriage is pulled in the other direction.

9. In a debarking machine having a horizontal, longitudinally extending log support means including bull wheels on which logs of various sizes may be supported, a longitudinally extending guideway parallel with and to one side of said longitudinally extending log support means, a carriage mounted for movement along said guideway, an arm extending from said carriage to a position over said support means above the plane at which a log on said bull wheels is supported, debarking means mounted on said arm positioned generally above a log supported on said bull wheels, longitudinally spaced, vertically disposed supports to one side of and at each end of said log support means, pivot means on said vertically disposed supports and having axes parallel to said guideway and to said log support means, an arm at each end of said guideway, connected to said pivot means and extending downward from said guideway in all positions thereof, whereby said debarking means may be raised and lowered through an arc about said pivot means to position it selectively in debarking position with respect to a log of any of said various sizes when supported on said bull wheels to debark said log, and the length of said arms extending downwardly from said guideway locating said guideway in a horizontal plane sufficiently high to provide space thereunder for passage of a log of the maximum of said various sizes, the axes of said pivot means lying in horizontal plane between the horizontal plane passing through a log supported on said bull wheels, and a horizontal plane containing said guideway, so that the chord of the arc of movement of the debarking head is substantially vertical and is approximately coincident with a vertical plane passing through the axis of a supported log.

10. A log handling bed for a debarking machine of the type in which a debarking means moves longitudinally of the bed to effect debarking, comprising a pair of shafts supported in parallelism, means for driving said shafts to rotate the same in the same direction, pairs of log supporting bull wheels spaced longitudinally of and mounted on the shafts so that each pair will rotate in a common vertical plane extending transversely of the axis of the log handling bed, at least two kicker devices pivotally mounted on the one of said shafts that is the rearmost shaft as regards the direction from which logs to be debarked are fed to the bed, said kicker devices being longitudinally spaced from one another and from the mutually adjacent pair of bull wheels, each kicker device including two arms, one arm extending normally toward the other shaft and lying below a supported log, the other arm extending upwardly to prevent a log from inadvertently rolling off of said bed, a rock shaft extending parallel to said other shafts and positioned rearwardly of the rearmost shaft, lever means carried by the rock shaft at positions thereon in alignment with the respective kicker devices, said lever means including at least one bell crank lever including two arms, one of which extends below said rock shaft and the other arm of which extends generally toward the associated kicker device, link means pivotally connected to said other arm of said bell crank lever and to the upwardly extending arm of the said associated kicker device, the other lever means each including a lever arm likewise extending toward the upwardly extending arm of the associated kicker devices and in longitudinal alignment with the said one arm of the bell crank lever, additional and similar link means pivotally connected between said other lever arms and the upwardly extending arms of the associated kicker devices, a double acting fluid motor including a pivotally mounted cylinder and a piston means, said piston means being pivotally connected to said one arm of the bell crank lever whereby extension of said piston swings said rock shaft to place said links in alignment with the lever arms associated therewith to rigidify the position of said upwardly extending arms of the kicker devices and movement of said piston in the other direction swings said rock shaft reversely and thereby swings said links and the associated lever arms to lower said upwardly extending arms of the kicker devices and to elevate the first mentioned arms thereof to eject a log off the bed.

11. In a log handling bed for a debarking machine of the type in which logs to be debarked are fed to the bed from the front thereof and discharged to the rear and which debarking machine is of the type including a debarking means movable longitudinally of the bed to debark a log supported thereon at least one wheel-supporting shaft extending longitudinally of the bed, longitudinally spaced log-supporting wheels mounted on said shaft, means for driving said shaft and thus said wheels, log kicker devices carried by said shaft and each including a first arm portion extending toward the front of the bed and adapted to be disposed beneath a supported log and a second arm portion projecting upwardly of the shaft and

adapted when so positioned to prevent a log from inadvertently passing over said wheels, means for actuating said arm including a rock shaft extending parallel to said wheel supporting shaft, lever means carried by the rock shaft and including a lever arm extending toward the respectively upwardly projecting arms, at least one of said lever means constituting a bell crank lever and having another arm depending below the rock shaft, a link means pivotally interconnected between the upwardly projecting second arm portion of each kicker device and the first mentioned arms of the respective lever means, and a double acting fluid motor including a pivotally mounted cylinder and a co-operating piston pivotally connected to the depending arm of the bell crank lever, whereby movement of said piston in one direction rocks the rock shaft and places the links and their associated lever arms in alignment to rigidify said kicker devices and movement of said piston means in said other direction swings said lever arm downwards and rocks said kicker devices so that the first mentioned arm thereof swings a log over the supporting wheels.

12. In a log debarking machine, a log handling bed including means for supporting a log to be debarked and to which a log is fed transversely of its axes, vertical support at each end of and to the rearmost side of the bed as regards the direction of log feed, a pair of pipes disposed parallel to one another and spaced transversely apart, said pipes having a length approximately corresponding to the spacing between said vertical supports, a plate means connected to the adjacent ends of the pipes and maintaining them in their spaced parallel relationship, said plate means including a depending portion, pivot means at the upper ends of the vertical supports and axially aligned with each other, said depending portions of the plate means being connected at their lower ends to said pivot means, a carriage means including an arm extending outwardly therefrom, a debarking head carried at the outer end of said arm, means mounting the carriage

for movement along and relative to said pipes with said arm extending over a supported log, lever means connected to one of said pivot means, means for moving said lever means to thereby rock said plate means and pipes and thus said carriage about said pivot means toward and away from a supported log and the length of said depending portion of the plate means above the pivot means bearing such relationship to the length of the arm extending outwardly from said carriage that the chord of the arc of movement of the debarking head during debarking is substantially vertical and is approximately coincident with a vertical plane through the axis of a supported log and whereby after debarking, rocking of said lever means to elevate said head from a debarked log and to displace said pipe means permits discharge of a debarked log beneath said pipe means while allowing for a minimum transverse distance between a vertical plane containing the axis of said pivot means and a vertical plane passing through the axis of a supported log.

References Cited in the file of this patent

UNITED STATES PATENTS

1,541,712	Horn	June 9, 1925
1,549,855	Cote	Aug. 18, 1925
2,011,037	Cook	Aug. 13, 1935
2,157,762	Knox	May 9, 1939
2,611,401	Burton	Sept. 23, 1952
2,702,570	Rothrock	Feb. 22, 1955
2,705,971	Dorkins	Apr. 12, 1955
2,795,320	Dillingham	June 11, 1957
2,831,317	Watkins	Apr. 22, 1958
2,841,195	Fulghum	July 1, 1958
2,874,006	Sloyan	Feb. 17, 1959
2,901,011	Eaton	Aug. 25, 1959
2,907,610	Wise	Oct. 6, 1959
3,017,911	Fulghum	Jan. 23, 1962