Nov. 27, 1951 E. C. SHAW ET AL 2,576,861

HYDRAULIC BARKER WITH MULTIPLE NOZZLE OSCILLATING LINKAGE

Filed Nov. 18, 1948 3 Sheets-Sheet 1

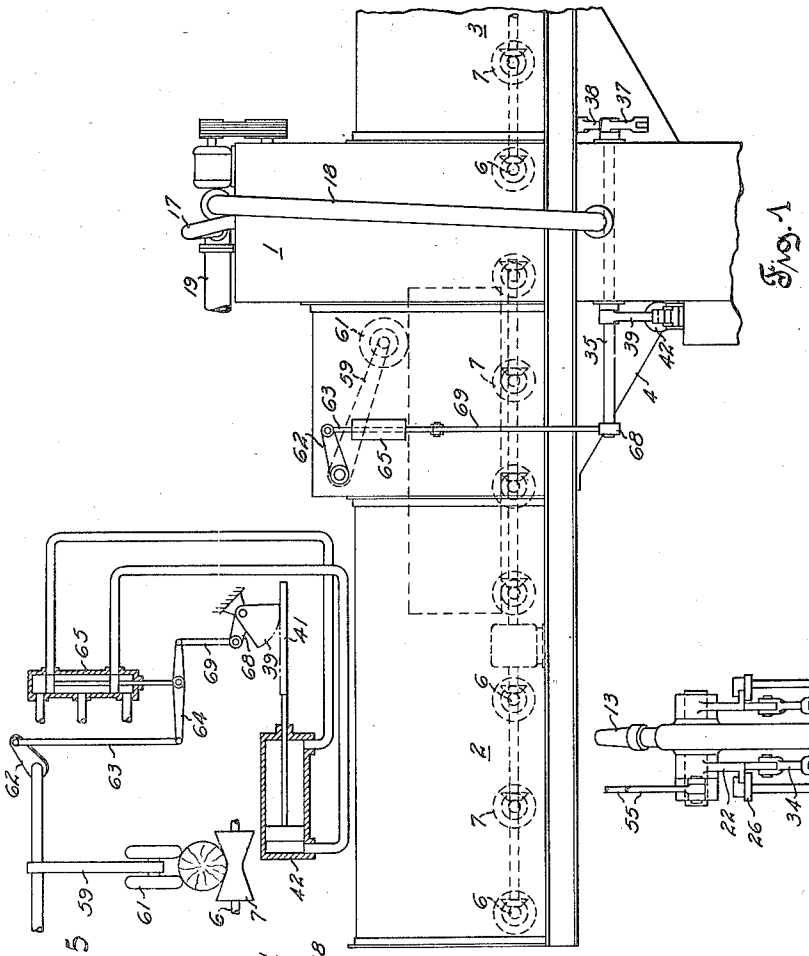


Fig. 1

Fig. 5

Fig. 6

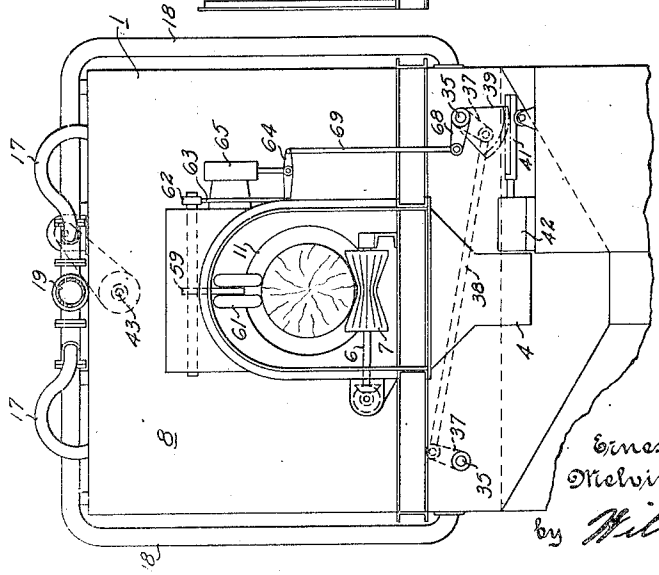


Fig. 2

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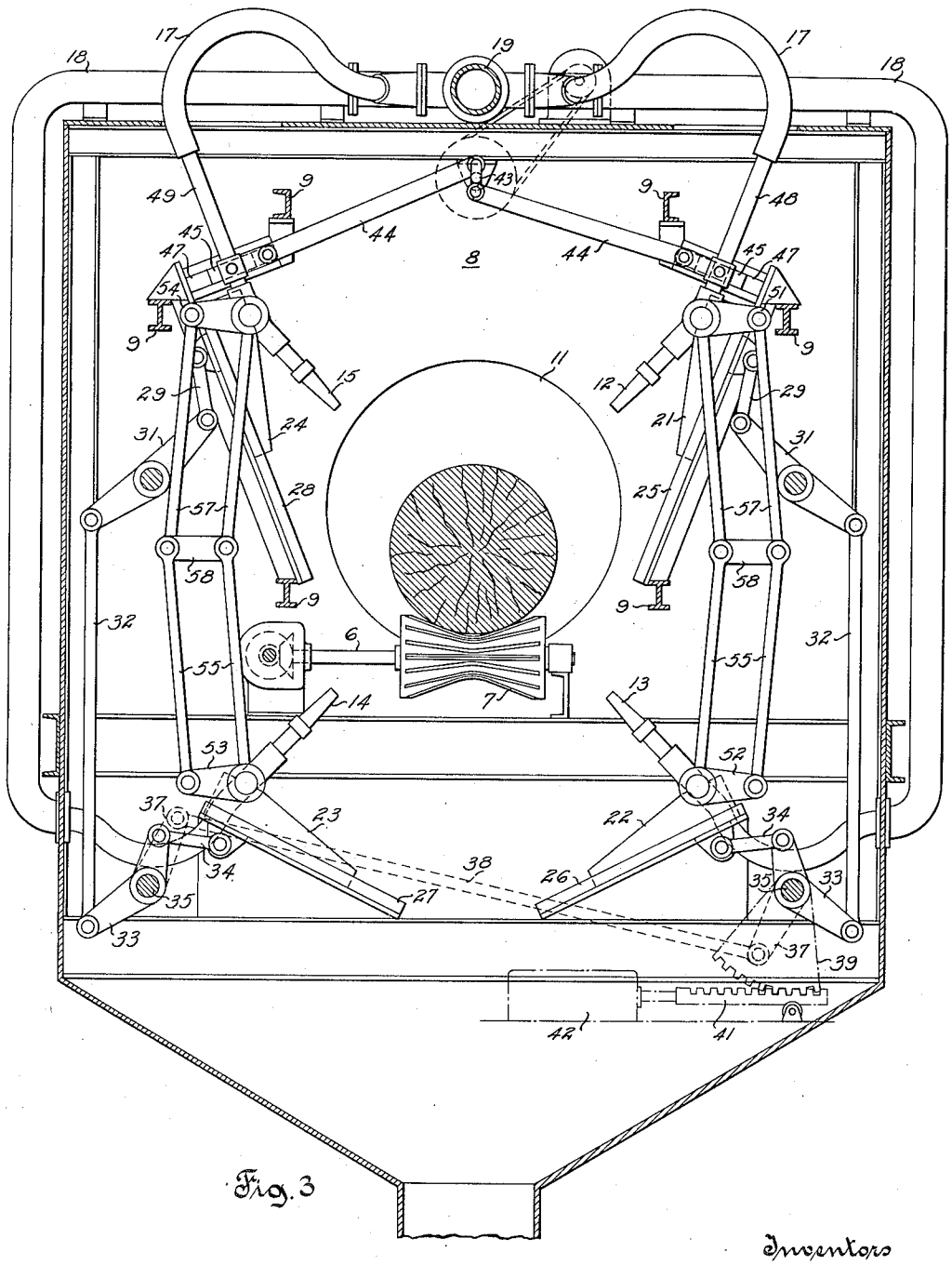


Fig. 3

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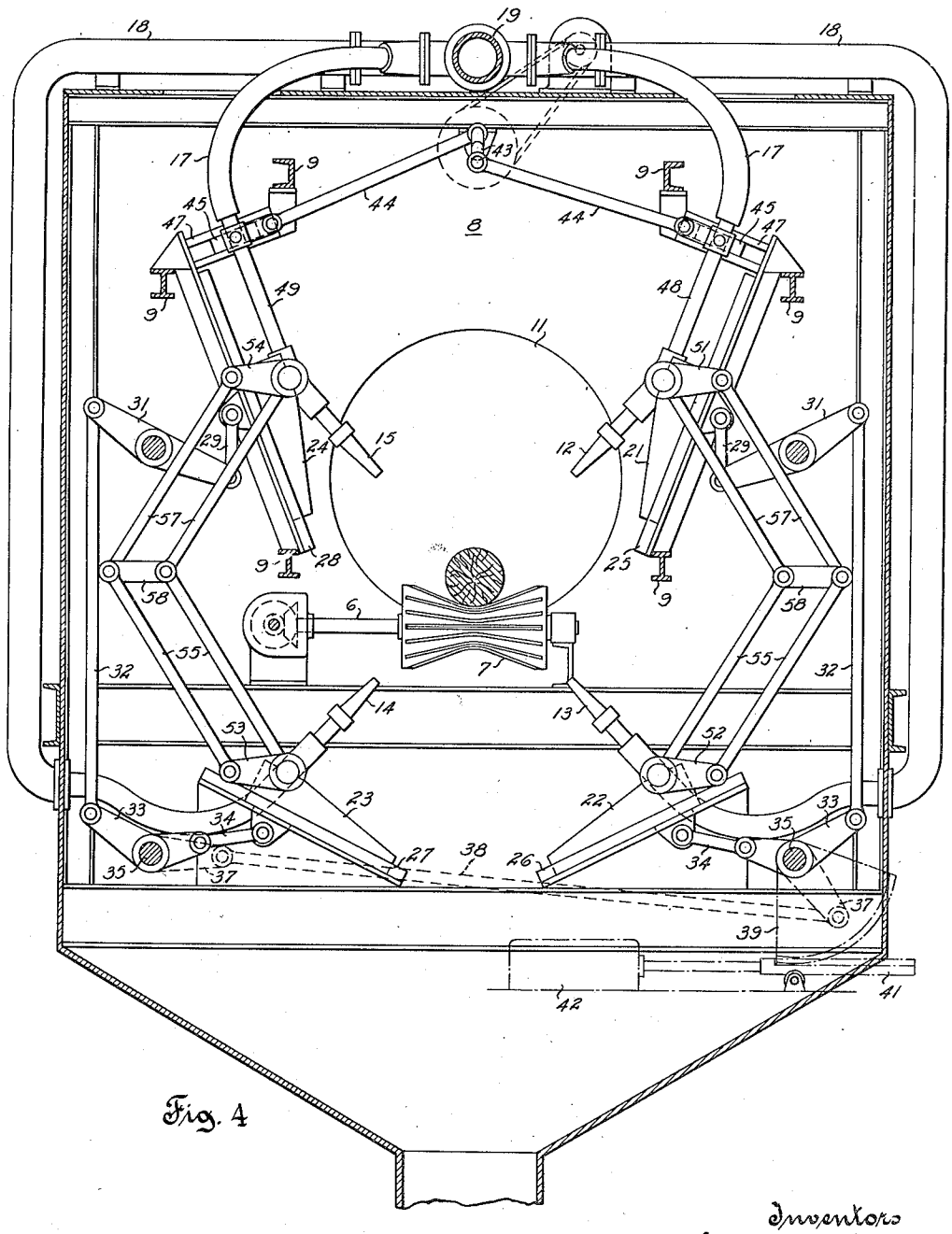


Fig. 4

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UNITED STATES PATENT OFFICE

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HYDRAULIC BARKER WITH MULTIPLE NOZZLE OSCILLATING LINKAGE

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15 Claims. (Cl. 144—208)

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This invention relates generally to the improvement of devices for treating the surfaces of cylindrical work pieces, and, more particularly, work pieces in the nature of logs or the like.

It has been known to the inventors that logs or the like may be mechanically barked and cleaned by surface treating elements and that such surface treating may advantageously be applied to the log or the like by supporting power operated surface treating elements at a fixed station and applying them to the surface of a work piece as the same passes the station, propelled by hand or power operated conveyer means. The surface treating element in most instances is limited as to the arc of circumference treated. To overcome this, the log can be rotated as it passes the station so that all surface portions are treated by a single element. It has been found advantageous, however, to avoid rotation if possible, so various devices have been employed to provide for treatment all around the periphery without work piece rotation, as the work piece passes in one direction.

It is found desirable, if possible, to have the work piece travel along a fixed path or bed, and to have the treating elements adjustable to various work piece diameters.

One known type of log barking and cleaning device involves use of high velocity jets of liquid to erode and knock off bark and other foreign matter without injuring the sound wood of a log. However, the size of jet that will work efficiently, and the available power supply, may both be limited, and there are other practical reasons why a limited number of jets must be used, with a high relative speed of travel of the point of impact of the jet on the log surface. It is also found that for any given jet nozzle, pressure of fluid supply and character of bark, there will be an optimum distance from the nozzle tip to the log, at which the best results will be obtained.

One form of hydraulic log barker heretofore suggested would involve equipment for passing a log longitudinally, and without rotation, past a station at which a limited number of nozzles are oscillated in planes transverse to the log axis, so that each nozzle will remove bark from and clean a broad strip of surface, covering as much as one-quarter or one-third or even half of the log circumference. It would do this by actually tracing a sinusoidal path at such high frequency with relation to log travel and its impact pattern area, that the strips cleaned would overlap to give full surface coverage. However, adjustment of such an arrangement to handling of logs

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of various diameters is a difficult practical problem.

The nature of the present invention is the provision of a novel combination of elements for positioning a plurality of surface treating elements with relation to a conveyer bed, along which logs or the like may be longitudinally conveyed without rotation, in such a manner that such surface treating elements may be simultaneously moved to accommodate logs, or the like, of various diameters. More particularly, the nature of the present invention is in the provision in such a combination of a novel mechanism for so supporting such surface treating elements that points on such elements will coincide with points on the circumference of a circle concentric with a given log or the like on such bed, such mechanism having a control portion actuable to so move such surface treating elements, simultaneously and proportionally, that the same points may be made to coincide with similar points of a system of circles concentric with logs, or the like, of various diameters, on said bed.

The invention also includes provisions for oscillation of the surface treating elements and conditioning of the oscillating mechanism to effectively accommodate logs, and the like, of various sizes, in response to changes in the position of the elements, relative to the bed, by the supporting mechanism.

An object of the invention is to provide a new and improved device for hydraulically barking and cleaning logs, or the like, and having advantageous adjustability to the handling of a series of logs of various diameters, moving continuously past the point of treatment.

The invention having the above and still further objects and advantages, which will be apparent from a reading of this specification, may best be carried into practical effect as described hereinbelow, with reference to the drawing in which:

Fig. 1 is a partial side view of a hydraulic barker embodying the present invention;

Fig. 2 is a left end view of the barker of Fig. 1;

Fig. 3 is a detail end view to an enlarged scale of a nozzle supporting control and oscillating mechanism according to the present invention as embodied in the barker of Figs. 1 and 2;

Fig. 4 is a view similar to Fig. 3 with the parts shown in a different position;

Fig. 5 is a schematic view of an automatic control system for the device of Figs. 1, 2, 3 and 4; and

Fig. 6 is a detail side view of a nozzle mounting of the mechanism of Fig. 3.

A preferred form of machine for barking and cleaning logs will be described to illustrate a practical embodiment of the present invention. Such a machine comprises a barking station, enclosed by housing 1, for the prevention of splash, and conveyer mechanism such as roller conveyers 2 and 3 arranged to convey logs to the station, pass the logs longitudinally through the station, and carry the same away, without log rotation. In the device shown in the drawing, conveyers 2 and 3 are covered or housed in for a substantial distance adjacent the feed and discharge ends of the barking station housing 1. A hopper bottom 4 is connected with the barking station housing 1 and conveyer housings 2 and 3 to receive and lead off bark and water resulting from operation of the machine. The conveyers 2 and 3 may, as shown, consist of a series of shafts 6, journaled for rotation on axes extending transversely across the conveyer housings, carrying rolls 7 of spool like form, the upper surfaces of which form a trough like rest in which an elongated cylindrical work piece, such as a log or the like, will naturally lie in a substantially horizontal position with its longitudinal axis substantially in a vertical plane through the midsection of the rollers. It will be seen that conveyers 2 and 3, or rolls 7, suitably driven as by the conventional bevel gear arrangement illustrated in the drawing, will establish a bed or path along which a log, or the like, of any size, will be conveyed. Thus, logs of various diameters will be carried through the barking station 1, with their lowermost surface portions at about the same level with relation to the housing 1, while their upper surface portions will be at various elevations, depending upon the diameter of the log, or the like.

Within the barking station or housing 1, is a framework, including end plates 8, connected by longitudinal struts 9. Plates 8 are pierced by aligned holes 11, which provide an opening through which logs, or other elongated cylindrical work pieces, may be passed. It will be seen that a work piece, in passing from conveyer 2 to conveyer 3, must bridge the gap between the endmost rollers 7 of the two conveyers, within the station housing 1, so that, at this point, a complete circumferential band of work piece surface is exposed. Surrounding the openings 11, within the housing 1, is a plurality of hydraulic nozzles 12, 13, 14, and 15 arranged with their jet forming orifices directed in the general direction of the space within which the above mentioned exposed circumferential band of work piece surface will be located. Each of the nozzles is connected with a source of hydraulic fluid under high pressure, as by a flexible connector 17, pipe 18 and manifold 19 (to which a high pressure liquid pump may be connected as is well known in the art). The nozzles are arranged within the housing 1 so that their tips, in one operational position, will coincide with the intersections of equiangularly spaced radii with a circle concentric to a log, or the like, of given diameter, in position on rollers 7.

In order to provide for variously positioning the nozzles so that the distances from their tips to the circumferential surfaces of logs of various diameters may be kept substantially equal, to take advantage of the conditions under which the nozzles will most effectively treat the surface to be treated, the nozzles are mounted on

carrier shoes 21, 22, 23 and 24 which are slidably mounted on guide tracks 25, 26, 27 and 28, respectively. In the device illustrated, these tracks are supported on the framework within housing 1, to establish paths for nozzle motion which lie substantially in a plane radial to the path of motion of objects to be treated along the conveyers 2 and 3. The angles which these tracks make with the horizontal are determined, for any given number of tracks and nozzles, by parallelism with a system of straight lines which approximately contain the points of intersection of a corresponding plurality of equiangularly spaced radii with the peripheral surfaces of a series of cylinders corresponding to cylindrical work pieces of various diameters supported by conveyer rollers 7. By so arranging the tracks, the nozzle carrying shoes may, by a suitable linkage, be connected to a single control which can move them proportional distances along the tracks, in accordance with the diameter of the work piece, in such a manner that the nozzle tips may be made to coincide with equally spaced points on the periphery of a circle concentric with any given work piece and spaced radially therefrom by a predetermined amount consistent with effective operation.

In the mechanism illustrated in the drawing, the linkage connecting the nozzle carrying shoes comprises links 29, connected with bell crank levers 31 suitably pivoted in the station housing 1, and links 32, connecting bell cranks 31 with another pair of bell cranks 33, pivotally mounted in the lower part of housing 1. Bell cranks 33 are connected by links 34 to shoes 22 and 23. The shafts 35, upon which bell crank levers 33 are mounted, are provided with additional lever arms 37, connected by a link 38; and one of the shafts 35 is provided with a toothed gear segment 39, which meshes with a rack 41, connected with a hydraulic servomotor 42. It will be seen that motion of the rack 41 will oscillate bell cranks 33 and 31, the arms of which may be so proportioned that the shoes 21 and 24 will move so that the nozzles may be simultaneously adjusted, from a position in which they are radial to a work piece of a given diameter, to a position in which they will be substantially radial to a work piece of a different diameter.

In the operation of hydraulic barkers it has been found that there are limitations on the size of nozzles and the width of the strips of bark which any given nozzle will remove from a log, which make it impractical to remove bark all about the circumference of a large log by passing it once through a ring of stationary nozzles with any reasonably small number of nozzles. However, since the relative speed of travel of the hydraulic jet formed by a nozzle and the log surface may be quite high, it will be practical, in the device illustrated in the drawing, to bark a large log in one pass through the machine, if the four nozzles shown (or any other reasonably small practical number) are caused to oscillate in a plane substantially normal to the path of travel of the work piece, through such an arc that the jets may trace a sinusoidal path on the log surface as it passes, the amplitude of the path and the frequency of oscillation being so chosen that the strips of bark removed will overlap and the entire surface of the log be covered. Since the machine will not be efficient if there is too much overlapping of areas covered by the several jets, or if the jets miss contact with the work piece surface,

it is desirable to provide a nozzle oscillating mechanism which will simultaneously oscillate the jets through arcs dependent upon the size of the work piece being treated. Such a mechanism is illustrated in the drawing and includes rotating crank shaft 43 with connecting rods 44 and actuating blocks 45 which are reciprocated in tracks 47 on the housing 1. Tracks 47 are arranged substantially perpendicular to tracks 25 and 28, respectively. Lever arms 48 and 49, on nozzles 12 and 15 respectively, are slidably and pivotally connected with blocks 45, in such a manner that movement of shoes 24 and 21 will result in a lengthening and shortening of the effective length of lever arms 48 and 49, so that oscillation of nozzles 12 and 15, caused by the constant reciprocatory movement of blocks 45, will vary in amplitude as a result of movement of shoes 21 and 24. It will be seen from an inspection of the drawings, that upward movement of shoes 21 and 24, to accommodate logs of large diameter, will result in a shortening of lever arms 48 and 49, so that the angle of oscillation of nozzles 12 and 15 will be increased as the log size is increased. The proportions of the various links and levers of the mechanism shown may be so chosen that when the nozzles are set, by movement of segment 39, for a log of any given diameter, the amplitude of nozzle oscillation will substantially equal that required for each nozzle to cover one-quarter of the surface of the work piece.

Nozzles 13 and 14 are connected to nozzles 12 and 15, respectively, by another linkage, consisting of lever arms 51 and 52, 53 and 54, pairs of links 55 and 57 connected at one end to the opposite ends of lever arms 52 and 53, and 51 and 54, respectively, and at their other ends to connecting links 58. The parts 51 to 58, inclusive, form parallel motion devices which, in the present mechanism, have the function of keeping lever arms 51 and 52, and 53 and 54, constantly parallel, so that, when nozzles 12 and 15 are oscillated, nozzles 13 and 14 will be oscillated through exactly equal angles.

Fig. 3 of the drawing shows the nozzles and mechanism described, in position for handling a log of large diameter; the nozzles are in their neutral position of oscillation, being all directed toward the central axis of the log. With the mechanism in this position, rotation of the crank shaft 43 will, owing to the shortness of the effective length of lever arms 48 and 49, cause a large amplitude of nozzle oscillation, sufficient to cover a full quarter of the circumference. Fig. 4 shows the parts with the nozzles adjusted in a neutral position radial to a log of small diameter and it will be seen that, with the nozzles in this position, rotation of crank shaft 43, acting on the long effective radius of lever arms 48 and 49, will cause only a small angular amplitude of nozzle oscillation, so that the jets directed by the nozzles will not miss contact with a log of small diameter such as is shown in position on the conveyer rollers.

The control of the positions of shoes 21 to 24 may be accomplished by provision of a feeler arm 59 with a roller or rider wheel 61 adjacent to the station 1. Roller 61 will take a position determined by the height above the rollers of the uppermost surface of the work piece entering the station, and its movement will be communicated to a lever arm 62, connected by link 63 with a floating lever 64 of a servomotor control valve 65 of known type, capable of supplying operating fluid to opposite ends of servomotor 42, so that movement of feeler arm 59 will cause a corresponding movement of rack 41 and segment 39. Movement of shaft 35 by segment 39 will be communicated to floating link 64 as by a suitable crank arm 68 and link 69. It will be clear that any other suitable known mechanism for causing the control shaft 35 to respond in a definite manner to movements of the feeler arm 59, may be used in place of the hydraulic servo mechanism shown.

In operation, suitable pumps and motors are energized to drive conveyers 2 and 3, supply fluid under pressure to the nozzles 12—15 and servomotor 42, and rotate crank shaft 43. Logs, or the like, to be barked or cleaned, are fed to the feed end of conveyer 2, one after another, and are moved lengthwise toward station 1. The rider wheel 61 is lifted by contact to a height determined by the log size, moving arm 59 which sets the nozzle operating mechanism to the proper adjustment for a log of the size being handled. As the log passes the plane of the nozzles, the jets act to clean or bark its peripheral surface, each nozzle oscillating so as to clean approximately one-quarter of the surface as the log passes. When the leading end of the log passes the nozzle plane it comes into contact with conveyer 3, which carries it on beyond the barking station.

It is considered obvious that suitable known conveyer speed controls (not shown) may be used to slow conveyer speed for large logs, and that such controls can, in any known manner, be made to automatically respond to movement of feeler arm 59, in such a manner that conveyer speed will be automatically varied in inverse proportion to log diameter.

While a particular form of machine embodying the present invention has been illustrated having as a purpose the barking and cleaning of logs by hydraulic jet action, it will be understood that the mechanism for simultaneously adjusting the positions of a plurality of nozzles could be applied to adjustably positioning surface treating elements of other kinds, such as rigid or flexible cutting tools, brushes, hammers, paint sprays or other known surface treating devices. The present invention is therefore not limited to the precise details of the illustrated mechanism, but includes such modifications and equivalents as may readily occur to persons skilled in the art to which it appertains, within the scope of the appended claims.

It is claimed and desired to secure by Letters Patent:

1. In a device for treating logs or the like, a treating station, logs supporting rest means, adjacent said station and fixed in position relative thereto, having level fixing portions on which logs or the like of various diameters will lie naturally in stable longitudinally horizontal attitudes, with their lowermost longitudinal surface elements in a substantially fixed level path through said station, and with a circumferential band of surface exposed at said station, log propelling means associated with said rest means and adapted to propel a log longitudinally relative to said rest means and through said station, a plurality of log surface treating elements surrounding said path of log movement at said station and being pivotally mounted for oscillation about relatively movable axes perpendicular to a plane normal to said path of log movement established by said rest and conveyer means, and log surface treating element supporting mechanism connecting said sur-

face treating elements in movable relation to said station and having a control portion movable to move said surface treating elements simultaneously and proportionally relative to said rest means in such a manner that points on said surface treating elements coincident with equiangular, spaced points on a circle concentric with a given log or the like on said rest means may be made to coincide with similar points on a system of circles concentric with logs or the like of other and various diameters on said rest means, said surface treating element supporting mechanism comprising a plurality of guide tracks at said station parallel to straight lines approximately containing a series of points determined by the intersections of a corresponding plurality of equiangularly spaced radii of cylinders of various diameters positioned on said rest means with the peripheral surfaces of the respective cylinders, and a corresponding plurality of shoes slidably guided on said tracks and connected with said station by a proportional motion linkage including said control portion.

2. In a device for treating logs or the like, a treating station, logs supporting rest means, adjacent said station and fixed in position relative thereto, having level fixing portions on which logs or the like of various diameters will lie naturally in stable longitudinally horizontal attitudes, with their lowermost longitudinal surface elements in a substantially fixed level path through said station, and with a circumferential band of surface exposed at said station, log propelling means associated with said rest means and adapted to propel a log longitudinally relative to said rest means and through said station, and a plurality of fluid jet forming nozzles surrounding said path of log movement and being arranged to project fluid jets in the direction of said exposed circumferential band of surface of a log or the like at said station, said nozzles being pivotally mounted for oscillation about relatively movable axes perpendicular to a plane normal to said path of log movement established by said rest and conveyer means, and supporting mechanism connecting said nozzles in movable relation to said station and having a control portion movable to move said nozzle elements simultaneously and proportionally relative to said rest means in such a manner that points on said nozzle elements coincident with equiangular, spaced points on a circle concentric with a log or the like on said rest means may be made to coincide with similar points on a system of circles concentric with logs or the like of other and various diameters on said rest means, said nozzle supporting mechanism comprising a plurality of guide tracks at said station parallel to straight lines approximately containing a series of points determined by the intersections of a corresponding plurality of equiangularly spaced radii of cylinders of various diameters positioned on said rest means with the peripheral surfaces of the respective cylinders, and a corresponding plurality of shoes slidably guided on said tracks and connected with said station by a proportional motion linkage including said control portion.

3. In a device for treating logs or the like, a treating station, logs supporting rest means, adjacent said station and fixed in position relative thereto, having level fixing portions on which logs or the like of various diameters will lie naturally in stable longitudinally horizontal attitudes, with their lowermost longitudinal surface elements in a substantially fixed level path through said station, and with a circumferential band of surface exposed at said station, log propelling means associated with said rest means and adapted to propel a log longitudinally relative to said rest means and through said station, and a plurality of fluid jet forming nozzles surrounding said path of log movement and being arranged to project fluid jets in the direction of said exposed circumferential band of surface of a log or the like at said station, said nozzles being pivotally mounted for oscillation about relatively movable axes perpendicular to a plane normal to said path of log movement established by said rest and conveyor means, the combination comprising nozzle supporting mechanism connecting said nozzles in movable relation to said station and having a control portion movable to move said nozzle elements simultaneously and proportionally relative to said rest means in such a manner that points on said nozzle elements coincident with equiangular, spaced points on a circle concentric with a log or the like on said rest means may be made to coincide with similar points on a system of circles concentric with logs or the like of other and various diameters on said rest means, and nozzle oscillating mechanism connected with said station having relatively movable portions engaging said nozzles, said nozzle oscillating mechanism connecting said nozzles for simultaneous oscillation through substantially equal angles and having a variable portion responsive to changes in position of said nozzle supporting mechanism to vary the angle of oscillation of said nozzles.

4. In a device for treating logs or the like, a treating station, logs supporting rest means, adjacent said station and fixed in position relative thereto, having level fixing portions on which logs or the like of various diameters will lie naturally in stable longitudinally horizontal attitudes, with their lowermost longitudinal surface elements in a substantially fixed level path through said station, and with a circumferential band of surface exposed at said station, log propelling means associated with said rest means and adapted to propel a log longitudinally relative to said rest means and through said station, and a plurality of fluid jets forming nozzles surrounding said path of log movement and being arranged to project fluid jets in the direction of said exposed circumferential band of surface of a log or the like at said station, said nozzles being pivotally mounted for oscillation about relatively movable axes perpendicular to a plane normal to said path of log movement established by said rest and conveyor means, the combination of nozzle supporting mechanism connecting said nozzles in movable relation to said station and having a control portion movable to move said nozzle elements simultaneously and proportionally relative to said rest means in such a manner that points on said nozzle elements coincident with equiangular, spaced points on a circle concentric with a log or the like on said rest means may be made to coincide with similar points on a system of circles concentric with logs or the like of other and various diameters on said rest means, and nozzle oscillating mechanism comprising a pair of equivalent crank levers each connected with one of said nozzles and extending in the plane of movement thereof, two pairs of links of equal lengths pivotally connected at opposite ends to each other and to opposite ends of said crank levers, an addi-

tional link of length substantially equal to said crank levers, connecting the pivot axes on which said pairs of links are connected with each other, said links and crank levers forming two equal parallelograms with a common side connecting said nozzles for simultaneous oscillation through substantially equal angles, and means for oscillating one of said nozzles through an arc proportional to its distance from the mean path of movement of logs or the like on said rest means.

5. Hydraulic jet forming nozzle elements supporting and positioning means for a device for directing a plurality of oscillating hydraulic jets at a circumferential band of generally cylindrical work pieces of various diameters traveling longitudinally with lower surface portions following a substantially horizontal path determined by a bed, comprising a frame connected with said bed and surrounding said path in a plane substantially normal thereto, a plurality of shoes supporting said nozzles for oscillation about axes substantially parallel to said path and mounted on guide tracks on said frame having their directional axes parallel to a system of straight lines approximately containing the intersections of a corresponding plurality of equiangularly spaced radii of cylinders of various diameters positioned on said bed with the peripheral surfaces of the respective cylinders, a control mechanism connecting said shoes so designed and proportioned that said nozzles in one position being arranged with their orifices substantially equidistant from the surface of a cylindrical work piece of given diameter on said bed, a single operation of said control mechanism in appropriate direction will position said nozzles with their orifices substantially the same distance from the peripheral surface of a work piece of different diameter on said bed, and power operated means to simultaneously oscillate said nozzles through substantially equal angles relative to said shoes, said power operated means having a portion reciprocally mounted on said frame and a second portion of one of said nozzles interconnected with said reciprocable portion in such a manner that the angle of oscillation of said nozzles by said means is varied in response to a change in position of said nozzles by said control mechanism.

6. In a device for treating logs or the like, a treating station, logs supporting rest means, adjacent said station and fixed in position relative thereto, having level fixing portions on which logs or the like of various diameters will lie naturally in stable longitudinally horizontal attitudes, with their lowermost longitudinal surface elements in a substantially fixed level path through said station, and with a circumferential band of surface exposed at said station, log propelling means associated with said rest means and adapted to propel a log longitudinally relative to said rest means and through said station, and a plurality of log surface treating elements surrounding said path of log movement, and being pivotally mounted for oscillation about axes perpendicular to a plane normal to said path of log movement established by said rest and conveyer means, said axes being movable relative to the mean path of log movement, the combination comprising log surface treating element supporting mechanism connecting said surface treating elements in movable relation to said station and having a control portion movable to move said surface treating elements simultaneously and proportionally relative to said rest means in such a manner that points on said surface treating elements coincident with equiangular, spaced points on a circle concentric with a given log or the like on said rest means may be made to coincide with similar points on a system of circles concentric with logs or the like of other and various diameters on said rest means, and the bisectors of the angles through which said treating elements oscillate intersect at said mean path of log movement.

7. In a device for treating logs or the like, a treating station, logs supporting rest means, adjacent said station and fixed in position relative thereto, having level fixing portions on which logs or the like of various diameters will lie naturally in stable longitudinally horizontal attitudes, with their lowermost longitudinal surface elements in a substantially fixed level path through said station, and with a circumferential band of surface exposed at said station, log propelling means associated with said rest means and adapted to propel a log longitudinally relative to said rest means and through said station, and a plurality of fluid jet forming nozzles surrounding said path of log movement and being arranged to project fluid jets in the direction of said exposed circumferential band of surface of a log or the like at said station, said nozzles being pivotally mounted for oscillation about axes perpendicular to a plane normal to said path of log movement established by said rest and conveyer means with said axes movable relative to the mean path of log movement, the combination comprising nozzle supporting mechanism connecting said nozzles in movable relation to said station and having a control portion movable to move said nozzle elements simultaneously and proportionally relative to said rest means in such a manner that points on said nozzle elements coincident with equiangular, spaced points on a circle concentric with a log or the like on said rest means may be made to coincide with similar points on a system of circles concentric with logs or the like of other and various diameters on said rest means, and the bisectors of the angles through which said nozzles oscillate intersect at said mean path of log movement.

8. Cylindrical surface treating elements supporting and positioning means for a device for treating generally cylindrical work pieces of various diameters traveling longitudinally with lower surface portions following a substantially horizontal path determined by a bed, comprising a frame connected with said bed and surrounding said path in a plane substantially normal thereto and a plurality comprising four or more of treating element supporting guide tracks on said frame having their directional axes parallel to a system of straight lines approximately containing the intersections of a corresponding plurality of equiangularly spaced radii of cylinders of various diameters positioned on said bed with the peripheral surfaces of the respective cylinders.

9. Cylindrical surface treating elements supporting and positioning means for a device for treating generally cylindrical work pieces of various diameters traveling longitudinally with lower surface portions following a substantially horizontal path determined by a bed, comprising a frame connected with said bed and surrounding said path in a plane substantially normal thereto, a plurality comprising four or more treating element supporting shoes slidably mounted on a corresponding plurality of guide tracks on said frame, said tracks having their directional axes parallel to a system of straight lines approximately containing the intersections of a corresponding plurality of equiangularly spaced radii of cylin-

ders of various diameters positioned on said bed with the peripheral surfaces of the respective cylinders, and control mechanism connecting said shoes and operable in opposite directions to slide said shoes simultaneously and proportionally in convergent or divergent directions.

10. Hydraulic jet forming nozzle elements supporting and positioning means for a device for directing a plurality of hydraulic jets at a circumferential band of generally cylindrical work pieces of various diameters traveling longitudinally with lower surface portions following a substantially horizontal path determined by a bed, comprising a frame connected with said bed and surrounding said path in a plane substantially normal thereto, a plurality comprising four or more nozzle element supporting shoes slidably mounted on a corresponding plurality of guide tracks on said frame, said tracks having their directional axes parallel to a system of straight lines approximately containing the intersections of a corresponding plurality of equiangularly spaced radii of cylinders of various diameters positioned on said bed with the peripheral surfaces of the respective cylinders, and control mechanism connecting said shoes and operable in opposite directions to slide said shoes simultaneously and proportionally in convergent or divergent directions.

11. Hydraulic jet forming nozzle elements supporting and positioning means for a device for directing a plurality of hydraulic jets at a circumferential band of generally cylindrical work pieces of various diameters traveling longitudinally with lower surface portions following a substantially horizontal path edetermined by a bed, comprising a frame connected with said bed and surrounding said path in a plane substantially normal thereto and a plurality comprising four or more nozzle element supporting shoes slidably mounted on a corresponding plurality of guide tracks on said frame, said tracks having their directional axes parallel to a system of straight lines approximately containing the intersections of a corresponding plurality of equiangularly spaced radii of cylinders of various diameters positioned on said bed with the peripheral surfaces of the respective cylinders, and control mechanism connecting said shoes so designed and proportioned that said nozzles in one position being arranged with their orifices substantially equidistant from the surface of a cylindrical work piece of given diameter on said bed, a single operation of said control mechanism in appropriate direction will position said nozzles with their orifices substantially the same distance from the peripheral surface of a work piece of different diameter on said bed.

12. Hydraulic jet forming nozzle elements supporting and positioning means for a device for directing a plurality of oscillating hydraulic jets at a circumferential band of generally cylindrical work pieces of various diameters traveling longitudinally with lower surface portions following a substantially horizontal path determined by a bed, comprising a frame connected with said bed and surrounding said path in a plane substantially normal thereto, a plurality of shoes supporting said nozzles for oscillation about axes substantially parallel to said path and mounted on guide tracks on said frame having their directional axes parallel to a system of straight lines approximately containing the intersections of a corresponding plurality of equiangularly spaced radii of cylinders of various diameters positioned on said bed with the peripheral surfaces of the respective cylinders, a control mechanism connecting said shoes so designed and proportioned that said nozzles in one position being arranged with their orifices substantially equidistant from the surface of a cylindrical work piece of given diameter on said bed, a single operation of said control mechanism in appropriate direction will position said nozzles with their orifices substantially the same distance from the peripheral surface of a work piece of different diameter on said bed, and power operated means to simultaneously oscillate said nozzles through substantially equal angles relative to said shoes, said power operated means having a portion reciprocably mounted on said frame and slidably and pivotally connected to a crank lever attached to one of said nozzles, by means of a block slidably attached to a track fixed with respect to said station in a position substantially perpendicular to the nozzle supporting track, to vary the effective length of said crank lever and vary the amplitude of oscillation of said nozzle in proportion to its distance from the mean path of movement of logs or the like on said rest means.

13. In a device for treating logs or the like, a treating station, logs supporting rest means, adjacent said station and fixed in position relative thereto, having level fixing portions on which logs or the like of various diameters will lie naturally in stable longitudinally horizontal attitudes, with their lowermost longitudinal surface elements in a substantially fixed level path through said station, and with a circumferential band of surface exposed at said station, log propelling means associated with said rest means and adapted to propel a log longitudinally relative to said rest means and through said station, and a plurality of fluid jet forming nozzles surrounding said path of log movement and being arranged to project fluid jets in the direction of said exposed circumferential band of surface of a log or the like at said station, said nozzles being pivotally mounted for oscillation about relatively movable axes perpendicular to a plane normal to said path of log movement established by said rest and conveyor means, the combination of nozzle supporting mechanism connecting said nozzles in movable relation to said station and having a control portion movable to move said nozzle elements simultaneously and proportionally relative to said rest means in such a manner that points on said nozzle elements coincident with equiangular, spaced points on a circle concentric with a log or the like on said rest means may be made to coincide with similar points on a system of circles concentric with logs or the like of other and various diameters on said rest means, and nozzle oscillating mechanism comprising a pair of equivalent crank levers each connected with one of said nozzles and extending in the plane of movement thereof, two pairs of links of equal lengths pivotally connected at opposite ends to each other and to opposite ends of said crank levers, an additional link of length substantially equal to said crank levers, connecting the pivot axes on which said pairs of links are connected with each other, said links and crank levers forming two equal parallelograms with a common side connecting said nozzles for simultaneous oscillation through substantially equal angles, and power operated means to oscillate one of said nozzles, said power operated means having a portion reciprocably mounted on said frame and a second crank lever attached to one of said nozzles slidably and pivot-

ally connected with said reciprocable portion in such a manner that the angle of oscillation of said nozzles is varied in response to a change in position of said nozzles by said movable control portion of said nozzle supporting mechanism.

14. In a device for treating logs or the like, a treating station, logs supporting rest means, adjacent said station and fixed in position relative thereto, having level fixing portions on which logs or the like of various diameters will lie naturally in stable longitudinally horizontal attitudes, with their lowermost longitudinal surface elements in a substantially fixed level path through said station, and with a circumferential band of surface exposed at said station, log propelling means associated with said rest means and adapted to propel a log longitudinally relative to said rest means and through said station, and a plurality of fluid jet forming nozzles surrounding said path of log movement established by said rest and conveyer means, the combination comprising nozzle supporting mechanism connecting said nozzles in movable relation to said station and having a control portion movable to move said nozzles simultaneously and proportionally relative to said rest means in such a manner that points on said nozzle elements coincident with equiangular, spaced points on a circle concentric with a given log or the like on said rest means may be made to coincide with similar points on a system of circles concentric with logs or the like of other and various diameters on said rest means, said nozzle supporting mechanism comprising a plurality of guide tracks at said station parallel to straight lines approximately containing a series of points determined by the intersections of a corresponding plurality of equiangularly spaced radii of cylinders of various diameters positioned on said rest means with the peripheral surfaces of the respective cylinders, and a corresponding plurality of shoes slidably guided on said tracks, said nozzles being pivotally attached to said shoes for oscillation about axes perpendicular to a plane normal to said path of log movement, and nozzle oscillating mechanism to simultaneously oscillate said nozzles through substantially equal angles relative to said shoes and including power operated means connected to one of said nozzles having a variable portion responsive to changes in position of said shoes upon said tracks to vary the angle of oscillation of said nozzles.

15. In a device for treating logs or the like, a treating station, logs supporting rest means, adjacent said station and fixed in position relative thereto, having level fixing portions on which logs or the like of various diameters will lie naturally in stable longitudinally horizontal attitudes, with their lowermost longitudinal surface elements in a substantially fixed level path through said station, and with a circumferential band of surface exposed at said station, log propelling means associated with said rest means and adapted to propel a log longitudinally relative to said rest means and through said station, and a plurality of fluid jet forming nozzles surrounding said path of log movement established by said rest and conveyer means, the combination comprising nozzle supporting mechanism connecting said nozzles in movable relation to said station and having a control portion movable to move said surface treating elements simultaneously and proportionally relative to said rest means in such a manner that points on said nozzle elements coincident with equiangular, spaced points on a circle concentric with a given log or the like on said rest means may be made to coincide with similar points on a system of circles concentric with logs or the like of other and various diameters on said rest means, said nozzle supporting mechanism comprising a plurality of guide tracks at said station parallel to straight lines approximately containing a series of points determined by the intersections of a corresponding plurality of equiangularly spaced radii of cylinders of various diameters positioned on said rest means with the peripheral surfaces of the respective cylinders, and a corresponding plurality of shoes slidably guided on said tracks, said nozzles being pivotally attached to said shoes for oscillation about axes perpendicular to a plane normal to said path of log movement, and nozzle oscillating mechanism to simultaneously oscillate said nozzles through substantially equal angles relative to said shoes and including power operated means having a portion reciprocably mounted on said frame slidably and pivotally connected to a crank lever attached to one of said nozzles, by means of a block slidably attached to a track fixed with respect to said station in a position substantially perpendicular to the nozzle supporting track, to vary the effective length of said crank lever and vary the amplitude of oscillation of said nozzle in proportion to its distance from the mean path of movement of logs or the like on said rest means.

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