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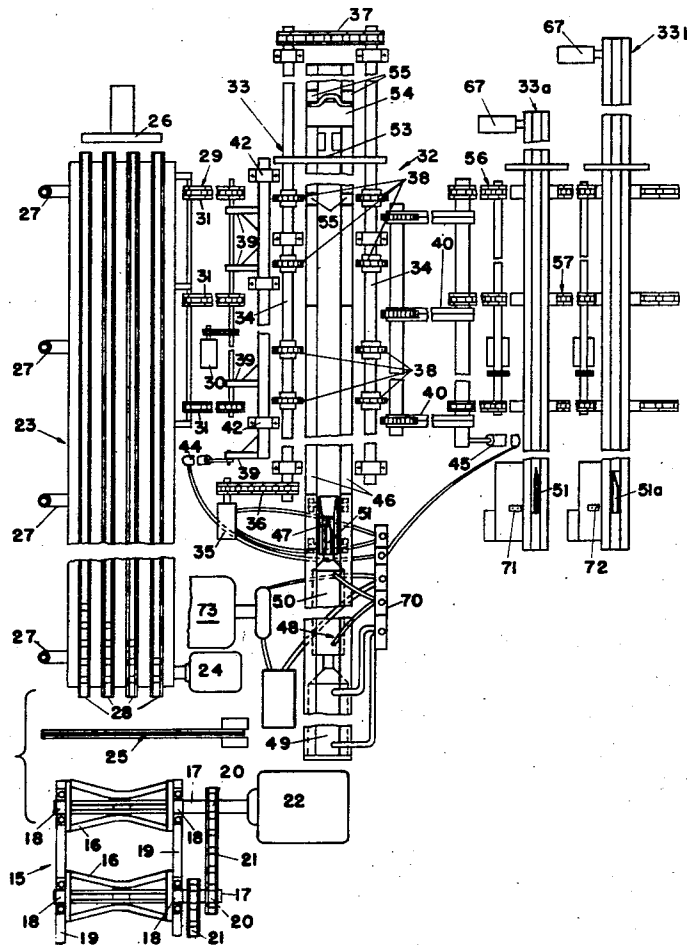
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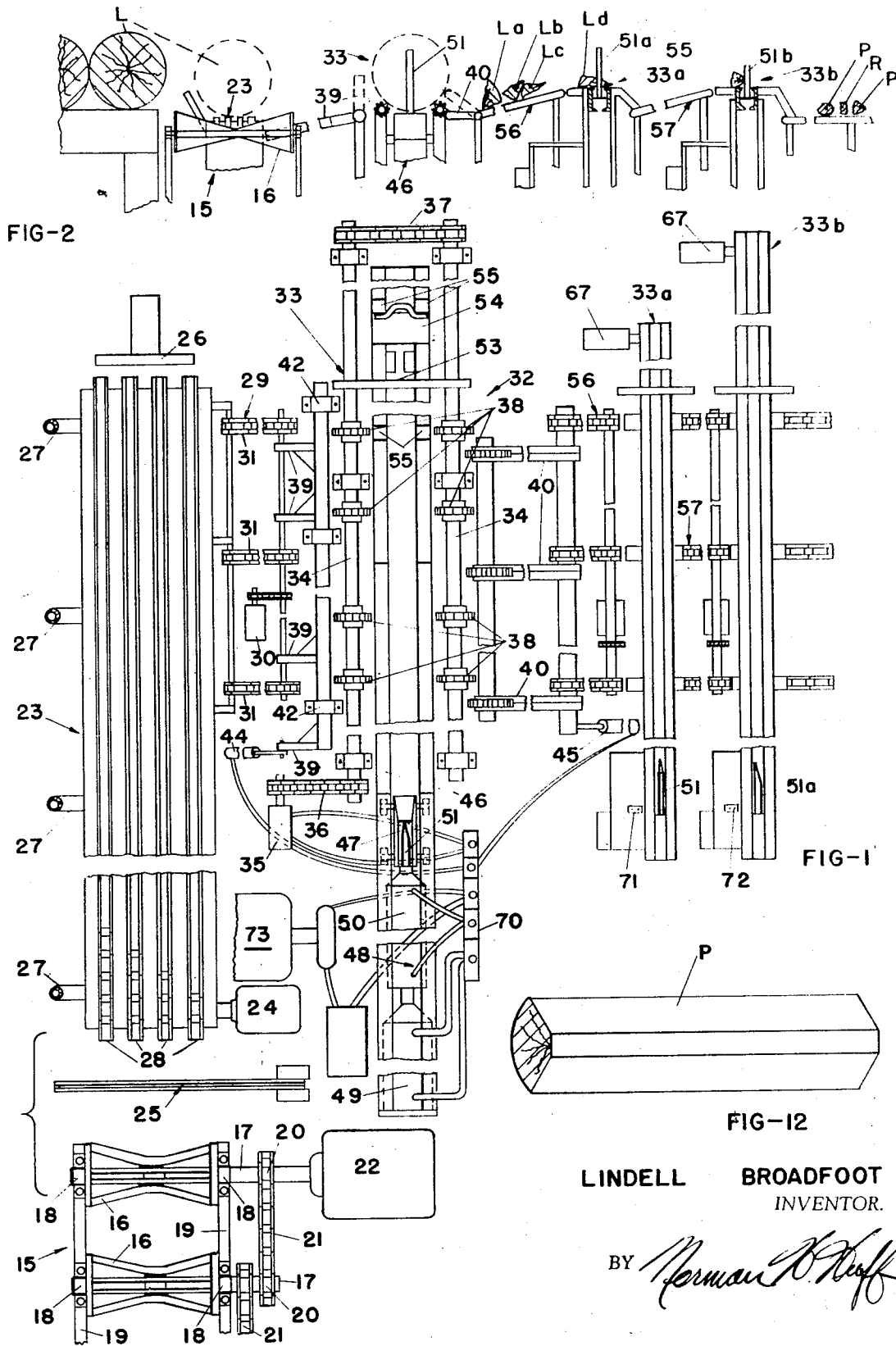
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[54] **APPARATUS FOR MANUFACTURING WOOD FENCING MATERIAL**
 10 Claims, 12 Drawing Figs.

[52] U.S. Cl. 144/193,
 144/312
 [51] Int. Cl. B271 7/00
 [50] Field of Search 144/193,
 193-1, 194, 312, 208, 8; 143/50

ABSTRACT: Apparatus for machine-splitting logs to form wooden fencing materials wherein the log is held while a powered knife or wedge is caused to split it from end to end and additionally having means to hold the split segments according to manual selection in their relative positions while effecting additional splitting functions.





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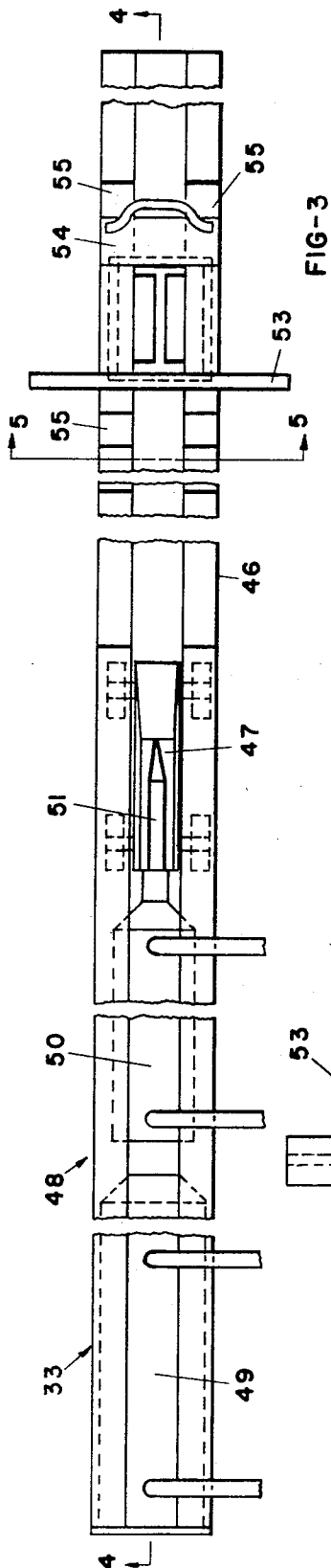


FIG-3

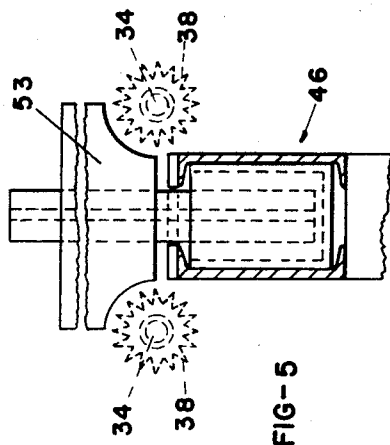


FIG-5

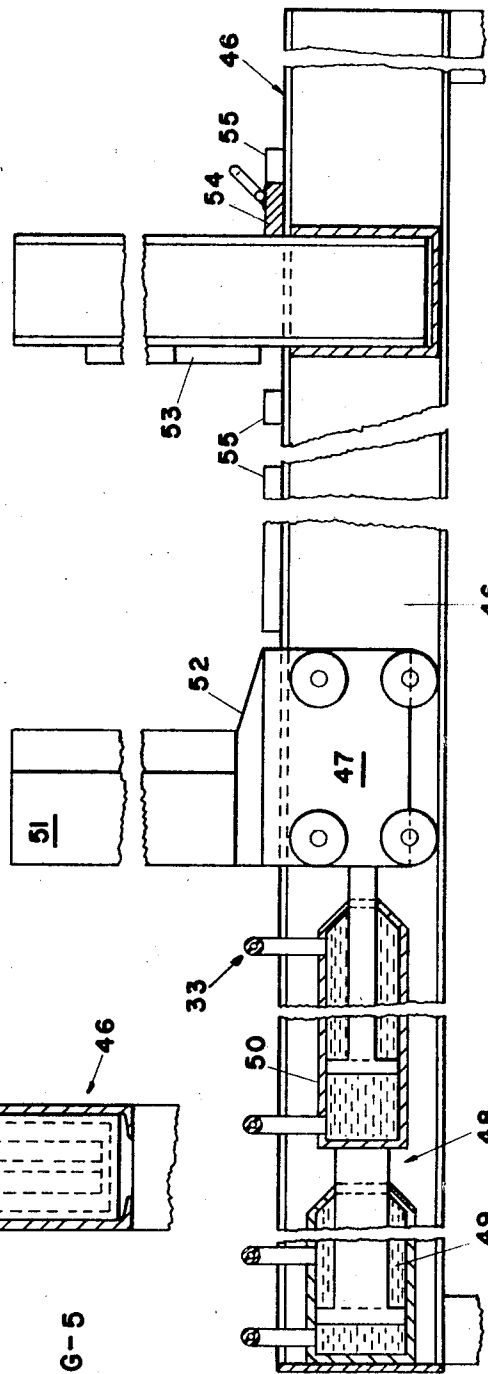


FIG-4

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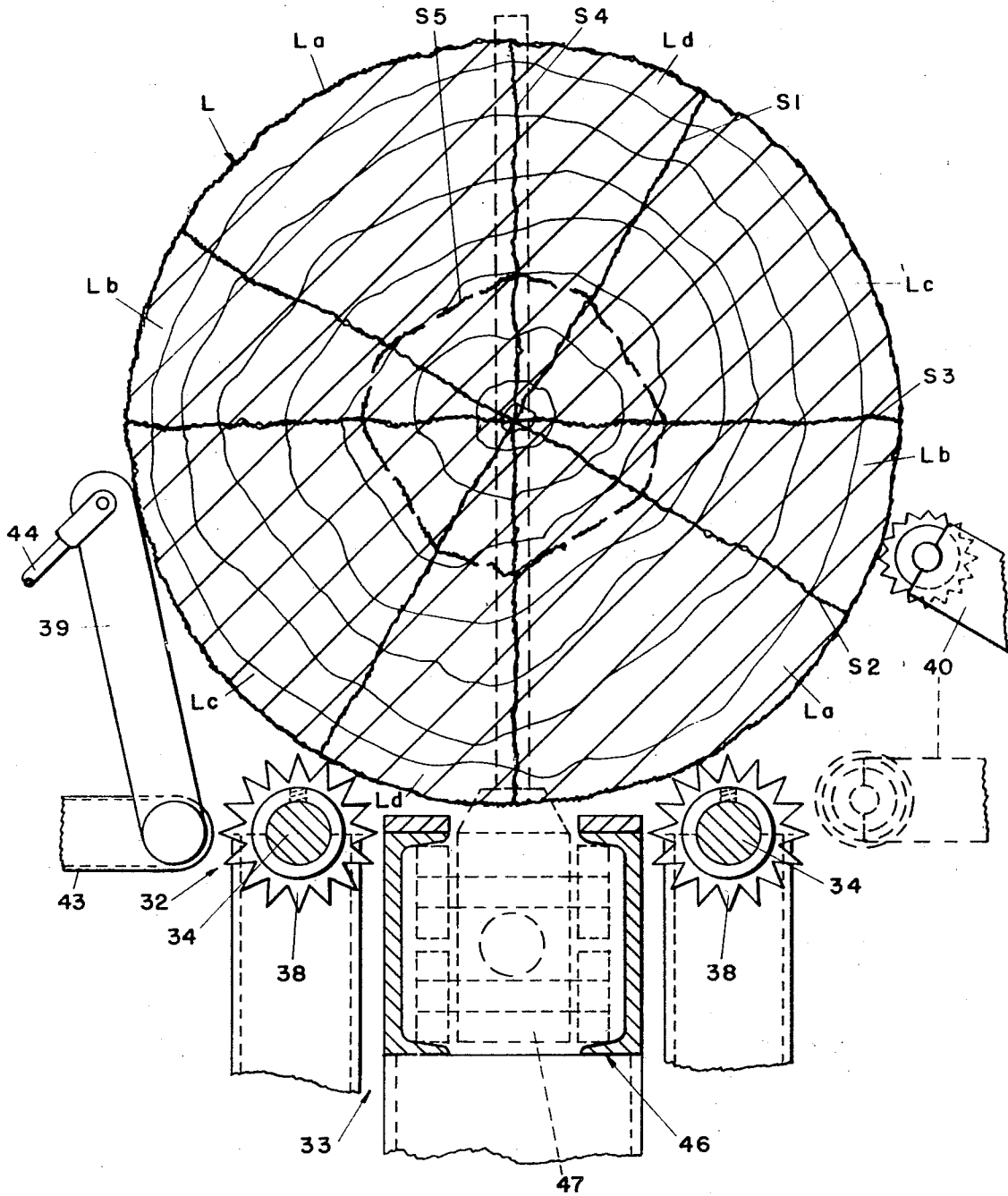


FIG - 6

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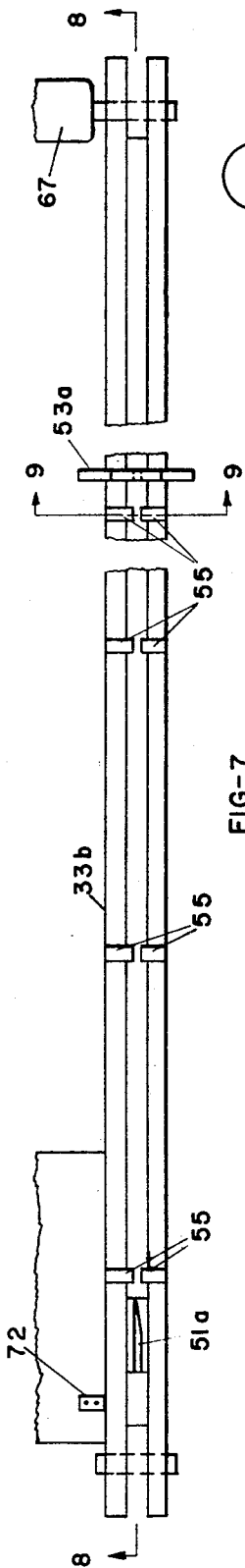


FIG-7

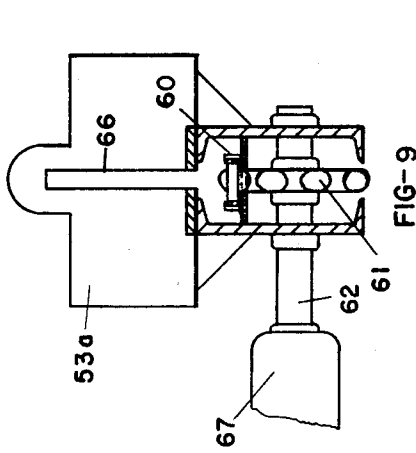


FIG-9

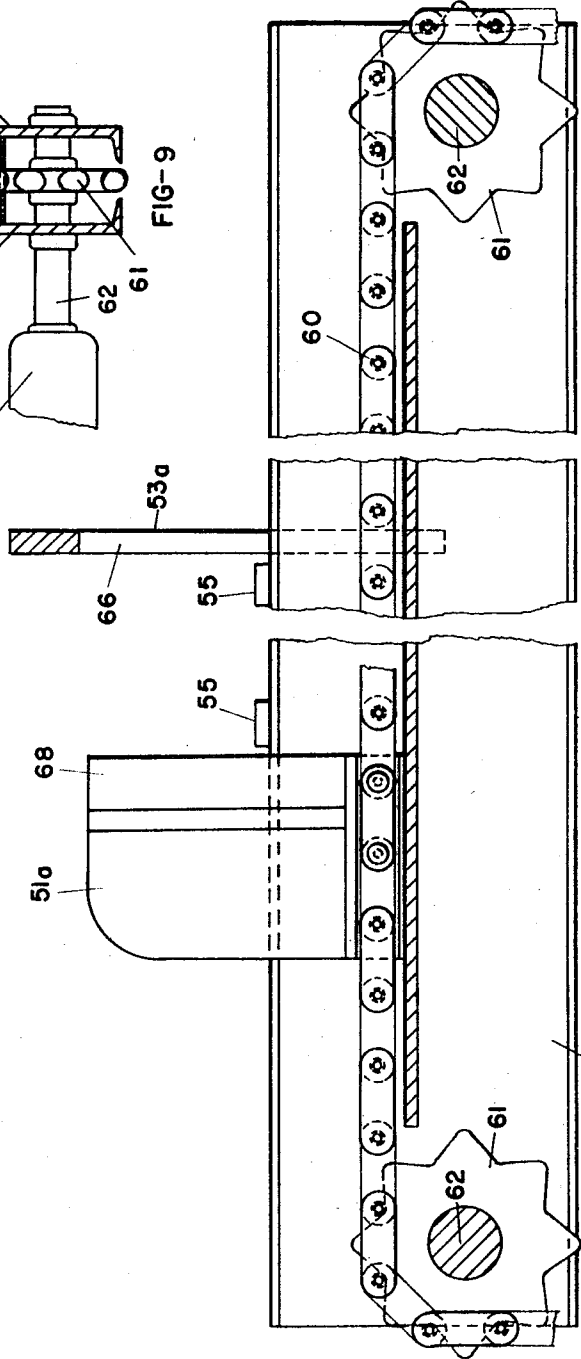


FIG-8

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APPARATUS FOR MANUFACTURING WOOD FENCING MATERIAL

This invention relates to the lumbering industry and more particularly to a method and apparatus for manufacturing wood fencing materials.

Wood fencing materials including posts to support wire as well as wood spans and wood fence rails enjoys a ready market. Some of these wood materials are sawn to form rough lumber which may be further treated to surface one or more sides. The least expensive and longest lasting is that which has been split along its natural grain rather than sawn or planed wherein cuts are made into the wood grain extensively.

Also, split posts and rails produce a rustic Early American appearance which is desired by many in their finished fencing.

Heretofore, we have been apprised of only one type of powered equipment for splitting cut-to-length logs into posts or rails. Briefly, this type of equipment comprised a wedge-shaped splitting blade fixed vertically adjacent to the end of a horizontal bed upon which a log could be placed. A shaft, extended by hydraulics is adapted to advance the log along the bed onto and by the blade which splits the log into two parts or sectors with the sectors terminating one at each side and at the end of the splitting device. Subsequent splitting of the sectors is accomplished by manually returning each segment to the bed and effecting one or more subsequent passes of each segment onto the blade until the final desired size is effected.

My present invention is an apparatus for manufacturing split fencing materials, namely, post and rails, in a more economical and facile means, thus greatly increasing the rate of production per unit of cost.

Another object of the invention lies in apparatus for manufacturing split fencing materials which very materially reduces the amount of handling of timber and segments thereof.

Yet another object of the herein disclosed invention is an apparatus for splitting logs into fencing materials wherein the log is maintained substantially in its presplit configuration while plural splits at selected circumferential diameters are effected thus greatly reducing the handling required to produce desired pieces.

Still additional objects are to provide means for supporting a log to be parted and successively moving a powered splitting wedge through the log at plural selected circumferential diameters, holding the log so parted with its sectors in substantially their presplit relationships each to the other and rotating the parted log to successively dispose the blade at selected circumferential diameters.

The foregoing and other objects and advantages of the present invention will become more apparent and meaningful during the course of the following specification when considered in association with the accompanying drawings wherein a preferred form of the invention is graphically illustrated. It is to be understood, however, that the drawings are illustrative only and are not intended to limit the scope of the invention. It should also be understood that various changes in construction may be resorted to in the course of manufacture without in any way departing from the spirit of the invention which is to be understood only in accordance with the appended claims. Furthermore, it is to be understood that while the invention is described in one particular association, it is not my intention to unnecessarily limit the applicability of the invention, but I desire to reserve to myself the claimed invention for every use of which it is now known or subsequently discovered to be susceptible.

Other advantages and features of this invention will become apparent from the more detailed description following in which like reference numerals are employed to designate similar parts in the accompanying drawings, wherein:

FIG. 1 is a plan view of the apparatus for manufacturing wood fencing materials and has parts broken away for convenience of illustration;

FIG. 2 is an end elevational view of the apparatus of FIG. 1 on the same scale and with parts broken away;

FIG. 3 is a slightly enlarged plan view of one device for splitting logs;

FIG. 4 is a view taken substantially on the vertical plane indicated by line 4-4 of FIG. 3;

FIG. 5 is a lateral view taken substantially on the vertical plane indicated by line 5-5 of FIG. 3;

FIG. 6 is a further enlarged lateral view similar to FIG. 5 and showing a log and cradling means therefor;

FIG. 7 is a plan view similar to FIG. 3 showing a modified splitting device and on approximately the same scale as FIG. 3;

FIG. 8 is an enlarged view taken substantially on the vertical plane indicated by line 8-8 of FIG. 7 and having more of the central section removed to accommodate it to the drawing sheet;

FIG. 9 is a lateral view taken substantially on the vertical plane indicated by line 9-9 of FIG. 7 and upon a scale intermediate of FIGS. 7 and 8;

FIG. 10 is a fragmentary perspective of a splitting device;

FIG. 11 is a partially exploded perspective showing a splitting wedge and its carriage; and

FIG. 12 is an isometric view of a post with an end removed.

Having reference now more particularly to FIG. 1 of the drawings, it may be seen that I have provided a feed conveyor 15 which has a plurality of tapered log-support rollers 16-16, two of which are shown each having a shaft 17 journaled in pillow blocks 18-18 carried by frame members 19. At one end or the other each one or selected ones of the shafts are provided with fixed sprockets 20 about which endless drive chains 21-21 are trained to rotate the rollers 16-16, one from another, to axially advance a log (not shown) onto the sizing conveyor 23. The power for conveyor 15 is supplied by a prime mover or electric motor 22 suitably coupled to one of the shafts 17.

A separate prime mover 24, here utilizing a reversible electric motor drives the sizing conveyor chains 28 to continue to axially advance the log received from conveyor 15 to permit the operator to cut it to the proper length by means of powered chain saw 25. After the log is sized to length, it is advanced to the stop 26. The log is confined against rolling off the conveyor 23 by an upstanding fence, the posts of which are seen at 27-27.

A lateral conveyor 29 having a motor 30 which drives chains 31, receives each log from conveyor 23 and advances them laterally to the cradle 32 which supports the log L centered above the log-splitting device 33.

Cradle 32 comprises a pair of spaced-apart parallel shafts 34-34 selectively rotatable by means of a reversible motor 35 connected thereto by a chain drive transmission 36. The shafts 34 are interconnected by a chain 37 which imparts coincident rotary motion in the shafts 34 both in RPMs and direction of rotation. Examination of FIG. 6 will thus clarify the capability of rotating the log L about its axis in either direction by rotating the shafts 34 upon which are fixed the spaced toothed sprocket wheels 38-38.

As cooperating parts of the cradle 32, I provide arms 39 and 40. Arms 39 are carried by a pivot shaft 41, journaled in pillow blocks 42, carried by the frame 43 and are selectively movable between the elevated full line position of FIG. 6 and the lowered dotted position thereof by means of hydraulic servomotor 44. During the elevating movement, arms 39 may be employed to assist in the transfer of the log L from conveyor 29 onto the wheels 38 of cradle 32 and in the elevated position arms 39 serve as retainers to hold, on one side, the split sectors La, Lb, Lc and Ld from displacement with respect to each other as in the presplit log. At the opposite side of the cradle arms 40 also are selectively moveable between the lowered dotted position and the raised full line position, in the latter one of which they serve as retainers to hold the log L sectors as counterparts of arms 39. A servomotor 45 admits of control of these functions.

Centered beneath the cradle 32, I have provided an elongated frame 46 constituting a part of the splitting device 33. The frame 46 serves as a way supporting carriage 47 for move-

ment longitudinally of the frame 46 from end to end. To facilitate said movement I provide a two-stage tandem power source 48 wherein a relatively large area and thus high-powered servomotor 49 advances a reduced area and thus high speed servomotor 50 which is operably connected in turn to advance the carriage 47. Obviously, reversal of the fluid for activating the servomotors will effect withdrawal of the carriage in the conventional manner.

At its top, the carriage 47 is provided with a vertically disposed splitting wedge 51 which is preferably extended sufficiently to split a log L of the greatest diameter the device is designed to accommodate. At the juncture of the wedge 51 and the carriage 47, I provide an elevating ramp 52 which raises the log L from the wheels 38 during log splitting movements of the carriage and blade 47—50, thus protecting the wheels 38 and attendant parts from receiving undue forces which may tend to displace or distort them.

An adjustable stop 53 may be selectively fixed along the length of the frame 46 by placing a blocking bar 54 between the stop 53 and a selected set of cleats 55 spaced along the frame 46 and welded or otherwise fixed thereto.

Logs which are precut or sized, usually 5 feet 4 inches or 6 feet 6 inches long for use as posts and 10 feet 8 inches or 13 feet when rails can be formed, are split axially thereof by advancing the wedge 51 lengthwise of the log sufficiently to split the log from end to end. In most instances, this will be approximately 2/3 of its length, but this will vary depending upon the type and condition of the wood used. The wedge is then withdrawn from the log L and the shafts 34 rotated to cause the toothed wheels 34 to rotate the log while it is additionally held by arms 39 and 40 against displacement of the sectors. Of course, the circumferential size of the log L, the condition of the heart, the knot or limb induced configuration and other criteria, will dictate how much rotation of the log is required for the next splitting function. However, ideally after split S1 is made, the log L will be rotated substantially 90° and split S2 through the full diameter of the log, that is to say, through both sectors defined by S1, will be made. In successive repetition S3 and S4 will also be made.

After the desired splits (here shown as 4, but which may be more or less) are completed, arm 40 is lowered and shafts 34 are rotated clockwise, as viewed in FIG. 6, at a higher speed than when rotating log L to another splitting set and this throws or advances the sectors onto the conveyor 56 which carries the now displaced segments to a successive splitting device 33a.

Sector splitting device 33a is used to generally size the posts P and rails (not shown). The posts are maintained at cord about 20 inches in circumference and the rails at about 10 inches. Of course, these sizes may be altered without changing the inventive concept set forth herein. When a sector, for example La, is received at splitting device 33a, a split is made at S5 thus providing post material of the major segment portion and rail material of the minor apex heart-wood portion.

Conveyor 57 is then utilized to advance the split material to a trimming device 33b where an extremely sharp blade 51a may be used to cut off protuberant shapes when found necessary, but this function is kept to a minimum to maintain surfaces which follow the grain of the wood as nearly as is feasible.

Drive means for the sector-splitting device 33a and the trimming device 33b may be substantially the same as splitting device 33 but because the material is smaller, the wedge 51 or the blade 51a may be advanced at much greater speed, so I prefer to use an endless chain 60, trained about sprockets 61—61 carried by shafts 62—62 journaled at each end of frame 46 and driven in one direction only as indicated by arrows 49—49 in FIG. 10.

Instead of one carriage 47, I thus use two secured to the chain by passing clevis links 63 through bores 64 formed in members 65 rigid with each carriage 47, through mating chain members and secured by a keeper 76 and cotter pins 77. It will be noted that in this species the stop 53a is provided with a slot

66 through which the blades may pass and the power is supplied by an electric motor transmission device 67.

It should also be noted that the blade 51a has a removable knife edge 68 which may be easily removed by releasing block 69 for sharpening purposes.

Since controls for servomotors, electric motors and like prime movers are well-known, I have not detailed these structures. However, it should be understood that suitable and well-known sources of energy, as for example, motor-pump 73, and controls to effect the functions hereinbefore defined are provided at strategic locations. For example, the bank of normal controls indicated at 70, 71 and 72 are located to permit operators to control their respective splitting devices, conveyors, etc.

Having thus described my invention, I desire to secure by Letters Patent of the United States the following:

I claim:

1. In an apparatus for manufacturing wooden fencing materials from wooden logs, a log-splitting device mounted on a frame comprising:

a cradle for supporting and centering a log along a longitudinal axis in which the cradle has a stop means for preventing the log from moving longitudinally;

a splitting wedge movably mounted on the frame opposing the stop means for reciprocally moving along the axis for splitting the log along a diameter of the log;

a drive means operatively connected to the splitting wedge for reciprocating the wedge along the longitudinal axis to split the log along a diameter during each stroke; said cradle having rotating means mounted thereon for incrementally rotating the log about the longitudinal axis to sequentially position the log at various angular positions to enable the splitting wedge to split the log along various diameters to form a plurality of log sectors; and

holding means mounted on the frame for holding the log sectors together while the log is being split and rotated.

2. The apparatus as defined in claim 1 further comprising a log-conveying means mounted on the frame for moving a log laterally into position between the stop means and the movable splitting wedge.

3. In the apparatus as defined in claim 1 further comprising sector separation and discharge means mounted on the frame for separating the sectors at the conclusion of the log-splitting operation and discharging the sectors from the log-splitting device.

4. In the apparatus as defined in claim 1 wherein the holding means includes releasable engaging means for engaging the periphery of the log on both sides of the longitudinal axis, to hold the sectors together during the splitting operation and further comprising a sector separating and discharge means operatively connected to the rotating means and engaging means for disengaging the engaging means from one side of the log at the conclusion of the splitting operation and for operating the rotating means to rotate the log at an increased speed to discharge the sectors laterally one at a time from the splitting device.

5. In the apparatus as defined in claim 1 wherein the holding means includes arm structures pivotally mounted on the frame on opposite sides of the longitudinal axis for pivotal movement between a nonengaging position and an engaging position to engage both sides of a log positioned between the stop means and the movable splitting wedge to hold the sectors together while the log is being split along the various diameters and further comprising pivot drive means operatively connected to the arm structures for pivoting the arm structures between the nonengaging position and the engaging position.

6. The apparatus as defined in claim 1 wherein the rotating means includes powered wheels supported on the cradle for engaging the periphery of the log to rotate the log and further comprising disengaging means mounted on the frame for disengaging the powered wheels from the log periphery while the log is being split to prevent damage to the powered wheels.

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7. In the apparatus defined in claim 6 wherein the powered wheels engage the underside of the log periphery to provide at least some support of the log while the log is being rotated about the longitudinal axis and wherein the disengaging means includes an inclined elevating ramp movably mounted with the splitting wedge to move under the log to raise the log from the wheels while the log is being split to prevent damage to the powered wheels.

8. In the apparatus as defined in claim 1 in which each of the log sectors is substantially pie-shaped having a segment portion and an apex portion;

further comprising a sector-splitting device mounted on the frame for receiving the log sectors in which the sector-splitting device has a movable splitting wedge and an accompanying drive means for moving the splitting wedge for splitting the log sector to separate the segment portion and the apex portion to form post material and rail material respectively and further comprising conveying means mounted on the frame for transferring the log sectors from the log-splitting device to the sector-splitting

device.

9. In the apparatus as defined in the claim 8 further comprising a conveying means for conveying the post material and rail material to a trimming device mounted on the frame in which the trimming device has a movable cutting blade and an accompanying drive means capable of moving the cutting blade the full length of the material to trim off any protruberant shapes that may exist along the length of the material.

10. In the apparatus as defined in claim 9 in which the cutting blade is affixed to a continuous chain that has a forward flight and a return flight in which the accompanying drive means is operatively connected to the chain to drive the chain in one direction and wherein the trimming device further comprises a stop means mounted on the frame along the forward flight of the chain to receive one end of the material and prevent the longitudinal movement of the material while the material is being trimmed, said stop means having a slot therethrough to enable the cutting blade to pass therethrough at the completion of a trimming operation.

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