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2,390,459

APPARATUS FOR DEBARKING AND CLEANING LOGS

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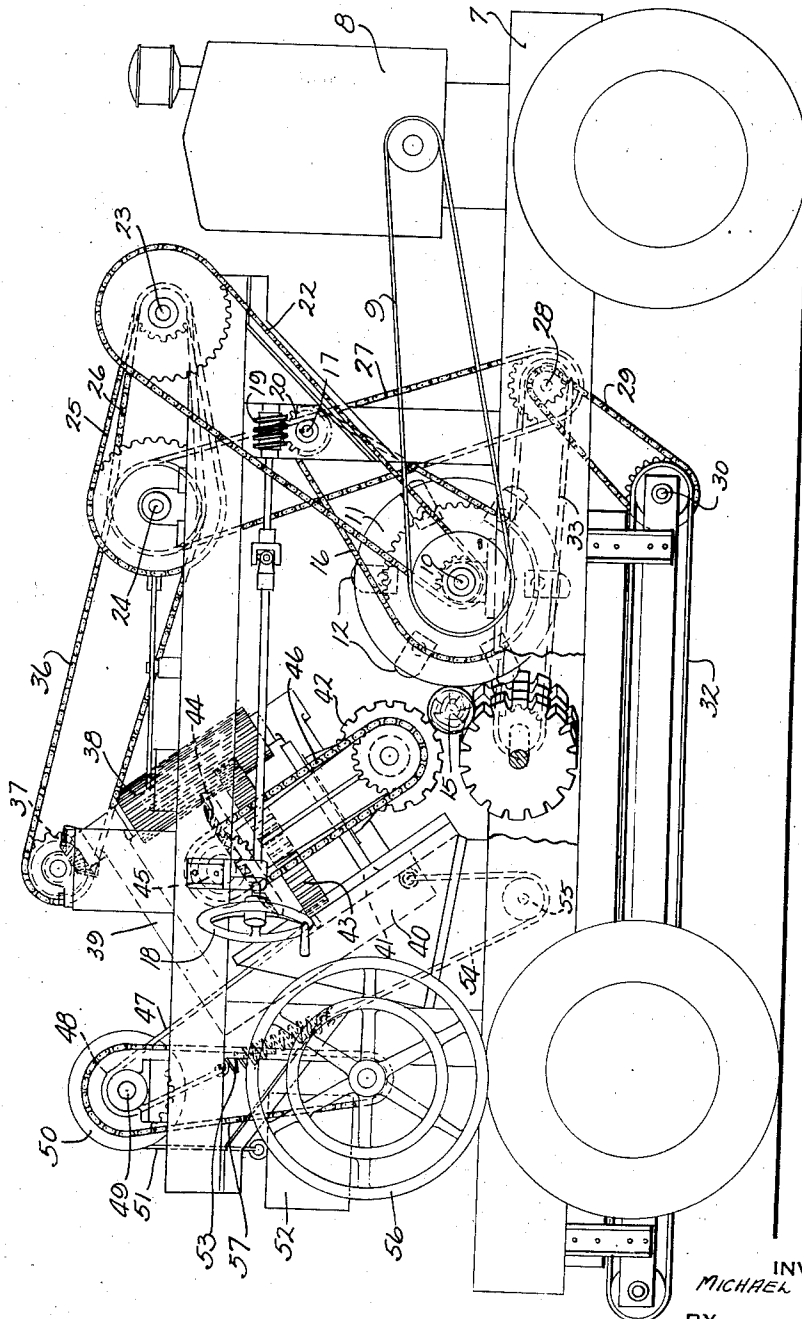


Fig. 1

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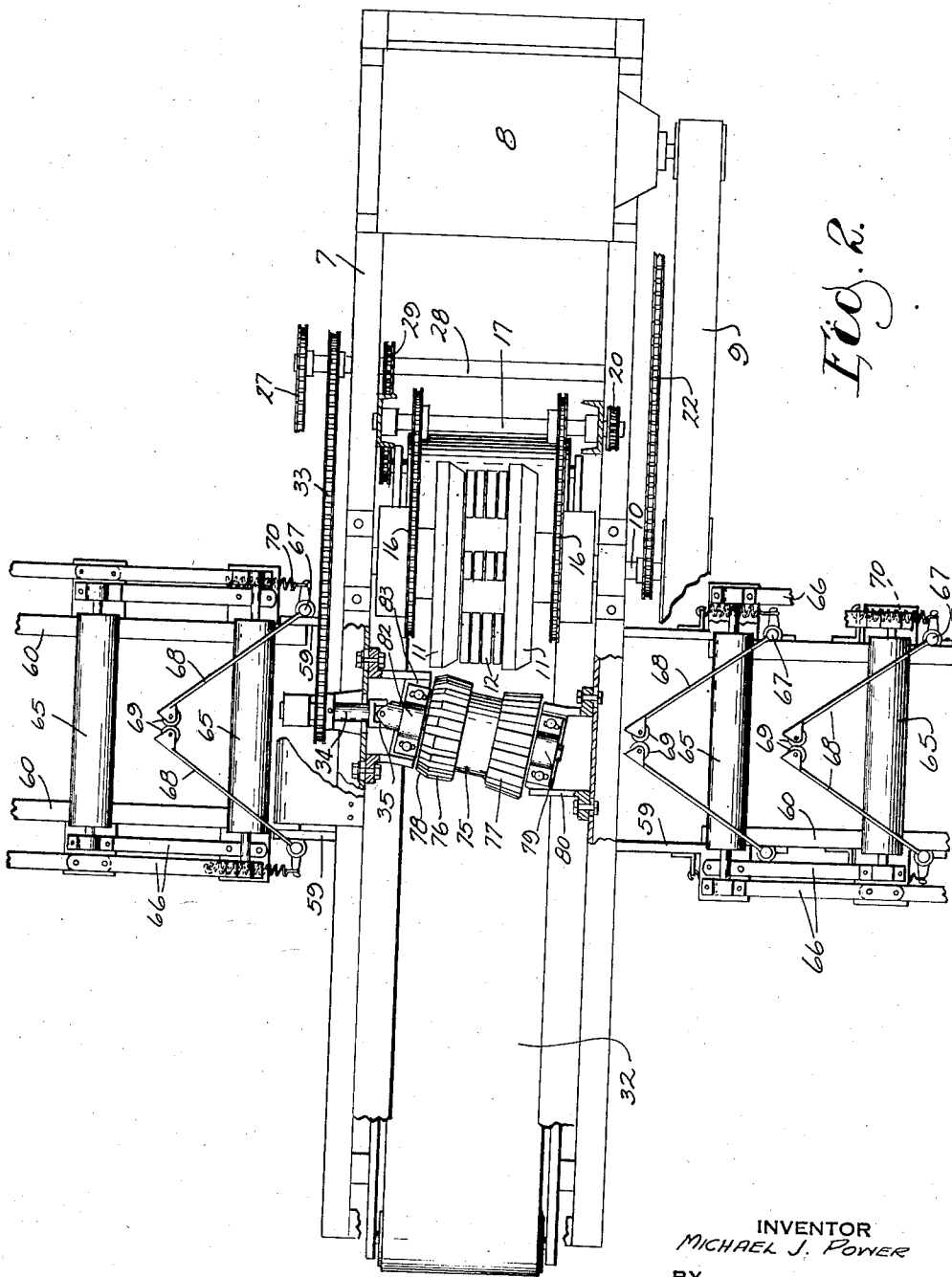
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Feb. 2.

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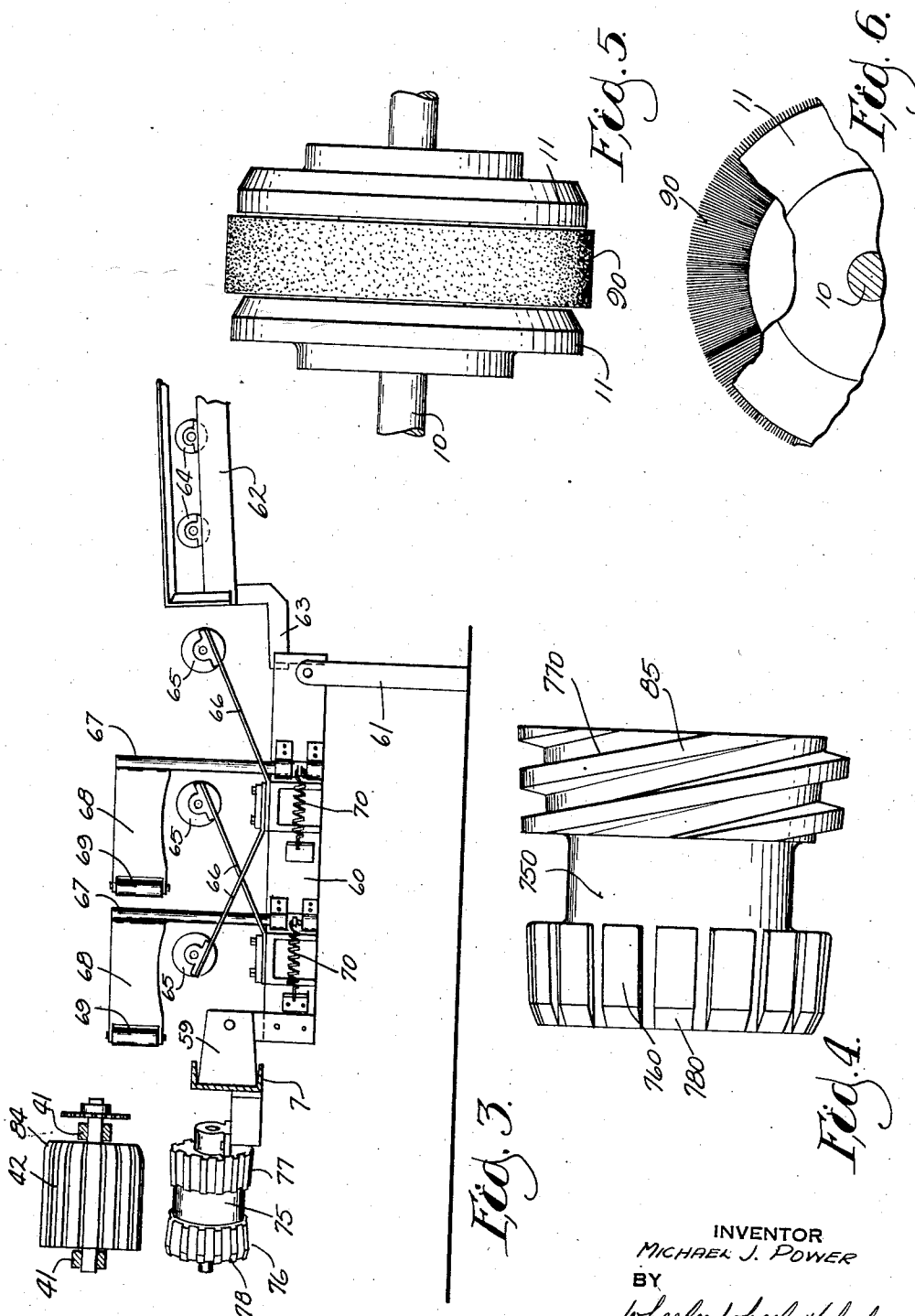
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3 Sheets-Sheet 3



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APPARATUS FOR DEBARKING AND
CLEANING LOGS

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21 Claims. (Cl. 144—208)

This invention relates to improvements in apparatus for debarking and cleaning logs. The present device is an improvement on that disclosed in my companion application 241,368 filed November 19, 1938.

It is the primary object of the present invention to improve the means for feeding and controlling the movement of the logs and supporting them in their traverse of the debarking and cleaning equipment. The objective is to provide a novel and improved means for accommodating and accurately controlling the rate of movement of crooked, irregular and knotty sticks.

The manner in which this is accomplished will appear more fully, and other objects will be apparent, from the following disclosure of the invention.

In the drawings:

Fig. 1 is a view largely in side elevation but partially in section showing a machine embodying the invention.

Fig. 2 is a fragmentary view in plan of the log supporting and feeding mechanism and the hammermill, superposed portions of the machine being broken away.

Fig. 3 is a fragmentary detail view in end elevation, of the log supporting and feeding mechanism, other portions of the machine being broken away.

Fig. 4 is an enlarged detail view of a modified form of log controlling and feeding roller.

Figs. 5 and 6 are enlarged detail views of a modified form of implement member substituted for the hammermill where it is only necessary to clean the log rather than to debark it.

Like parts are identified by the same reference numbers throughout the several views.

Those portions of the machine which are similar to the construction disclosed in the companion application above identified will merely be summarized for the purposes of the present case.

The wheeled frame 7 supports an engine or other prime mover 8 connected by belt 9 with hammermill shaft 10 which carries between the eccentrically adjustable disks 11 the pivotally mounted hammers 12 which operate on the work 15 to remove the surface bark. Through means not here disclosed the eccentricity of the disks 11 may be adjusted to vary the extent to which

the hammers 12 project therefrom against the work. The disks constitute fending means which take the thrust of the work laterally toward the hammers, thus accurately determining the penetration of the hammers with respect to the bark on the logs. The adjustment of disks 11 is controlled by chains 16 which are driven from shaft 17 when said shaft is rotated by hand wheel 18, worm 19, and worm gear 20.

From hammermill shaft 10 chain 22 transmits motion to a jack shaft 23 from which shaft 24 is selectively driven at differing speeds by clutch mechanism (not shown) which enables either chain 25 or chain 26 to be used in transmitting motion from shaft 23. From shaft 24 a chain 27 drives shaft 28 which in turn, through chain 29, drives shaft 30 to operate the conveyor 32 which carries away the part dislodged by the hammermill. From this same shaft 28, intermediate in the drive to conveyor 32, chain 33 drives a shaft 34 mounted on the side of the frame and having an adjustable flexible driving connection through universal joint 35 to an inclined roll which controls the feed of the work in a manner hereinafter to be described. The construction of this roll is novel and constitutes one of the features of the present invention and its detailed description will be deferred until the general construction of the apparatus has been outlined.

From the variable speed shaft 24 at the top of the machine chain 36 drives through bevel gearing 37 an elongated pinion 38 mounted at an angle in the yoke 39 on which suitable ways at 40 provide for the reciprocable adjustment of a slide 41 carrying the feed roll 42. Mounted on the slide 41 to partake of its adjustment is a gear 43 meshing with the elongated pinion 38 which transmits motion thereto in all positions of the slide. This gear drives a bevel gear 44 which in turn actuates a bevel pinion 45 to transmit motion through chain 46 to the feed roll 42 so that in all positions of adjustment of the feed roll on slide 41 the feed roll 42 is positively driven.

The slide 41 and the parts assembled thereon are counterbalanced by cable 47 which extends over a sheave 48 on the control shaft 49. Wound on a drum 50 on the control shaft is another cable 51 connected with counterweight 52. Cable 47 is maintained taut about the sheave 48 by a tension spring 53, the lower end of which is connected

to another cable 54 extending about the idler pulley 55 back to the slide 41. The hand wheel 56 is connected by chain 57 to shaft 49 for the positive rotation thereof, whereby the slide and its compensating counterweight are adjusted to any desired relative position.

The work is fed to and from the machine upon conveyor systems, fragments of which are shown in Figs. 2 and 3. At each side of the machine frame 7 is a bracket 58 to which is pivoted a short section of conveyor frame 60 supported by legs 61 from the ground. To the conveyor frame 60 a longer conveyor section 62 is detachably engaged by the hooked bracket 63. This construction is duplicated at each side of the machine. The conveyor assembly on the frame 60 is new and co-operates with the novel feeding devices for handling irregular work pieces.

The rollers 64 in the conventional conveyor section 62 are fixed therein in the usual manner. In the novel conveyor section 60 the rollers 65 are supported at each end upon leaf springs 66 whereby said rollers, and each end of each roller, are free to yield independently so that no matter how crooked or knotty a log may be it will readily feed and adjust itself during the combined rotary and axial movement by which it progresses past the hammermill. But for the increased flexibility of support provided by the spring mounted rolls 65 the feed of the logs past the hammermill would be bound to be irregular since every knot that encountered a fixed roll would interfere with the orderly progress of the log.

Not only is the log left free to accommodate itself in a vertical plane to any irregularities which it may have, but it is also guided against lateral displacement in a way permitting lateral accommodation.

Upright posts 67 are pivoted at the sides of the conveyor frame 60 and carry flag-like guides 68 each of which has a terminal roller 69 on a vertical axis. Tension springs 70 act on the posts 67 individually to oscillate them inwardly until their rollers 69 are in contact as shown in Fig. 2. A log advanced over the conveyor toward the tools will spread the guide members 68 but will be maintained under constant yielding pressure from both sides tending to center the log on the conveyor while permitting individual portions of the log freedom of lateral movement as the log passes through the feed mechanism. The conveyor section on the delivery side of the machine corresponds in construction to that already described as indicated in Fig. 2.

The feeding device 75 may have the form shown in Figs. 2 and 3 or the form shown at 750 in Fig. 4. In the construction shown in my previous application this feeding device was provided with strips of rubber for engaging the work. I have found it preferable to make the feeding device with ribs of iron or steel in two spaced sections designated 76 and 77 respectively in Figs. 2 and 3. In each of these sections the ribs taper frusto-conically toward the center of the spool-shaped feeder, but in section 76 the outer ends of the ribs at the delivery side of the feeder are beveled at 78. I have found that by dividing the feeder into separate sections it is adapted to handle knotty and irregular logs. By making the ribs on its periphery of metal it attains a firmer grip on the work. The taper of both sections 76 and 77 toward the center better adapts the device to conform to the log at the peculiar angle at which the log is engaged by the feeder and the reverse taper at 78 on

the beveled end of section 76 of the feeder gives a smoother delivery.

For different sizes of logs it may be desirable to adjust the angle of the feeding tool 75. Accordingly, the bearing 79 upon which its end is mounted is adjustable on the bracket 80 carried by the frame. Its bearing 82 at the end primarily driven is likewise adjustable with respect to bracket 83 and the bracket 83, like bracket 80, is mounted for bodily adjustment with respect to the frame 7, either the bracket or the frame being slotted to accommodate a limited displacement of the bolts by which the bracket is held to the frame.

The upper feed member 42 is likewise axially ribbed, and the ribs are beveled at one end at 84. The roll 42 is axially parallel to the direction in which the work moves but the feeder 75 is disposed at an angle and it is this angle which imparts to the work a measure of axial advance in the course of its rotation while engaged between the feeders 42 and 75 and the disks 11 of the hammermill.

For certain types of very knotty work pieces I have found it advantageous to use the modified feeder shown at 750 in which the section 770, instead of being provided with axially extending and conically tapered ribs, is provided with thread-like ribs 85 of helical pitch. The section 760 is somewhat similar to section 76 in the corresponding device 75, being beveled at 780 at its end.

One problem involved in the handling of logs from which knots and sticks project is the difficulty of controlling the feed of such logs with any regularity. The projecting stubs, sticks and knots tend to catch on portions of the machine and thereby to be driven at a rate which may prevent the machine from removing all of the bark. The pitch of the thread-like helical ribs 85 tends to prevent this since any stick or knot getting caught in between two of these ribs will not jump ahead but will be fed with considerable regularity through the device.

In some instances the logs have already lost their bark and it is necessary only to clean up the logs and remove partial lateral superficial tissue therefrom. In such cases I have found it possible to substitute a wire brush 90 between the disks 11 in place of the hammers 12, and such an arrangement is shown in Figs. 5 and 6.

It will be apparent that an irregular, crooked, or knotty log which is rigidly supported on its infeed or outfeed conveyor will be much more difficult to feed with regularity through the debarking or cleaning tools than a log which is free to accommodate its irregularities in traversing the flexibly yieldable supporting and guiding means of the conveyor here disclosed. This flexibility of the supporting conveyors makes possible the more rigid engagement of the work by the feeding devices 42 and 75 with a consequent gain in the uniformity of feed and workmanship. The feeding devices 42 and 75 hold the work against the disks 11 of the rotary bark remover, the latter being fixed as to its location, but these elements acting alone would, by reason of their limited extent, be incapable of holding the log in the desired position with any considerable degree of accuracy while rotating and axially advancing it. The conveyor is, therefore, relied upon to contribute to the accurate positioning of the log respecting the bark-removing head. Yet, if the sets of rollers 65 at the respective ends of the feedway were in fixed bearings, or if the resilient

guide arms 68 could not yield, it would be impossible to rotate and advance a crooked or irregular log without very material interference with the presentation of the bark in predetermined relation to the bark removing devices. Such a log cannot be held in continuous contact with the disks 11 unless the log supporting and guiding devices can yield.

I claim:

1. In a device of the character described, the combination with a tool, of means for rotating and feeding work past said tool, said means comprising spaced rolls provided with projecting work engaging teeth, at least one of said rolls being axially inclined to the path of work movement and having separate axially spaced sections on which said teeth are carried, the teeth of the section last engaged by the work being beveled at their delivery ends.

2. In a device of the character described, the combination with a tool, of means for rotating and feeding work past said tool, said means comprising spaced rolls provided with projecting work engaging teeth, at least one of said rolls having separate axially spaced sections on which said teeth are carried, the teeth of the section last engaged by the work being beveled at their delivery ends, said last mentioned roll being set obliquely and axially inclined to the path of work movement and across a transverse plane which includes the tool, said roll being adapted to impart axial movement as well as rotative feed to the work.

3. A device of the character described comprising the combination with a tool adapted to operate on the surfaces of logs, of a co-operating roller axially parallel to the path of log advance past said tool, a second co-operating roller obliquely disposed with reference to the path of logs past said tool, said last mentioned roll having two axially spaced sections individually provided with teeth and having a mounting upon which said roll is adjustable as to its angle, and flexible driving connections for the actuation of the adjustably mounted roll, the teeth of one of the sections of the adjustably mounted roll being helical.

4. A device of the character described comprising the combination with a tool adapted to operate on the surfaces of logs, of a co-operating roller axially parallel to the path of log advance past said tool, a second co-operating roller obliquely disposed with reference to the path of logs past said tool, said last mentioned roll having two axially spaced sections individually provided with teeth and having a mounting upon which said roll is adjustable as to its angle, and flexible driving connections for the actuation of the adjustably mounted roll, the teeth of one of the sections of the adjustably mounted roll being helical and the teeth of the other sections being axially disposed and beveled at their delivery ends.

5. In a device of the character described, the combination with a tool arranged to act on the surface of a log, of means for feeding and rotating the work on said tool comprising rolls coaxing with the tool and spaced at different levels about the path of a log, one of said rolls being obliquely disposed with reference to the path of the log and having enlarged end portions conically tapering toward the central portion of the roll and provided with log engaging teeth.

6. A conveyor comprising a pair of side members, series of leaf springs having fixed ends correspondingly connected in opposite pairs to the respective side members and having free ends

thereabove, bearings on the free ends of the corresponding springs of the respective series, rollers in the bearings of corresponding springs and disposed transversely between the side members to be resiliently supported and guided by the springs in which they are mounted, series of side plates disposed above the rollers, means connecting corresponding ends of said side plates in each series to the conveyor frame member underlying the plates of said series, the respective plates being oscillatable upon said means above the rollers, and spring means biasing the respective plate mounting means in a direction of oscillation such as to tend to maintain the free ends of the respective plates in proximity to the center line of the conveyor between said frame members.

7. A conveyor comprising right and left frame members, leaf springs mounted on the respective frame members in corresponding series, the corresponding springs in each series having fixed end portions anchored at corresponding points on respective frame members and having free end portions projecting at corresponding elevations above the respective frame members, bearings on said free end spring portions, rollers mounted in the bearings of corresponding springs whereby to be disposed transversely of said frame members and yieldable toward said frame members and guided and supported by the springs, a series of oscillatable posts mounted on the respective frame members and projecting above the rollers, flag-like guide plates having corresponding end portions connected to respective posts and correspondingly projecting laterally from the respective posts in the direction of work movement on said rollers, and springs connected between the posts and the respective frame members and comprising means for subjecting said posts to torsional bias in a direction such as to tend to oscillate the respective plates at their free end portions toward the center of said conveyor between said frame members.

8. Apparatus for feeding logs to debarking mechanism and the like, comprising the combination with a log feedway having end portions at each side of such mechanism, sets of resiliently mounted and respectively yieldable log supporting rollers in the respective end portions of the feedway, resiliently yieldable side arms located above said supporting rollers and extending obliquely in the direction of log advancement along said feedway, an obliquely positioned log supporting and advancing roller mounted in relatively unyielding bearings between said sets of yielding rollers, power operated driving means for rotating and advancing a log on said obliquely positioned roller, and means in pressure engagement with such log in a direction to urge the engaged portion of the log in the direction of said mechanism during its rotative and axial advance along the feedway, said means comprising a power driven pinch roller located above said log advancing roller in a position for co-operation therewith to hold the engaged portion of the log in predetermined relation to such mechanism.

9. In apparatus for debarking logs, the combination with debarking mechanism, of a log feedway having a central portion in working proximity to the debarking mechanism and having end portions at each side of said mechanism, sets of yieldably mounted log supporting rollers in the end portions of the feedway, a relatively unyielding log support in said central portion in substantially fixed relation to said debarking mechanism, and a pinch roller co-operative with said support

to rotatively present associated portions of advancing logs to the debarking mechanism, whereby the relation of the portion of the log presented to the debarking mechanism may be definitely fixed regardless of the position of its end portions on the yielding rollers of said sets.

10. In apparatus for debarking logs, the combination with debarking mechanism fixed as to location, of a log feedway having a central portion in working proximity to the debarking mechanism, sets of log supporting rollers provided with yieldable supports in the end portions of the feedway at each side of said mechanism, a relatively unyielding log supporting and feeding device in said central portion adjacent said mechanism, a pinch roller co-operative with said supporting and feeding device to present associated portions of advancing logs to the debarking mechanism, and power driven means for rotating the pinch roller to transmit rotary motion to the log, said supporting and feeding device being mounted in relatively unyielding bearings, whereby the relation of the portion of the log presented to the debarking mechanism may be definitely fixed as to its location respecting said mechanism regardless of the positions of its end portions on said yielding rollers.

11. In apparatus for feeding and presenting logs to rotary debarking mechanism and the like, the combination with a log feedway, of a log supporting and feeding roller obliquely disposed in an intermediate portion of said feedway and having two axially spaced sections individually provided with log engaging teeth and also having an intermediate spool-like section of less diameter toward which said teeth converge, and driving connections for actuating said roller.

12. In apparatus for feeding and presenting logs to rotary debarking mechanism and the like, the combination with a log feedway, of a log supporting and feeding roller obliquely disposed in an intermediate portion in said feedway and having two axially spaced sections individually provided with log engaging teeth and also having an intermediate spool-like section of less diameter toward which said teeth converge, an auxiliary log rotating roller located above the feeding roller with its axis substantially parallel to the line of log advancement, and driving mechanism for actuating said rollers in directions adapted to progressively present successive portions of the log to the debarking mechanism.

13. A conveyor for supporting and assisting in the centering of a log during its axial and rotative movement respecting a rossing head or the like, said conveyor comprising a series of rollers, means yieldably mounting the rollers for the yielding support of a log traversing the conveyor, and a succession of laterally yieldable guide members at each side of the conveyor biased toward the center of the conveyor and yieldable laterally from the path of a log traversing the conveyor, said guide members and rollers being adapted to urge a log toward a predetermined line of support and movement notwithstanding orbital movements of supported portions of a log in the course of its advance upon the conveyor.

14. A conveyor for feeding and presenting logs to a rossing head or the like and adapted to enable successive portions of a crooked log to be presented in fixed relation to the rossing head during the axial and rotative advance of the log past the head, said conveyor comprising a frame, a plurality of rollers each disposed transversely

of the frame, resilient supporting means carrying the respective rollers from the frame, sets of supports upon upright axes disposed in series along each side of the frame, centering guides mounted on the supports and having free end portions oscillatable about the respective axes of the respective supports, said guides projecting from said supports in the general direction of log advance toward the rossing head, and means biasing the respective guider for oscillation of their free ends about said axes toward the center line of the conveyor, said guides and rollers being yieldable to accommodate orbital movement of the end of a crooked log in the course of its rotative and axial advance along the conveyor while maintaining a constant bias on said log tending to resist its displacement in any direction from its predetermined path of advance.

15. Apparatus for feeding and presenting logs irrespective of their malformation along a predetermined line of advance in accurately predetermined relation to rotary debarking mechanism and the like, said apparatus comprising the combination with a feedway having end portions provided with log supporting rollers and lateral guiding devices, said rollers and guiding devices being each mounted for independent resiliently yielding movement, of an intermediate log supporting and advancing feed roller extending obliquely underneath the axial line of log advance and mounted in relatively unyielding bearings, a log rotating roller yielding supported above and at one side of said axial line, a thrust receiving member at the other side of said line, said supporting roller, log rotating roller and thrust receiving member being adapted to grip and accurately position the gripped portion of a log between them, and power driven means for rotating at least one of the last mentioned rollers to rotate and advance the log.

16. Apparatus as set forth in claim 15, in which the log supporting and advancing feed roller is of a generally spool shaped form, with its ends provided with rib like teeth, those at one end being helical, and those at the other end being axially disposed, with their rear ends bevelled in the direction of log advancement.

17. Apparatus as set forth in claim 15, in which the obliquely positioned feed roller has axially spaced toothed sections engageable with different portions of irregular surface.

18. Apparatus as set forth in claim 15, in which the obliquely disposed feed roller is of a generally spool-shaped form, having axially spaced sections provided with rib-like teeth inclined toward the center of the spool and adapted to engage a log on opposite sides of an irregular projection.

19. Apparatus as set forth in claim 15, in which the obliquely disposed feed roller is of a generally spool-shaped form, having axially spaced sections provided with rib-like teeth inclined toward the center of the spool and adapted to engage a log on opposite sides of an irregular projection, and the teeth of the section last to engage the log being bevelled at their delivery ends.

20. Apparatus as set forth in claim 15, in which the obliquely positioned feed roller has a log engaging section provided with helical teeth.

21. Apparatus for feeding and presenting logs in accurately predetermined relation to rotary debarking mechanism and the like, said apparatus comprising the combination of a log feedway having its end portions provided with sets of log supporting rollers mounted for individual

yielding movement, and log supporting, rotating and feeding means between said sets of log supporting rollers, including a supporting feed roller obliquely disposed with reference to the axial line of said feedway, a log rotating pinch roller above and at one side of said line, axially elongated teeth on the respective feed and pinch rollers and thrust receiving disks at the other side of said line, power driven means for posi-

tively rotating at least one of the rollers of the supporting and feeding means to rotate and advance the log while it is being gripped between them and the thrust receiving disks, and resiliently yielding means for holding the respective ends of the log to the general line of log advancement along said feedway while it is being rotated and advanced.

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