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3,223,129

LOG BARKER-CHIPPERS

Filed Oct. 8, 1962

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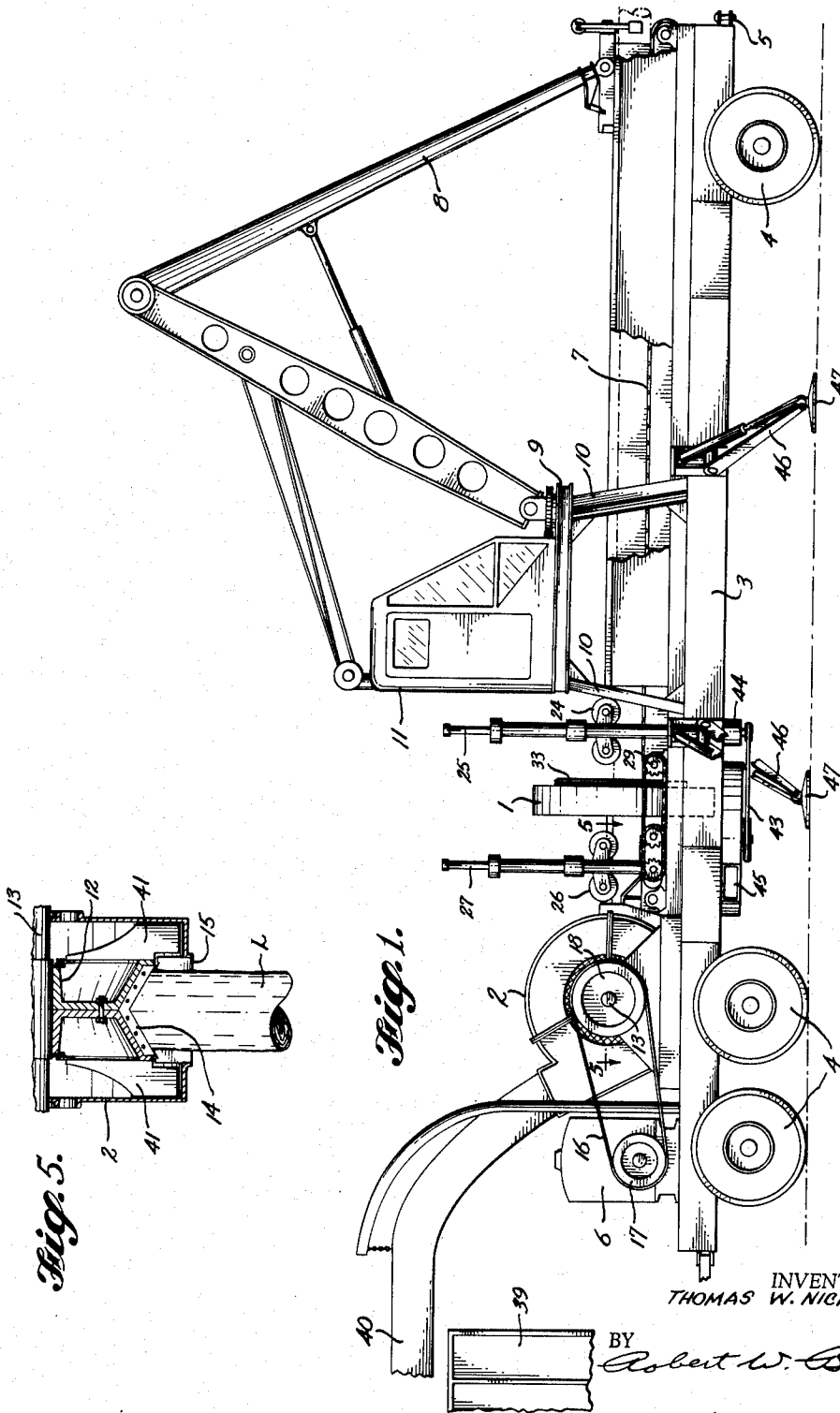


Fig. 1.

Fig. 5.

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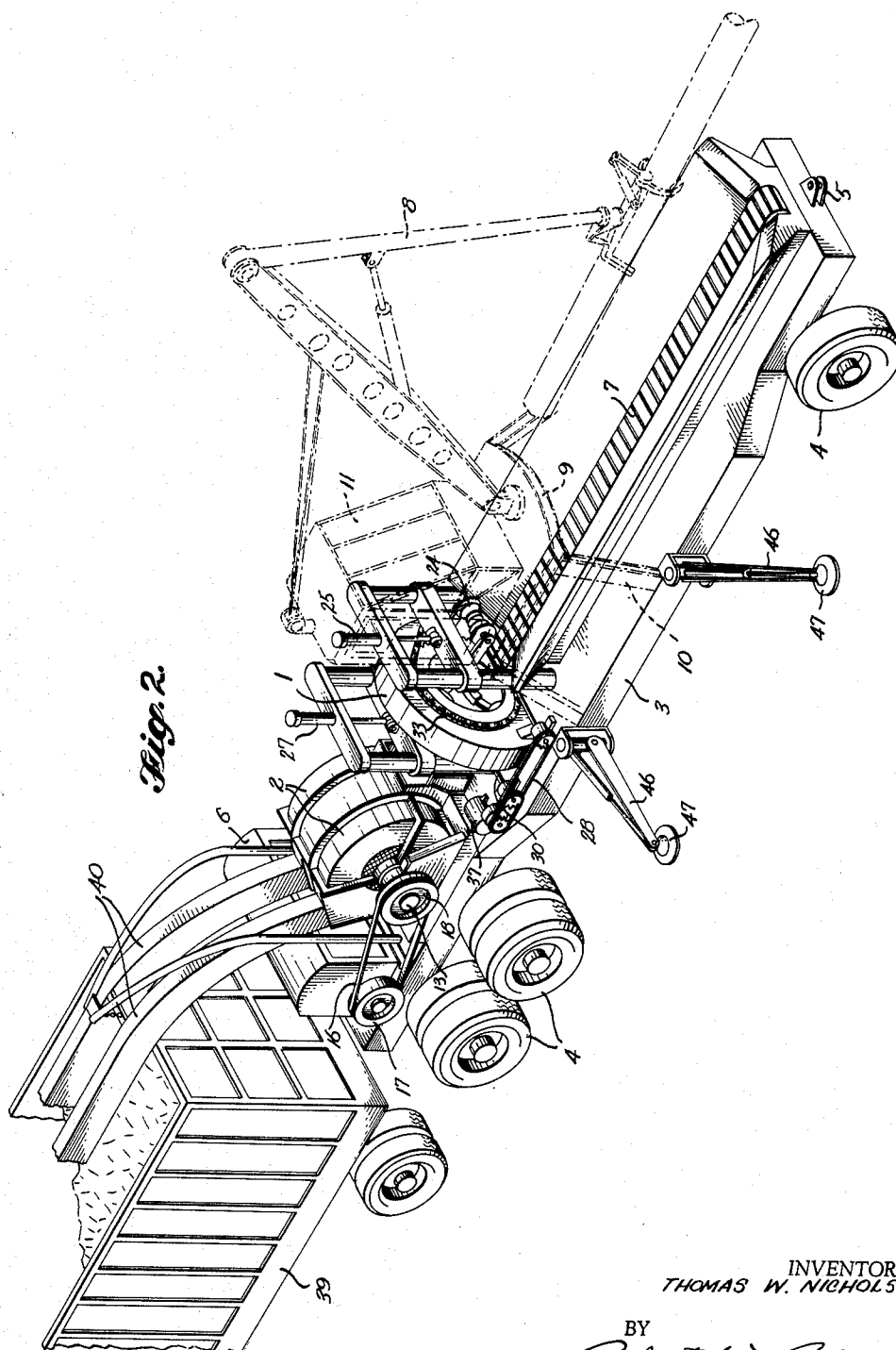
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3 Sheets-Sheet 3

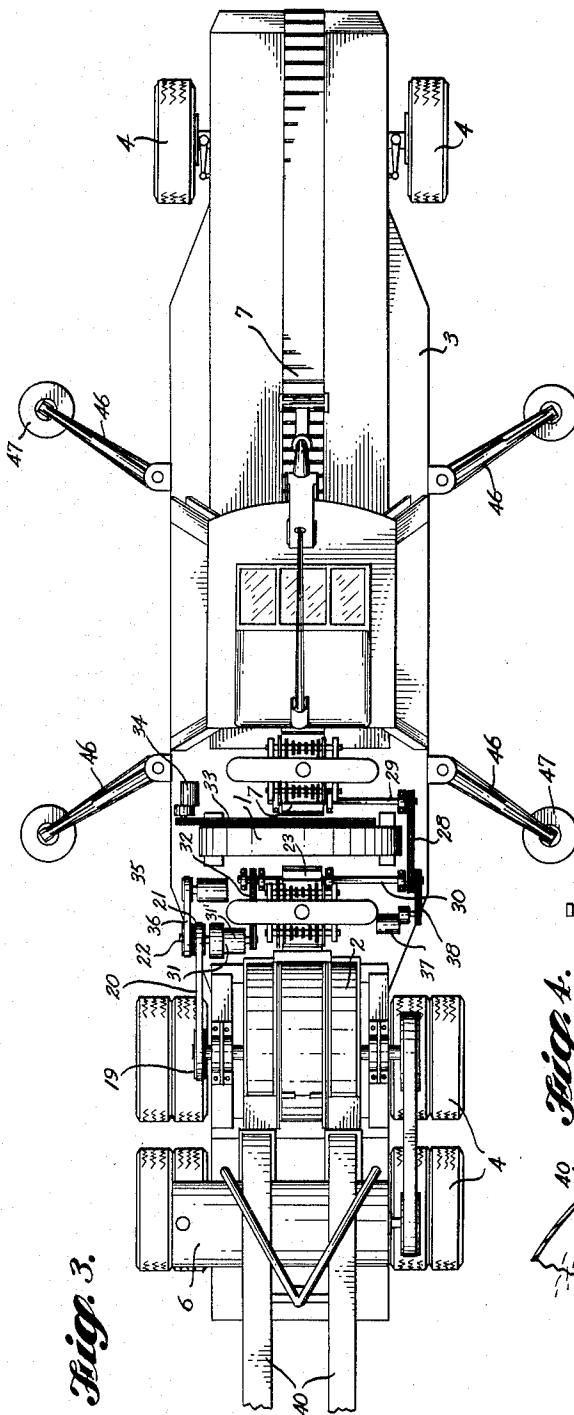


Fig. 3.

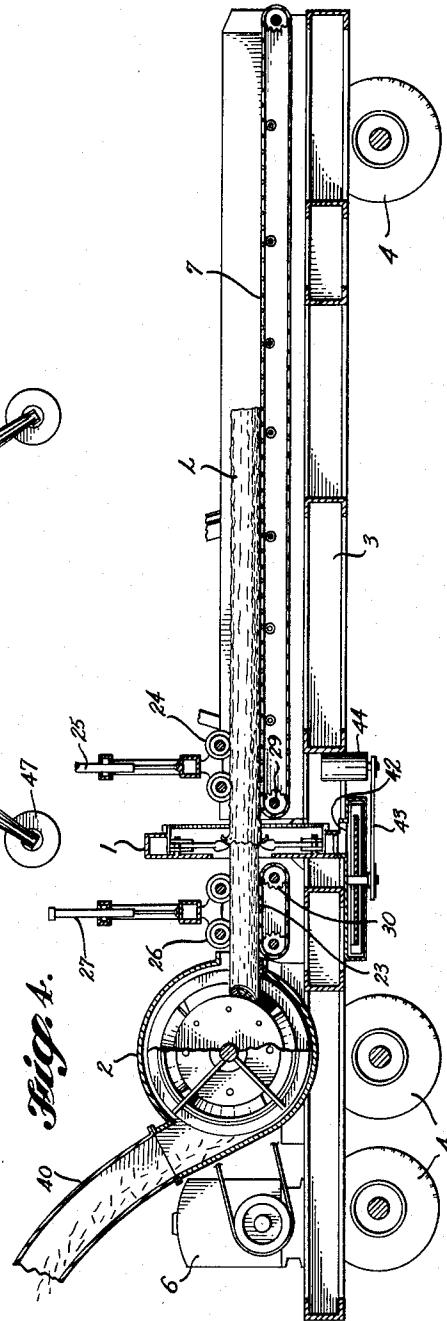


Fig. 4.

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LOG BARKER-CHIPPERS

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6 Claims. (Cl. 144—1)

This invention relates to a barker-chipper for reducing whole logs to chips which are free of bark and suitable for use in the manufacture of pulp.

A principal object of the invention is to provide a barker-chipper combination device which is capable of cutting whole logs into chips of consistently uniform length and which are free of bark.

Despite the ability of the device to handle and chip long logs it is an object to provide a barker-chipper which is compact and mobile so that it can be moved readily from one location to another in the woods and along roads, and which is adaptable to be handled as a trailer, or to be self-propelled.

Another object is to provide a barker-chipper combination in which the barker and chipper components will be coordinated automatically for conjoint operation and, in particular, the feed for the barker and chipper will be synchronized so that different portions of a particular log can be operated on simultaneously by the barker and chipper. While production of uniform length chips is facilitated by providing a force feed for the chipper, it is an incidental object to enable such feed to be interrupted and the direction of log feed reversed as may be necessary from time to time to produce a complete barking operation.

An additional object is to locate the barker and chipper components of the device in close-coupled relationship and to utilize barker and chipper units of a type, mounting them in such relationship and coordinating their operation so that the action of each of such components influences and improves the operation of the other of such components.

A barker-chipper capable of accomplishing the foregoing objects may include a barker component of the rotary ring type and a chipper component of the rotary drum type mounted on a chassis in adjacent relationship and arranged with the rotative axis of the barker's rotor extending lengthwise of the chassis, and the rotative axis of the chipper's rotor extending transversely of the chassis and substantially perpendicular to the rotative axis of the barker's rotor. Common feed mechanism is provided for feeding logs to and through the rotary ring of the barker and into the chipper, and the speed of such common feed mechanism is synchronized with the rotative speed of the chipper drum, although the feed mechanism includes clutch means and reverse gear, or a separate reversing drive, which will enable a log to be moved reversely lengthwise through the barker and withdrawn from the chipper at the will of the operator. The barker-chipper chassis is mounted on wheels to provide mobility and log hoist means also mounted on the chassis can be used to hoist logs onto the barker feed mechanism. Stabilizing legs can be provided to assist the wheels in supporting the chassis during operation of the barker-chipper.

FIGURE 1 is a side elevation of the mobile log barker-chipper, with parts broken away.

FIGURE 2 is a top perspective of the barker-chipper, parts being shown in phantom.

FIGURE 3 is a plan of the barker-chipper.

FIGURE 4 is a longitudinal section through the barker-chipper, with parts omitted.

FIGURE 5 (sheet 1) is a detail horizontal section through a portion of the chipper component on line 5—5 of FIGURE 1.

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Barkers of the rotary ring type have been used heretofore for removing bark from logs prior to being sawn into lumber, or peeled in the manufacture of veneer, for use in making plywood. Also, chippers of the drum type have been used heretofore usually for chipping log trimmings. Such barkers and chippers have been used at mills and there has not been mechanism available for reducing logs to chips in the woods. The barker-chipper of the present invention is intended primarily for use in the woods so that it is not necessary to haul logs out of the woods and then process them, but the logs can be reduced efficiently to the form of chips in the woods and the chips can be hauled to a pulp mill. Such operation eliminates the necessity of using log transporting vehicles for removing the logs from the woods and makes the provision of log handling equipment at the mill, or at some intermediate location, unnecessary. Being mobile the barker-chipper can be operated for a period of time at one log collection location and then can be moved to another log collection location quickly and easily because it is self-contained and may be self-propelled or capable of being hauled.

The barker-chipper includes a barker component 1 of the rotary ring type so that it can remove the bark from logs of indeterminate length fed nonrotatively through its rotating ring, and a chipper component 2. Such barker and chipper components are mounted on a chassis 3 which preferably is mounted on wheels 4 to make it readily mobile, although the chassis could be mounted on skids if it were simply to be hauled through the woods. A coupling 5 can be provided on one end of the chassis to which a tractor vehicle can be connected to haul the barker-chipper as a trailer, or an engine 6 mounted on the chassis can be connected by suitable transmission mechanism to drive adjacent wheels so that the chassis will be self-propelled.

The barker component 1 and the chipper component 2 are mounted on the chassis 3 in adjacent relationship so that a long log, such as one sixty or seventy feet in length, can be processed and different parts of such log will be operated on simultaneously by the barker and the chipper. Such a log L (FIGURES 4 and 5) is fed nonrotatively lengthwise to the barker and chipper by a feed conveyor 7 located at the side of the barker opposite the chipper. A log can be hoisted onto the feed conveyor by a log crane 8 mounted on a platform 9, which is supported above and straddling the feed conveyor 7, by legs 10 extending alongside opposite sides of the conveyor and anchored on the chassis 3. The platform 9 may, or may not, be rotatable as desired and carries a cab 11 for the operator, which houses the controls for the crane and, if desired, the controls for the barker and chipper components.

In order to provide a practical mobile barker-chipper which can be moved along highways it is necessary for such mechanism to be compact. Also, it is desirable for the barker and chipper components to be mounted on the chassis in such relationship that the operation of each component will aid the operation of the other component. It is also necessary for the barker and chipper components to be of a type which can process logs of considerably different diameters and will be arranged so that the operation of the two components will be compatible when logs of different diameters are being processed. It is necessary that the rotative axis of the rotary ring of barker component 1 coincide with the longitudinal axis of the log and consequently, the barker component must be supported by conventional mechanism (not shown) so as to enable its rotary ring to be shifted vertically without interfering with the operation of the chipper component.

A drum type chipper 2 includes a rotor 12 (FIGURE 5) rotatively supported by an axle 13 and having a circumferential V-groove. At locations spaced circumferentially of this groove V-shaped blades 14 are mounted on the drum. A log L can be fed lengthwise to such chipper in a direction perpendicular to the axis of rotation of the drum defined by axle 13 through a feed opening 15, as shown in FIGURE 5. The axis of such log should lie in the central plane of the drum 12, whatever the size of the log may be, and the bottom of the log may always be at the same elevation.

Different portions of a single log can be processed simultaneously by the barker component 1 and the chipper component 2 of the present combination by mounting the barker and chipper components in adjacent positions on the chassis 3 with the axis of rotation of the barker's rotary ring disposed substantially perpendicular to the rotative axis of the chipper component's drum. As shown best in FIGURE 3, the rotative axis of the barking ring extends lengthwise of the chassis 3 in its vertical central longitudinal plane and the rotative axis of the chipper component 2 extends transversely of the chassis in a vertical plane perpendicular to the rotative axis of the barking ring. The feed conveyor 7 establishes the position of the bottom of the log fed to the barker component and to the chipper component, except for the small variation of the thickness of the bark removed by the barker component. The feed mechanism including the conveyor 7 will thus feed the log both to the barker component and to the chipper component.

In order to produce chips of uniform length, which is very desirable for making pulp, it is necessary for the rotation of the chipper drum and the speed of log feed to the drum to be coordinated. If the load on the chipper is increased by having to cut chips from a large log so that the speed of chipper drum rotation is decreased, it will also be necessary to reduce the speed of log feed correspondingly. It is not as important for the speed of rotation of the barking ring to be coordinated precisely with the speed of longitudinal movement of the log through the barking ring, as long as the speed of barking ring rotation is sufficiently rapid relative to the speed of longitudinal movement of the log to enable the bark removing tools to contact effectively all parts of the log as it moves through the barker. The coordination of the rotative speed of the chipper drum and the speed of longitudinal log feed can be accomplished most reliably by providing drive mechanism common to the chipper drum rotation and the feed of the log to the chipper and through the barker.

Whether or not the engine 6 is utilized to propel the barker-chipper over the ground, it can serve as the prime mover for driving the chipper 2 and the log feed mechanism. Such engine may also drive the rotary ring of the barker 1, if desired. Such engine can be of the diesel type. It is connected directly to the axle 13 of the chipper drum by a belt 16 (FIGURE 2) extending around a pulley 17 on the output shaft of the engine 6 and a pulley 18 mounted on the chipper shaft 13. On the opposite end of the chipper rotor shaft, as shown in FIGURE 3, is a pulley 19 with which a belt 20 is engaged to drive the log feed mechanism. Specifically, the belt 20 engages a pulley 21 to drive countershaft 22. This countershaft in turn drives the log feed mechanism for both the barker and the chipper components.

The log feed mechanism includes the main log conveyor 7 by which a log is moved to the barker 1, and an intermediate conveyor 23 (FIGURE 4) between the barker and the chipper 2. Adjacent to the infeed side of the barker is a hold-down 24 vertically movable to engage the upper side of logs of different size. Such hold-down can be urged downwardly by a fluid jack 25 containing oil under pressure. Hold-down means are also provided between the barker and chipper, including the hold-down rolls 26 mounted for vertical movement and pressed downward by a fluid pressure jack 27, also of the

hydraulic type. The hold-downs 24 and 25 are shown in FIGURE 2 as including rolls having concave peripheries journaled in slides which are guided for vertical movement by guideposts supported at opposite sides of the conveyors. Various types of hold-downs may be provided for this purpose.

The intermediate conveyor 23 and the main feed conveyor 7 are interconnected for conjoint movement by a drive chain 28 connecting drive shaft 29, which drives the feed conveyor 7, and the drive shaft 30, which drives the intermediate conveyor 23, as shown in FIGURE 3. While such shaft is shown in FIGURE 4 as pushing the upper stretch of the chain 23, such shaft could be connected to the chain supporting sprocket shaft adjacent to the chipper 2, but this intermediate feed chain is so short that the drive can be located satisfactorily at the end adjacent to the barker. Also, the hold-downs 24 and 26 are shown as having log-engaging rolls of the idler type composed of disks spaced along their supporting axles, but these rolls could be power driven in synchronism with the log conveyors if desired.

Occasionally a portion of a log is not barked as completely as desirable during the first pass through the barker and consequently, it is desirable at times to retract a log lengthwise to pass a portion of it through the barking ring again. The drive mechanism for the conveyors 7 and 23 should therefore be reversible. Such reverse drive of the conveyors can be accomplished either by utilizing the same mechanism as used to drive the conveyors in a feed direction, or the forward drive feed can be isolated from the conveyors, and they can then be driven in the opposite direction by a separate drive. Moreover, the chipper drum rotating mechanism can be connected mechanically to the feed conveyors 7 and 23, or movement of such feed conveyors and rotation of the chipper drum can be synchronized by utilizing a different type of coordinated driving mechanism, such as an electric generator connected to the chipper drum rotating mechanism which powers a motor in step with the generator, and which motor is mechanically connected to drive the conveyors 7 and 23.

The preferred type of drive mechanism for conveyors 7 and 23 is the direct mechanical type including reduction gearing 31 (FIGURE 3) mounted on the countershaft 22 by which the chain 32 connected to drive shaft 30 is driven through clutch 31'. Shaft 30 will then drive shaft 29 of conveyor 7 through chain 28. Reduction gearing 31 will be selected, or adjusted, in accordance with the length of chip desired to be cut by the chipper and if the chipper drum is overloaded by cutting a large log and consequently is slowed down, the speed of conveyors 7 and 23 will be slowed down correspondingly. The drive for rotating the rotary ring of the barker 1 can be synchronized with the drive for the chipper drum, or the barker ring driving chain 33, can be driven by an entirely separate engine. This ring can, for example, be rotated by an electric motor 34 of the gear head type, the electric current for which is generated by a generator 35 driven by a belt 36, which engages a pulley mounted on the countershaft 22.

An alternate arrangement for driving the log conveyors 7 and 23 is by a gear head motor 37 independent of the broken ring driving motor 34 and connected to shaft 30 by chain 38. This motor is powered by electricity generated by the generator 35 and consequently it rotates in step with the generator. If the chipper drum is slowed down by the load of cutting a large log the transmission belt 20, connected to the chipper drum shaft, and consequently the generator 35, will be slowed down correspondingly. As a result, the speed of the drive motor 37 will be reduced to the same extent which in turn will slow down the log conveyors 7 and 23 to coincide with the reduced rotative speed of the chipper drum. Such speed reduction will insure that the conveyors 7 and 23 will always feed the log to the chipper at a rate corresponding to the ro-

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tative speed of the chipper drum so as to cut chips of uniform length.

Chips cut by the chipper 2 can be delivered to a receiving bin 39 which may be the body of a truck or trailer. Such a trailer can be attached to the end of the chassis and moved from place to place as the barker-chipper is moved. Such chips are delivered to the bin through ducts 40 extending from opposite sides of the chipper, as shown in FIGURE 3. The chips are propelled through these ducts by currents of air produced in them by centrifugal blowers including vanes 41 mounted on the opposite sides of the chipper drum, as shown in FIGURE 5. The bark removed from the log drops from the rotary ring through the feed opening 42 (FIGURE 4) of a bark hog mounted beneath the chassis and driven through belt 43 by a motor 44 which may be powered by the generator 35. This hog reduces the pieces of bark to a mulch which is discharged from the hog through the discharge aperture 45 (FIGURE 1) onto the ground, so that no special provision need be made for disposing of the bark, although it may be necessary to distribute the bark mulch over a reasonable ground area.

A log to be reduced to chips will be picked up by the crane 8 and placed on the feed conveyor 7. It may be necessary for the crane to retain its grip on the log until its leading end has passed under the hold-down 24 if the log is quite long so that its center of gravity would be behind the conveyor 7. The hold-down 24 will hold the leading end of the log in position to enter the barker ring. As the log passes through the barker ring the upper side of the log at the discharge side of such ring will be engaged by the hold-down 26. The leading end of the log will then enter the feed opening 15 (FIGURE 5) of the chipper and be engaged by the cutting blades 14 of the chipper rotor. Since these blades are V-shaped their engagement with the end of the log L will center such log end in a position such that the axis of the log lies in the central vertical plane of the chipper rotor 12 and in the center of the barker ring.

A log thus being processed has its leading end portion being processed by the chipper and a portion spaced from its leading end located within the barker ring being barked. The successive impacts of chipper blades on the leading end of the log tend to vibrate it, whereas the hold-downs 24 and 26 and the engagement of the barking tools with the log tend to prevent such vibration. The positive feed of the log to the chipper produces a constant pressure of the log against the chipper drum, which contributes greatly to the uniformity of length of the chips cut. Also, the pressure of the log end into the V-groove of the rotor strongly resists the tendency of the log to be rotated about its axis by the turning force exerted on the log by the barking tools of the barker rotating around it. If, at any time, it should be necessary to repeat the barking operation on a particular section of a log the clutch 31' between reduction gearing 31 and chain 32 can be disengaged and the conveyors 7 and 23 can be driven reversely by motor 37 (FIGURES 2 and 3) to the extent necessary without the rotary ring of the barker 1 being driven. When the log again is advanced its leading end once more will be forced into the V-groove of the chipper drum so that the chipping operation will continue. If logs are being barked one after the other the trailing end of one log when discharged from the barker can be pushed by the leading end of the next log as it moves beneath the hold-down 26 until it has been cut up completely by the chipper. Even if the stub end of a log after leaving conveyor 23 should tilt somewhat it still will be fed positively to the chipper drum and produce satisfactory chips.

Because logs are heavy, rotation of the ring of barker 1 may produce considerable centrifugal force about one axis, rotation of the chipper drum may cause considerable centrifugal force about a transverse axis and the impact of the chipper knives against the log tend to produce vibration, it is desirable to provide stabilizing legs 46, the upper

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ends of which are pivotally mounted on the chassis 3 and the lower ends of which carry pads 47 which can be swung downward and pressed against the ground to assist the wheels 4 in stabilizing the chassis and supporting the load on it during operation of the barker-chipper. Also, such legs will deter tilting of the chassis by the weight of a log picked up by crane 8 from a location spaced a considerable distance to the side of the chassis.

I claim as my invention:

1. A mobile log barker-chipper comprising a chassis, a rotary ring barker mounted on said chassis with its rotative axis extending lengthwise of the chassis, a drum chipper mounted on said chassis close to said barker and having a drum rotatable about an axis extending generally perpendicular to the axis of rotation of said barker ring, said drum having a V-groove in its periphery with its bottom apex disposed in the vertical plane substantially in which the axis of the rotary ring log barker lies, and log-feed means between said barker and said chipper operable to move a log axially through the ring of said barker and press its end into the V-groove in the drum of said chipper.

2. A mobile log barker-chipper comprising a chassis, a rotary ring log barker mounted on said chassis with its rotative axis extending lengthwise of the chassis, a drum chipper mounted on said chassis close to said barker and having a drum rotatable about an axis extending generally perpendicular to the axis of rotation of said barker ring, said drum having a V-groove in its periphery, and log-feed means between said barker and said chipper and operable to press the leading end of a log on said log-feed means into such V-groove of said chipper drum for deterring rotation of the log about its axis by the turning force exerted on such log by the rotation of the log barker's rotary ring.

3. A log barker-chipper comprising supporting means, log-feed means mounted on said supporting means and operable to move a log lengthwise, a rotary ring log barker mounted on said supporting means with its rotative axis extending parallel to the direction of movement of said log-feed means for movement of a log lengthwise through said rotary ring log barker by said log-feed means, and a chipper mounted on said supporting means close to said log barker and including cutting means operable on a log moving through said rotary ring log barker to cut a surface of such log at a substantial angle to the axis of such log for deterring rotation of the log about its axis by the turning force exerted on such log by rotation of the log barker's rotary ring.

4. A log barker-chipper comprising supporting means, a rotary ring log barker mounted on said supporting means for rotation of its ring about a rotative axis, a drum chipper mounted on said supporting means close to said barker and having a drum rotatable about an axis extending generally perpendicular to the axis of rotation of said barker ring, said drum having a V-groove in its periphery containing cutting means, and log-feed means mounted on said supporting means and operable to move a log axially through the ring of said barker and press its end into the V-groove in the drum of said chipper for deterring rotation of the log about its axis by the turning force exerted on such log by rotation of the log barker's rotary ring.

5. A log barker-chipper comprising supporting means, a drum chipper mounted on said supporting means and having a drum rotatable about an axis, a rotary ring log barker mounted on said supporting means close to said drum chipper with its rotative axis extending generally perpendicular to the axis of rotation of said chipper drum, log-feed means mounted on said supporting means and operable to move a log lengthwise through the ring of said barker and press its ends against the drum of said chipper, drive means operatively connected to rotate the drum of said chipper, an electric generator driven in synchronism with rotation of said chipper drum, reversible first electric

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motor drive means powered by said electric generator and connected to said log-feed means for driving the same in synchronism with rotation of said chipper drum in a direction to feed a log through said barker to said drum chipper, and second electric motor drive means independent of said first electric motor drive means, powered by said electric generator means and operatively connected to rotate the barker ring in synchronism with rotation of said chipper drum and movement of said log-feed means feeding a log toward said chipper drum, but deenergizable when said first motor means is reversed to drive said log-feed means in the direction to move a log away from said chipper drum.

6. A log barker-chipper comprising supporting means, a drum chipper mounted on said supporting means and having a drum rotatable about an axis, a rotary ring log barker mounted on said supporting means close to said drum chipper with its rotative axis extending generally perpendicular to the axis of rotation of said chipper drum, log-feed means mounted on said supporting means and operable to move a log lengthwise through the ring of said barker and press its end against the drum of said chipper, drive means operatively connected to rotate the drum of said chipper, an electric generator driven in synchronism with rotation of said chipper drum, first drive means synchronized with rotation of said chipper drum and connected to said log-feed means for driving the same in synchronism with rotation of said chipper drum in a direction to feed a log through said barker to said drum chipper, reversing drive means operatively connected to said log-feed means and operable to drive the same in the direction to move a log away from said chipper drum, and

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electric motor drive means independent of said first drive means, powered by said electric generator means and operatively connected to rotate the barker ring in synchronism with rotation of said chipper drum and movement of said log-feed means feeding a log toward said chipper drum, but deenergizable when said reversing drive means is driving said log feed means in the direction to move a log away from said chipper drum.

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