March 9, 1954 R. L. EFURD, JR., ET AL 2,671,480

ADJUSTABLE CUTTER HEAD FOR BARK-REMOVING MACHINES

Filed June 23, 1948 4 Sheets-Sheet 1

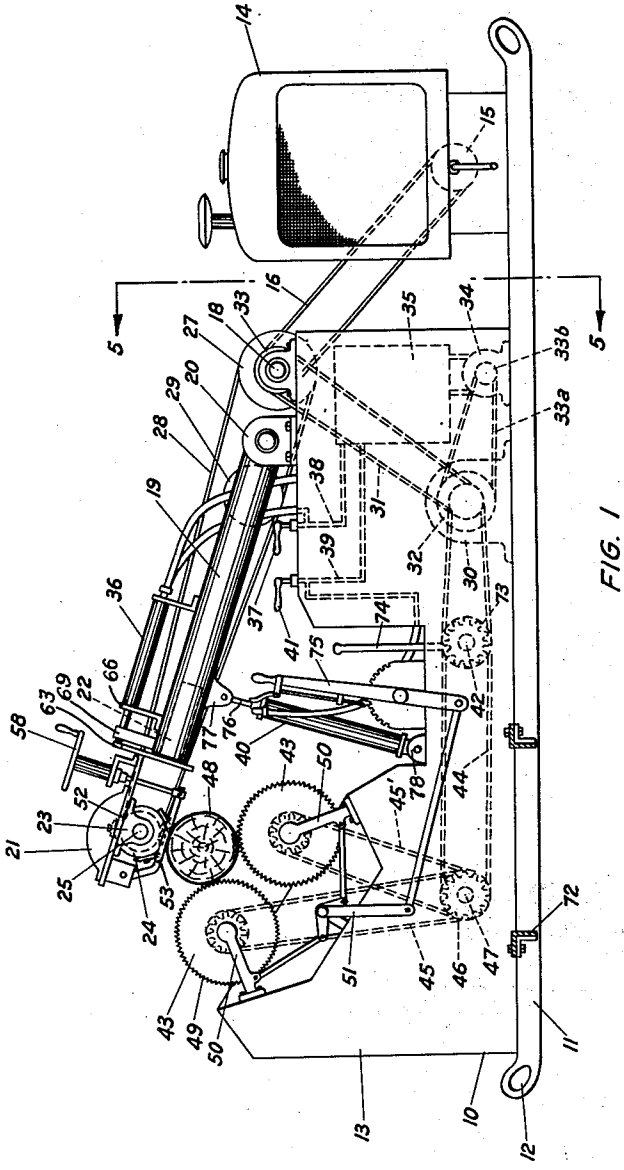


FIG. 1

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Filed June 23, 1948 4 Sheets-Sheet 2

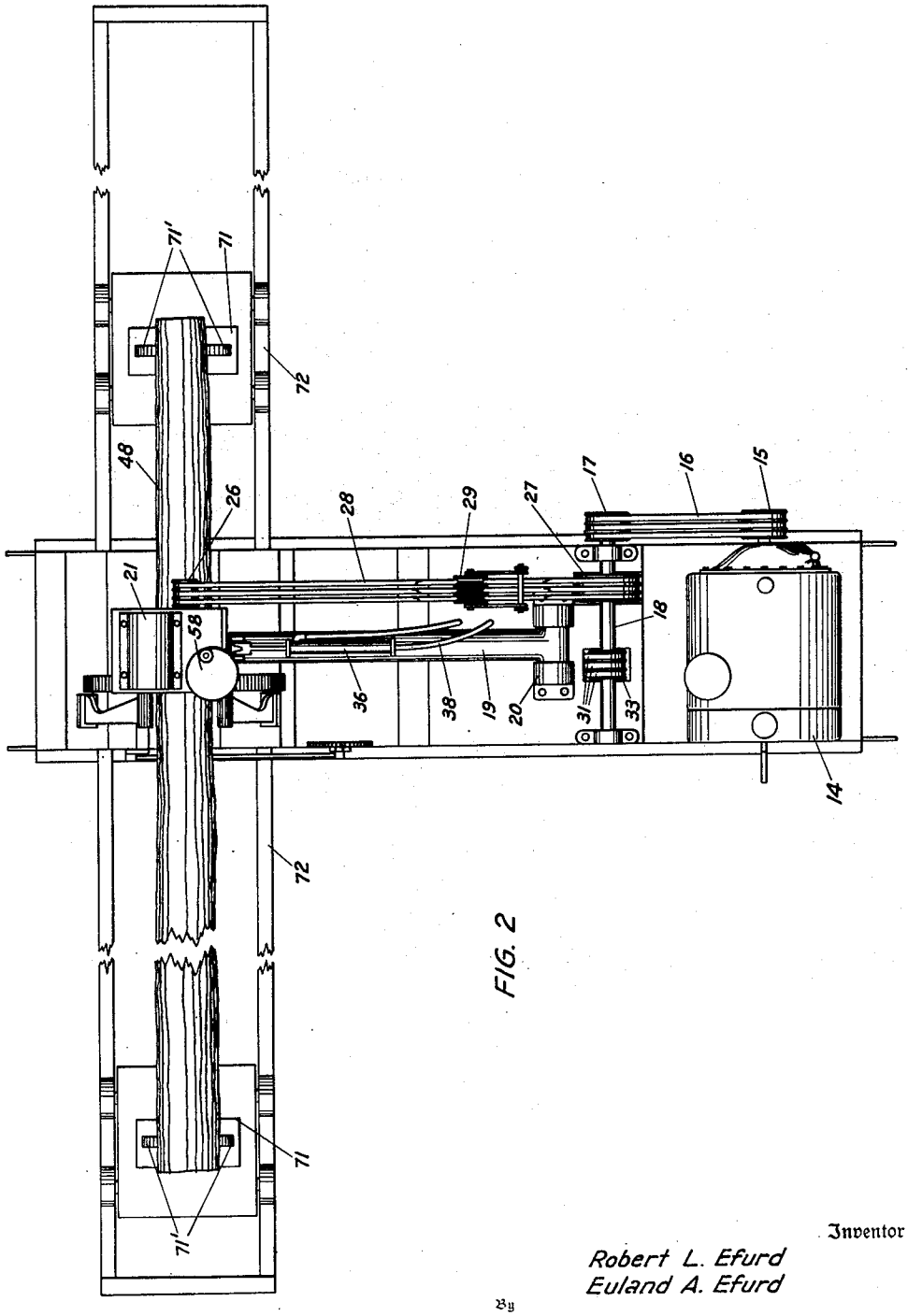


FIG. 2

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ADJUSTABLE CUTTER HEAD FOR BARK-REMOVING MACHINES

Filed June 23, 1948 4 Sheets-Sheet 3

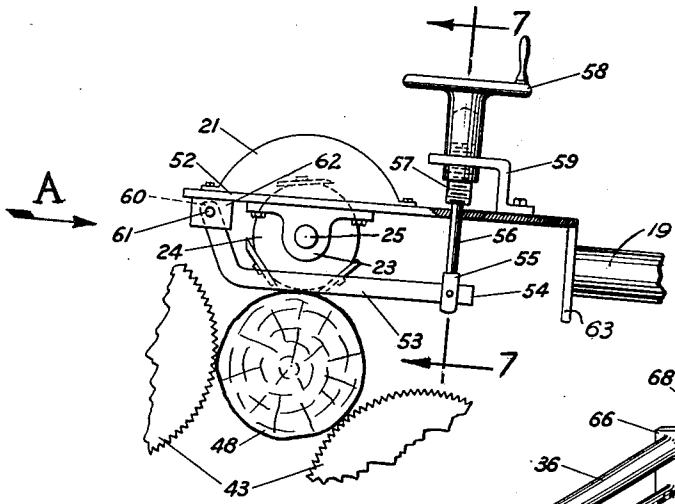


FIG. 3

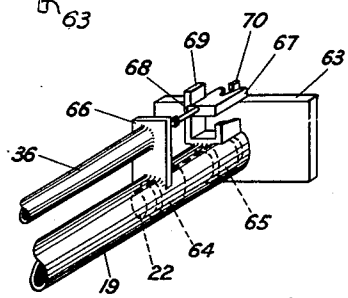


FIG. 4

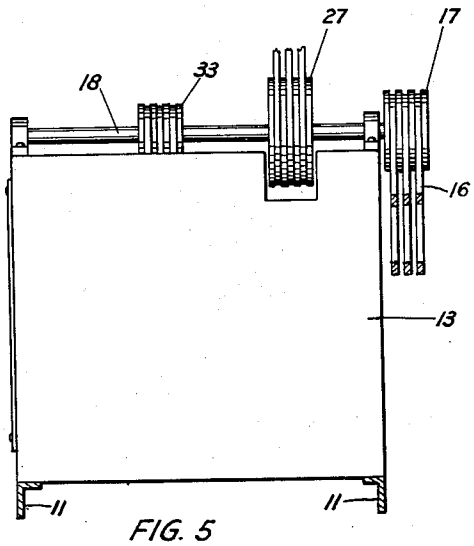


FIG. 5

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ADJUSTABLE CUTTER HEAD FOR BARK-REMOVING MACHINES

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FIG. 6

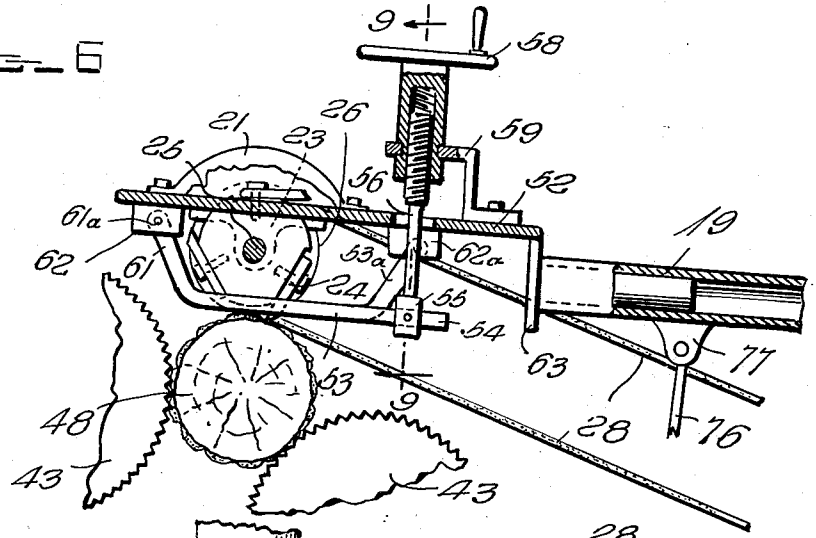


FIG. 7

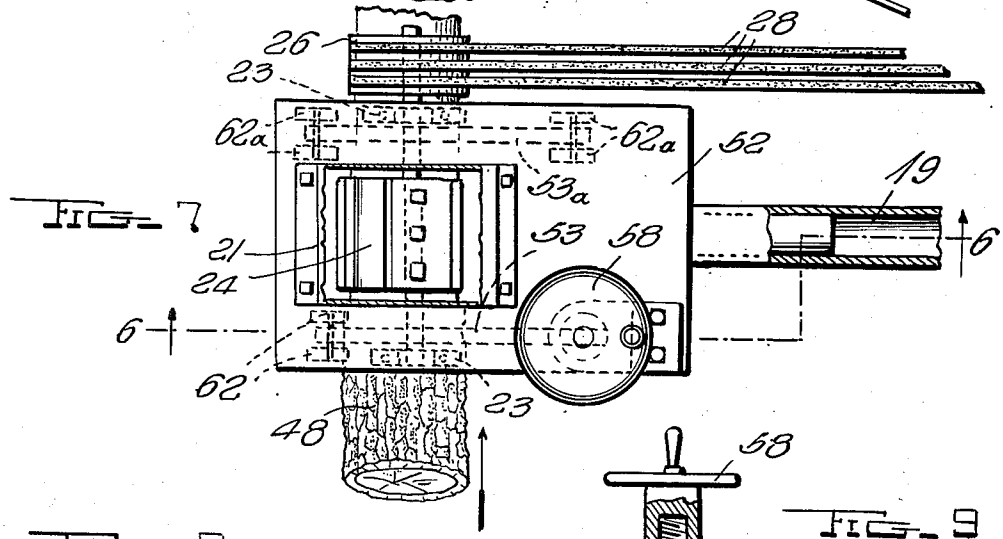


FIG. 8

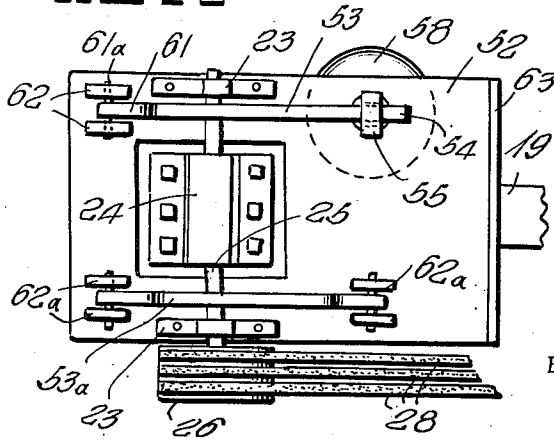
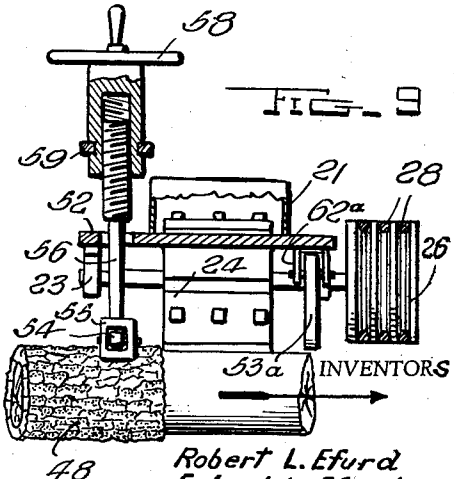


FIG. 9



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UNITED STATES PATENT OFFICE

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ADJUSTABLE CUTTER HEAD FOR BARK-REMOVING MACHINES

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Application June 23, 1948, Serial No. 34,734

5 Claims. (Cl. 144—208)

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Our invention relates to a novel portable machine for disbarking or peeling timber preparatory to the manufacture of poles from the timber.

An object of our invention is to provide a portable debarking machine which is adapted to be transported into forest locations to save the cost and expense in bringing felled timber to a permanently located mill and furthermore save the cost of disposing of the bark waste product incident to the peeling or debarking of the felled timber.

Another object of our invention is to provide a debarking machine with an improved cutting head which is adapted to rotate in its mounting in a vertical plane so that it may follow the longitudinal contours of an irregular shaped log during a debarking operation of the same.

Another object of our invention is to provide a debarking machine which is provided with a cutter head carried by a cutter head support which is actuated by means of a hydraulic cylinder and piston. The cylinder and piston may be operated by the operator of the machine to lift the cutter head off of a log being processed and then to lower the cutter head back on the log in order to skip a protruding branch or other protrusion on a log being debarked by the machine.

Another object of our invention is to provide in debarking machines a cutter head which is provided with an adjustable guide arm for measuring the depth of cut taken by the cutter head, which is rotatably mounted in a cutter head carrying arm that allows the cutter head to follow the longitudinal contours of an irregular log, and which cutter head is further provided with a locking mechanism adapted, when necessary, to hold the cutter head steady in a true horizontal position during a log debarking operation.

Other objects and advantages of our invention will appear in the course of our detailed description of a debarking machine illustrated in our accompanying drawings which embodies our invention, in which:

Figure 1 is a side elevational view of a device embodying our invention in a pole decorticating machine;

Fig. 2 is a top plan view thereof;

Fig. 3 is a broken side view of a manual adjusting mechanism for lowering the cutter onto the log and for setting the depth of cut to be made;

Fig. 4 is a broken isometric view showing an arrangement of the mechanisms for locking the cutter head to prevent it from rolling off the end of the log during a cutting operation;

Fig. 5 is a fragmentary and sectional view of the device as taken on the line 5—5 of Fig. 1.

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Fig. 6 is an enlarged fragmentary longitudinal sectional view of the cutter head taken on line 6—6 of Fig. 7;

Fig. 7 is a fragmentary top plan view of the cutter head shown in Fig. 6;

Fig. 8 is a fragmentary bottom view of the cutter head; and

Fig. 9 is a fragmentary vertical sectional view taken substantially on line 9—9 of Fig. 6.

In Fig. 1 of the drawings numeral 10 designates a frame which consists of spaced runners 11 extending longitudinally for the full length of the device and having their extreme ends formed into eyes 12 by which the entire device may be dragged from place to place or be lifted onto a truck or the like to be moved to various locations.

The main body 13 is a fabricated, sheet metal box arranged to both support and enclose certain of the operating mechanisms.

A gasoline engine 14 is mounted on the rear end of the runners 11 and has its driving flywheel 15 connected by driving belts 16 to a driven pulley 17 mounted on the outer end of a jackshaft 18.

Upon the upper side of the main body 13 is a cutter head beam arm 19 pivotally mounted in bearings 20 and arranged for movement in a vertical plane only with respect to a horizontally positioned log 48 on the front end of the machine.

The cutter head proper 21 is provided with a stub shaft 22 arranged to be slidably inserted into a hollow end of the beam arm 19. Thus the entire cutter head is able to rotate about the shaft axis whereby the cutter blades may follow any uneven surfaces of a log 48.

The cutter head 21 is provided with bearings 23 mounted underneath the same with the cutter blade 24 mounted therebetween and positioned upon a rotatable shaft 25. On the outer end of the shaft 25 is a pulley sheave 26 connected to the rear jackshaft pulley 27 by driving belts 28.

An idler block 29 is conveniently arranged over lower runs of the belts 28 to maintain tension on the driving belts 28 as the beam arm 19 changes positions according to the size of the log being processed.

Inside the hollow main body 13 and positioned beneath the jackshaft 18 is a gear reduction drive 30 connected to the jackshaft 18 by driving belts 31 and pulley sheave 32 connected with the reduction drive 30 and sheave 33 mounted on the inner end of the jackshaft 18.

The high speed side of the gear reduction drive 30 is connected by belts 33*a* and pulleys 33*b* to a small hydraulic pump 34 which maintains pressure within a fluid reservoir 35 also positioned within the sheet metal body 13.

One set of fluid lines 38 from the pressurized reservoir 35 leads to a cylinder 36 mounted on the beam arm 19 and is used for a purpose which will be described later in this specification. Placed within this line is a manually controlled valve 37 used for controlling the operation of the cylinder 36.

The other set of lines 39 leads to another cylinder 40 mounted beneath the beam arm 19 and is provided with a control valve 41. The beam arm or bar 19 may be raised by means of an upwardly extending fluid operated lifting means which includes the cylinder 40 in which a fluid actuated piston is slidably mounted and connected to piston rod 76 that is pivotally connected to the beam arm or bar 19 at 77. The lower end of cylinder 40 pivotally connects with frame 13 at 78 whereby the lifting means may assume angular positions when accommodating to swinging movement of the beam arm or bar 19.

The internally positioned gear reduction drive 30 is also arranged to rotate an intermediate jackshaft 42 which, in turn, drives the bull wheels 43 by driving chains 44, 45, and 45' and by sprockets 46 mounted on a forwardly positioned jackshaft 47.

Each of the bull wheels 43 is swivelly mounted (see Fig. 1) on the fabricated body and spaced apart a sufficient amount to allow a log 48 to be placed in tangential engagement with the peripheries of the bull wheels 43 which are provided with teeth 49 cut across the face and adapted to grip the log 48 to compel the same to turn.

Both of the mounting arms 50 of the bull wheels 43 are connected by a linkage mechanism 51 to a control lever 75 whereby the bull wheels 43 may be manually set to any degree of angularity with respect to the horizontal axis of the positioned log 48. Thus, the log may be drawn under the cutter head 21 at any rate of speed according to the setting of the bull wheels 43 and according to their rate of rotation.

As may be more clearly seen in Fig. 3 of the drawing, the cutter head 21 is provided with bearings 23 mounted on the lower side of a supporting plate 52 and carrying the shaft 25 and the cutter blade 24.

Mounted beneath the cutter head supporting plate 52 is a bent support arm 53 having its inner end 54 pivotally mounted in a yoke 55. The yoke 55 is adapted to receive an end of an adjusting shaft 56 having its upper end formed into a threaded upset adjusting link 57 threadedly engaged by an internally threaded hand wheel 58 swiveled upon a supporting bracket 59 mounted on the plate 52. The forward or outer end 60 of the bent arm 53 is pivotally mounted on a pivot pin 61 supported by brackets 62 attached to the underside of the cutter head supporting plate 52.

It can now be seen that the lower edge of the bent arms 53 is made to tangentially engage the log 48. A similar arm shown at 53*a* is symmetrically arranged along the under surface of the opposite edge of the supporting plate 52 and is mounted in brackets 62*a* in a manner similar to the mounting of arm 53. The arms 53 and 53*a* engage the log 48 and hold the same in position between the two bull wheels 43 and at the same time position the cutter blade 24 is adjusted at any desired depth by use of the adjustable hand wheel 58.

The cutter head 21 is provided with a rear supporting plate 63 (Fig. 4) on which is rigidly mounted the rearwardly extending shaft 22 rotatably mounted in bearings 64 and 65 encased

in the hollow end of the beam arm 19. This means of mounting allows the cutter head to swivel about the beam arm axis and thus follow the uneven surface contours of the log.

Positioned above the beam arm 19 and mounted in a bracket 66, as seen in Fig. 4, is one of the formerly mentioned hydraulic cylinders 36, the purpose of which will now be explained. The forward end of the cylinder's plunger is provided with a flat notched bar 67 arranged in a guiding slot 68 cut on the inner sides of a U-shaped guiding bar 69.

Welded or otherwise attached to the rear supporting plate 63 of the cutter head 21 is a lock pin 70 positioned in alignment with the notched bar 67. It is preferable that the notch in the flat notched bar 67 be made more or less in a V shape in order to guide the notched bar 67 into a locking position with the lock pin 70.

In a cutting operation and as the end of the log 48 nears the cutting blades 24, the operator will engage the hydraulic cylinder 36 by opening the control valve 38. This will advance the cylinder's plunger and force the notch of the flat notched bar 67 into engagement with the locking pin 70, thus preventing any movement of the cutter head 21 about the axis of its shaft 22, when the end of the log is reached. Otherwise the support arm 53 would drop off the end of the log and allow the cutter blade 24 to fall into unsupported engagement with the log and be injured or cause damage to the log 48.

Another feature of the present invention is the provision of a hydraulically controlled cylinder 40 for supporting the beam arm 19. Even though the depth of cut has been set by the manual control wheel 58, extreme variations in the contour of a log may be followed by a skilled operator while the log is being processed, by the use of the control valve 41 which operates the supporting cylinder 40.

With this cylinder 40 the operator may at any time lift the cutter 24 over extreme projections on the log, or may lift the cutter head 21 away from the log altogether. When the arm 19 is again lowered into place the cutting blades 24 will again make the same depth of cut in the log 48 as they did before being lifted because the depth of the cut is governed by the setting arm 53.

The following is an illustration of the use and advantages of a machine made according to the teachings of this invention, the example used being one of an extreme case; that is, where the log 48 to be processed has large knots on the surface, and where its two end diameters vary considerably. Let us assume, as shown in Fig. 2, that the log 48 is positioned on movable carriages 71 which ride on railed track sections 72 positioned on each side of the machine and in a position to align the log 48 to be processed beneath the cutter head 21. These carriages 71 and track sections 72 are constructed in a manner similar to those of the prior art and form no part of this invention. The carriage 71 is provided with vertically disposed rotatable discs 71' between which the log 48 is placed to allow it to be rotated by the bull wheels 43 of the machine.

One end of the log 48 in this example is placed on one of the carriages 71 and the other end of the same is placed on the bull wheels 43. The bull wheels 43 are pivoted by the use of the lever 75 into the same turning plane so that the log 48 is rotated but has no forward movement. The

operator then estimates the depth of the cut necessary to remove the bark on the log 48 and part of the outer growth of sap wood and adjusts the hand wheel 58 accordingly. Now, by the use of the control lever 41 the operator lowers the beam arm 19 and the cutter head 21 toward the log 48 and allows the full weight of the arm to rest upon the support arm 53 of the cutter head 21.

The operator now releases the cutter head 21 from its locked position by the use of the control lever 37 and starts the forward movement of the log 48 by the use of the bull wheel lever 52. This lever 75 separately turns each of the bull wheels 43 into opposite angles with respect to the log 48 and thus permits the peripherially disposed teeth 49 of the bull wheels 43 to draw the log forwardly, that is to say under the cutting head 21.

As the log 48 progresses beneath the cutter blades 24, the cutter head 21, being free to rotate about the beam arm axis, rides over the uneven surface of the log while the spinning blades 24 cut the surface of the log 48 to the depth set by the operator.

Since the forward end (tapered) of the log 48 is much smaller in diameter than the rear end (butt end) of the log, it may be necessary for the operator to gradually raise the cutter blades 24 as the log 48 moves forwardly. To do this, the supporting cylinder 40 is actuated by the control lever 41 and the entire beam arm 19 and cutter head 21 are raised without the necessity of stopping the log 48 or any of the other mechanisms. Also, when an extreme irregularity on the log 48 is reached, such as a protruding knot or improperly trimmed limb, the operator may lift the entire cutter head 21 clear of the log 48 to allow the log to pass and thus prevent injury to the cutting blades 24.

When a sufficient portion of the log has been processed and extends out of the opposite side of the machine, another workman will place the extending end on the opposite carriage 71 to support the log 48.

As the rear end of the log 48 is reached, the operator will reengage the locking cylinder 36 which locks the cutter head 21 to prevent rotative movement as formerly described to allow the log to pass beneath the cutter blades 24 for the finish of the processing.

It is important to note that by simple movements of the easily accessible levers and controls, an operator may stop the movement of the log 48 at any time or position, or may even reverse its movement through the machine. He may also raise or lower the cutting blades 24 to avoid any dangerous irregularities of the log 48 being processed or may even adjust the depth of cut without stopping the machine.

It will be remembered also that the above example was given as an extreme case and that all of such adjustments are not necessary if the logs 48 to be processed possess any reasonable degree of uniformity.

Positioned on the intermediate jackshaft 42 is a manually operable clutch 73 having a conveniently located control lever 74 by which an operator may selectively engage one of two speeds for the bull wheels 43. Each end of the two shafts 42 and 47 are provided with different speed sprockets which drive the bull wheels 43, as shown in Fig. 1. Where the log to be processed is soft pine or some other soft material, the speed may be comparatively high, and where the logs are of oak or some other tough wood, the speed may be accordingly reduced by engaging the lower speed side of the clutch 73.

The machine is solidly constructed in a manner to allow the entire unit to be lifted or drawn upon a truck or other vehicle and moved from place to place without fear of injury to the machine or misalignment of any of the parts. This is highly advantageous since the machine may be placed in the woods where the logs 48 are to be processed thus obviating the necessity of bringing the logs to a mill or factory and the expense of hauling and disposing of the waste connected with the operations.

The compact design of the unit permits all of the aforedescribed adjustments by an operator from a centralized position without having to stop the machine or the operator having to move from his control station.

While we have described in detail the various component parts of the machine and its mode of operation, it is to be understood that this has been by way of example only and that other constructions may be made or the steps in the operations varied without departing from the scope of the invention defined by the following claims.

We claim:

1. In a bark-peeling machine, the combination of a frame, a beam bar pivotally mounted on the frame for movement only in a vertical plane, a cutter head pivotally mounted on the free end of the beam bar for movement about an axis coincident with the longitudinal axis of the beam bar, a rotary cutter blade journaled in said head, a support arm mounted on said cutter head adjacent said cutter blade for establishing contacting relation with the log to be peeled and means for displacing said support arm relative to said cutter blade, and a cutter head locking means including hydraulic means for locking said head in a position in which the axis of rotation of said cutter blade extends horizontally, said head being movable for following longitudinal variations in the contour of a log moved under the cutter head, and fluid-operated means located beneath said beam bar for raising and lowering said beam bar.

2. In a bark-peeling machine, the combination of a frame, a beam bar pivotally mounted on the frame for movement only in a vertical plane, a cutter head pivotally mounted on the free end of the beam bar for movement about an axis coincident with the longitudinal axis of the beam bar, a rotary cutter blade journaled in said head, a support arm mounted on said cutter head adjacent said cutter blade for establishing contacting relation with the log to be peeled and means for displacing said support arm relative to said cutter blade, a cutter head locking means including hydraulic means for locking said head in a position in which the axis of rotation of said cutter blade extends horizontally, said head being movable for following longitudinal variations in the contour of a log moved under the cutter head, fluid-operated means located beneath said beam bar for raising and lowering said beam bar, said locking means including a slidably mounted flat notched bar carried by said beam bar, and a locking pin carried by said cutting head to receive said notched bar for maintaining said head in a predetermined position.

3. In a bark-peeling machine, the combination of a frame, a beam bar pivotally mounted on the frame and movable in a vertical plane, a cutter

head pivotally mounted in the free end of the beam bar, a vertically adjustable and pivotally mounted cutter head support for establishing substantially tangential contact with the log to be peeled and for gauging the depth of cut taken by the cutter head, fluid-operated means located beneath the beam bar for raising and lowering the position of the beam bar, a cutter head locking means including a slidably mounted flat notched bar carried by said beam, a locking pin carried by said cutter head to receive said notched bar, and hydraulic means for controlling the position of said pin.

4. In a bark-peeling machine, the combination of a frame, a beam bar pivotally mounted on the frame and movable in a vertical plane, a cutter head pivotally mounted in the free end of the beam bar, a vertically adjustable and pivotally mounted cutter head support for establishing substantially tangential contact with the log to be peeled and for gauging the depth of cut taken by the cutter head, fluid-operated means located beneath the beam bar for raising and lowering the position of the beam bar, a cutter head locking means including a slidably mounted flat notched bar carried by said beam bar, a locking pin carried by said cutter head to receive said notched bar, hydraulic means for controlling the position of said pin, said fluid-operated means for raising and lowering the position of said beam bar being pivotally mounted on said frame and pivotally connected with said beam bar, whereby said fluid-operated means may assume angular positions in accommodating movements of said beam bar.

5. In a machine for peeling bark from logs, a pivoted beam bar, a transverse plate connected to the end of said bar, a supporting plate connected with said transverse plate, a driven shaft journaled transversely beneath said supporting plate, a rotary cutter carried by said shaft, a support arm extending in parallel relation to one side of said cutter and having one end pivoted on an axis adjacent the under surface of said supporting plate and remote from the connection of said supporting plate with said transverse plate on the end of the beam bar, said support arm being substantially L shaped and having one linearly extending leg exceeding in length the length of the other leg, the longer leg tangentially contacting a log being peeled, and said support arm having its other end located adjacent the connection of said supporting plate to said transverse plate on said beam bar, an adjustable screw extending through said supporting plate and connected at its lower end to the longer leg of said support arm and manually operated means connected to the upper end of said screw for raising or lowering said support arm about the pivot thereof and correspondingly controlling the projection of said rotary cutter below said support arm and the penetration of said cutter into the bark on the log being peeled.

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