Sept. 7, 1954 T. W. NICHOLSON 2,688,349

LOG BARKING MACHINE OF LIGHT FRAME AND HAVING SAFETY MEANS FOR HOLDING THE LOG

Filed Feb. 17, 1950

4 Sheets-Sheet 1

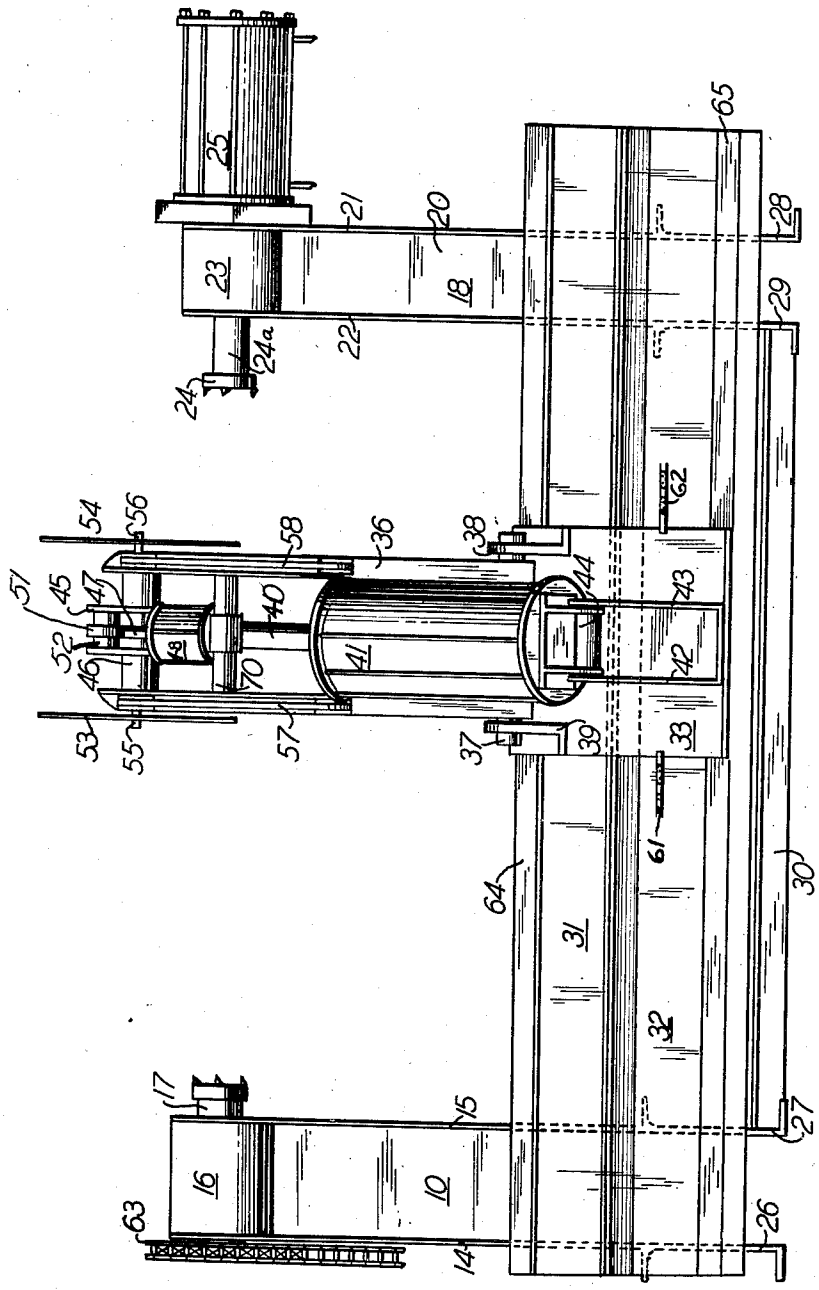


Fig. 1.

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4 Sheets-Sheet 2

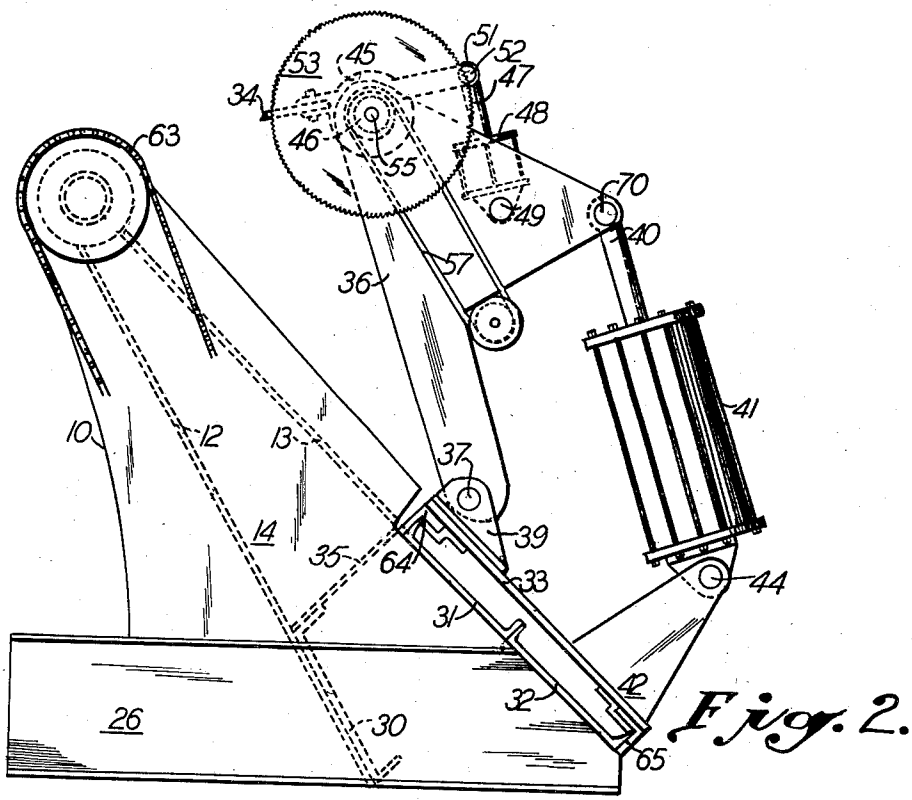


Fig. 2.

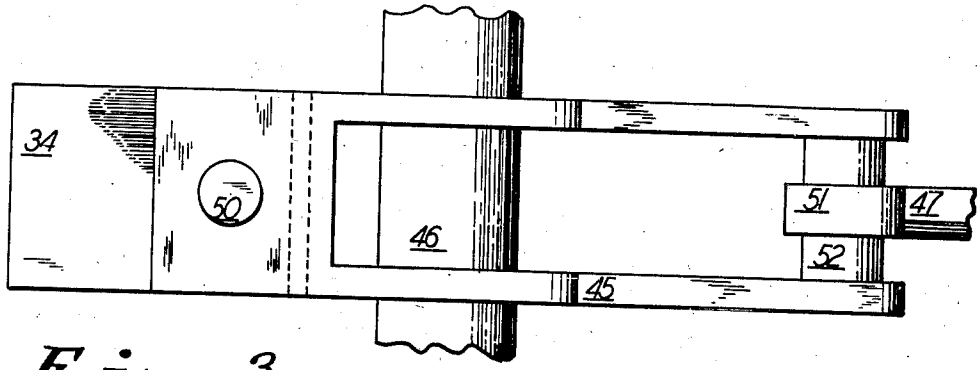


Fig. 3.

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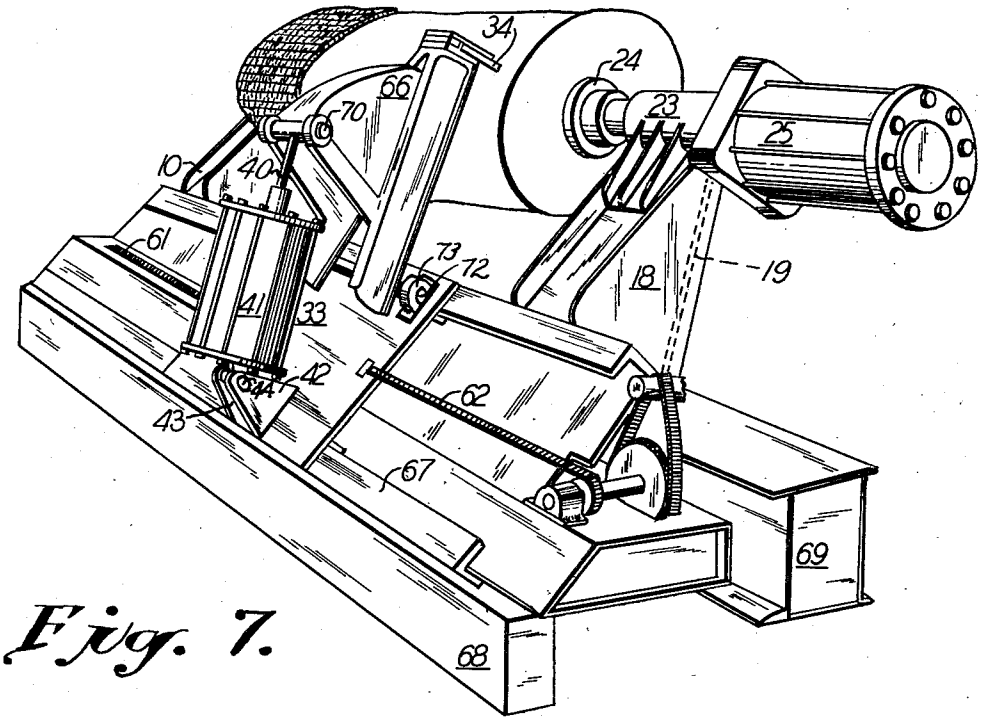


Fig. 7.

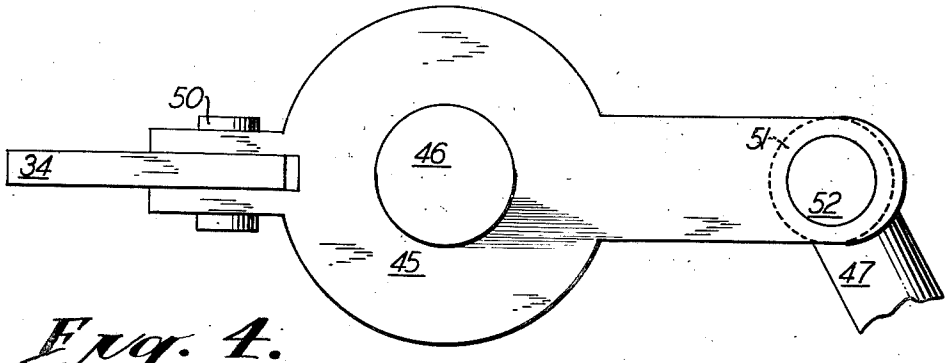


Fig. 4.

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LOG BARKING MACHINE OF LIGHT FRAME AND HAVING SAFETY MEANS FOR HOLDING THE LOG

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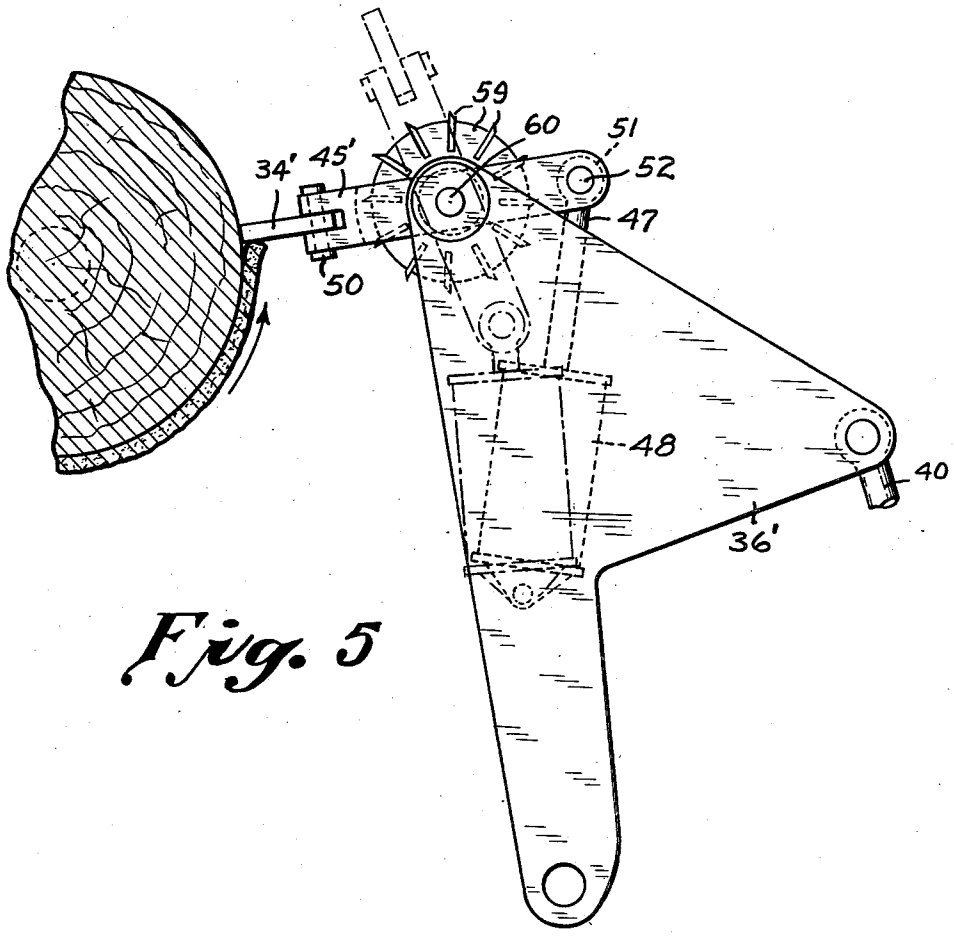


Fig. 5

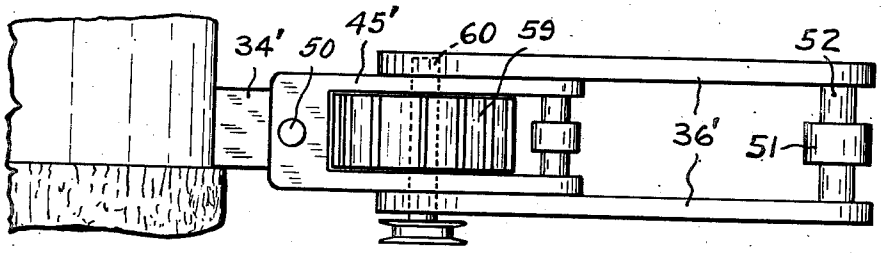


Fig. 6.

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UNITED STATES PATENT OFFICE

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LOG BARKING MACHINE OF LIGHT FRAME AND HAVING SAFETY MEANS FOR HOLDING THE LOG

Thomas W. Nicholson, Seattle, Wash.

Application February 17, 1950, Serial No. 144,676

5 Claims. (Cl. 144—208)

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My invention relates to the art of mechanical log barking machines.

More particularly my invention relates to a log debarking machine characterized by having a relatively light frame relative to the forces developed—said lightness of the frame being made possible by the novel construction provided by my invention, and also characterized by having a knife resiliently held against a rotating log, which knife is pivotally mounted so that it is angularly movable longitudinally of the log.

Also, particularly is my invention characterized by having a bark cutting means operable to cut the bark circumferentially of the log in conjunction and preferably substantially simultaneously with the bark removing knife. My invention is also characterized by providing for a log to be resiliently held in rotating chucks whereby when debarking stresses become too great, the log will be freed from the machine.

In preparing logs for the manufacture of veneer and for the manufacture of pulp, it is necessary that the bark be removed, which bark may vary in thickness from 2" to 4" and even more.

Mechanical barking machines have heretofore been of somewhat limited application due to the great weight of machines prior to mine. A primary object of my invention is to overcome this disadvantage by a functional arrangement of the elements of a barking machine resulting in the elimination of a substantial part of the weight or mass heretofore characteristic of such machines.

In machines of the character described as heretofore commonly constructed, difficulty has been encountered due to the "digging in" of the knife resulting in jamming of the machine and often consequent damage to expensive components of the machine. Another primary object of my invention has been to mount the knife so as to minimize the danger of such "digging in" and to provide safety features resulting in the automatic release of the log where such "digging in" cannot be overcome.

A further difficulty heretofore encountered in the operation of mechanical barking machines has been in the removal of "stringy bark," that is, bark containing long fibers which cause adherence of a long section of bark to the log in resistance to the knife. My invention includes the discovery that by said cutting or sawing of the bark circumferentially that the knife operates to remove very substantially all of the stringy portions of the bark that have heretofore been left on the log.

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Furthermore, cutting of such bark into segments facilitates handling by conveyor means and in bark utilization processes after removal from the log and thereby overcomes the problem heretofore existent in connection with disposal of such bark.

Also, in mechanical barking devices heretofore employed, difficulty has been encountered in removing the bark surrounding knots, depressions and other irregularities in the surface of the log. A primary object of my invention has been to provide the functional combination of knife and cutter head such that the cutter head can be selectively used to remove such knots and other irregularities from the surface of the log which could not be removed by the debarking knife and from which irregularities the knife cannot remove the bark.

Stresses developed in removing the bark of proportions above-mentioned are very great and it is an object of my invention to bring about a counteracting of the forces developed in such operation to have them nullify each other as far as possible and therefore provide for the use of relatively light frame members in novel arrangement.

Furthermore, a primary object of my invention is to provide for a chuck urged against the end of a log by fluid pressure means such that when forces greater than a predetermined magnitude develop, the log is freed from the machine thereby preventing jamming and damage to the machine.

Another primary object of my invention is to resiliently hold the knife against the log with operative pressure of a predetermined magnitude so that rotational stresses exceeding this magnitude will cause the knife to pivotally yield and thereby prevent jamming of the machine. Preferably this is done with two fluid pressure means—one providing for a forcing back of the pivotally mounted tool arm, and the other providing for pivotal or rotational yielding directly of the knife holding member which is mounted on said tool arm.

The above-mentioned general objects of my invention, together with others inherent in the same, are attained by the mechanism illustrated in the following drawings, throughout which drawings like reference numerals indicate like parts:

Figure 1 is a view in front elevation of the preferred form of my invention;

Fig. 2 is a view in end elevation of the machine illustrated in Fig. 1;

Fig. 3 is an enlarged plan view of the knife holding member or knife yoke and knife;

Fig. 4 is a view in side elevation of the knife yoke or knife holding member and knife illustrated in Fig. 3;

Fig. 5 is a view in side elevation of a modified knife yoke or knife holding member and knife provided with a cutter head;

Fig. 6 is a plan view of the same construction as illustrated in Fig. 5; and

Fig. 7 is a view in perspective of a modified form of my invention.

My improvement in barking machine frames can best be illustrated by reference to Figs. 1 and 2.

Drive pedestal 10 is made up of back plate 12 and front plate 13 interconnected by end plate 14 and side plate 15. Plates 12, 13, 14 and 15 carry drive spindle bearing sleeve 16 which provides bearing surface for drive spindle 17.

Likewise, chucking pedestal 18 is similarly formed of back plate 19 (see Figure 7), front plate 20, end plate 21, and side plate 22. Chucking pedestal 18 carries a bearing sleeve 23 which provides bearing surface for a piston rod 24*a*. The idler chuck 24 is rotatably connected with the piston rod 24*a* of cylinder 25, which cylinder 25 may be pneumatically or hydraulically operated. However, for this purpose I have found a pneumatically operated cylinder the more desirable.

Inasmuch as the cylinder and piston construction are of conventional and well-known design, details of said cylinder and piston are neither illustrated nor included in the specification.

Drive pedestal 10 is supported by parallel base beams 26 and 27. Chucking pedestal 18 is supported by parallel base beams 28 and 29.

Longitudinal support member 30 is connected at right angles with base beams 27 and 29. This longitudinal support member 30 is in cross-section inclined transversely to a vertical plane passing through the longitudinal axis of the chucks. It is thus ideally located to take the stress and shock caused by the fall of a log released from the chucking spindle 17 and the chuck 24. Such shock is transmitted along the lateral axis of the longitudinal support member 30.

The carriage track may be preferably formed of track channel members 31 and 32 suitably connected with pedestal front plates 13 and 20 as by welding and connected as by welding to the end portions of base beams 27 and 29. Channel members 31 and 32 are in cross-section inclined toward the vertical plane, through the longitudinal axis of the chucks.

Carriage 33 is carried by the angularly disposed track channel members 31 and 32 whereby the stress developed by the contact of the knife 34 with the log engaged in the machine and rotating counterclockwise with respect to Fig. 2, is resolved into counteracting forces directed substantially in the direction of the axis of the chucks. The carriage 33 is slidably mounted on said tracks 64 and 65 by means of roller chain means 61 and 62, segments of which are illustrated in Fig. 1. The chains are driven by conventional power means, as an electric motor, of standard and conventional design (not shown).

Bark deflector plate 35 runs longitudinally of the machine between drive pedestal 10 and chucking pedestal 18 and is connected with longitudinal support channel 30 and with pedestal front plates 13 and 20 and with track channel member 31.

Tool arm 36 is pivotally mounted on carriage 33 by means of shaft 37 carried by tool arm base brackets 38 and 39.

Pivotal movement of tool arm 36 is governed by piston arm 40 of cylinder 41, which cylinder 41 is pivotally mounted on cylinder base brackets 42 and 43 by means of shaft 44. Cylinder base brackets 42 and 43 are carried by the lower portions of the carriage 33.

Cylinder 41 may be either pneumatically or hydraulically operated. However, I have found a pneumatically operated cylinder best for this particular purpose because of the greater compressibility of air as compared to liquid and the consequent resiliency imparted to the tool arm 36 as it holds the knife 34 against the surface of a log being debarked.

The tool arm 36 is connected to piston arm 40 by means of shaft 70.

Knife yoke or knife holding means 45 pivots on shaft 46. Pivotal movement of knife yoke 45 on shaft 46 is governed by piston arm 47 on cylinder 48, which cylinder may be of either hydraulic or pneumatic operation. Cylinder 48 is pivotally mounted on tool arm 36 by means of shaft 49. This construction permits not only the tool arm 36 to be moved toward and away from a log engaged in the machine by means of cylinder 41 and piston arm 40, but also permits of a supplementary movement of knife 34 toward and away from the surface of the log by means of piston 48 and piston arm 47 independently of tool arm 36. The angle of the knife with respect to the log can therefore be controlled.

Referring now to Figs. 3 and 4, knife 34 is angularly movably mounted in the knife holding member 45 preferably by a pin 50. The angular movement of the knife 34 is limited by the contact of the butt of the knife 34 and the wall of the slot in knife holding member 45 in which the knife is held by pin 50. I have found a fifteen degree angular movement of the knife to be satisfactory.

The end of piston arm 47 forms a bearing sleeve 51 which surrounds shaft 52 thereby connecting piston arm 47 with knife holding member 45.

Saws 53 and 54 may be rotatively mounted on shafts 55 and 56 and driven through belts 57 and 58 by an electric motor mounted on tool arm 36. The motor is of conventional type and design and is therefore neither illustrated nor described.

The modified form of knife holding member 45′ is illustrated in Figs. 5 and 6 in which form a cutter head 59 is mounted on shaft 60 of tool arm 36′ and driven by an electric motor as heretofore described in connection with the driving of saws 53 and 54.

In the modification of my invention illustrated in Fig. 7, the tool arm 66 is pivotally mounted to the carriage 33 by means of shaft 72 carried in tool arm base bracket 73.

The knife 34′ (the knife being of a blunt end form) is angularly movably mounted in the upper portion of tool arm 66.

Tool arm 66 is resiliently urged toward the surface of the log to be debarked by means of cylinder 41 and piston arm 40, which arm 40 is carried by shaft 70.

Pedestals 10 and 18 as well as track 67 are mounted on base beams 68 and 69.

The carriage 33 is slidably movable on track 67 by means of carriage roller chains 61 and 62 driven by conventional power means, as an electric motor (not shown).

Chucking cylinder **25** resiliently urges chuck **24** into the end of the log carried in the machine.

Mode of operation

The mode of operation of my invention is as follows:

A log is hoisted or otherwise conveyed to a position between chucking spindle **17** and the chuck **24** so that the axis of the log approximates the axis of rotation of the chucking spindle **17** and the chuck **24**.

Fluid pressure within the cylinder **25** is then increased thus driving the chuck **24** into the end of the log and forcing the log against the drive spindle **17**. Spindle **17** is then rotated by means of force applied as by an electric motor through roller chain **63**.

The carriage **33** carrying the tool arm **36** may be slidably moved by means of carriage roller chains **61** and **62** until opposite one end portion of the log.

The tool arm **36** may be swung into contact with the log by means of fluid pressure increase in cylinder **41** and consequent outward movement of piston arm **40** as respects the cylinder **41**. The angle of the knife blade may be adjusted by alteration of the fluid pressure in cylinder **48** and consequent movement of piston arm **47** and thereby knife holder **45** to the desired angle with respect to the bark covered surface of the log.

Should it be expected that the bark to be removed will give trouble due to its "stringy" character, the saws **53** and **54** may be employed to make peripheral circumferential cuts in the bark by appropriate correlative swinging movements of the knife arm **45** and the tool arm **36** whereby the saws are placed in operative cutting position against the surface of the log. Knife **34** can be adjusted independently of the saws **53** and **54** by means of cylinder **48** and piston arm **47** as described above.

In the modified form of knife holder illustrated in Figs. 5 and 6, the cutter head **59** may be moved into operative position by movement of the tool arm **36**, the knife being substantially simultaneously removed from operative position by means of piston **48**.

The cutting edge of the knife **34** will tend to follow the surface of the log despite irregularities in the surface because of the angular movement of the knife **34** about the axis of the pin **50**, the cutting edge being rockable longitudinally of the long axis of the log. Thus the knife edge has two adaptations to the surface of the log—one radially of the log, and one longitudinally thereof.

Since the rotation of the log is counterclockwise as shown in Fig. 2, that is, the log is turning upwardly against the knife **34**, any force exerted by the log against the knife **34** in excess of that exerted by the fluid pressure within cylinder **41** or that within cylinder **48** will result in adaptation of the tool arm **36** as a unit or adaptation of knife holding member **45**—the one permitting the tool arm **36** to swing backwardly from the log and the other permitting of a rotational adaptation of the knife with respect to the bark. Should the force of the log against the knife fail to overcome the pressure exerted by fluid pressure means in cylinder **41** or cylinder **48** during jamming, the resiliency in the chuck **24** provided by reason of the fluid pressure means carried by cylinder **25** will result in the freeing of the log from the machine and thus eliminate the danger of damage to the machine as a result of such jamming.

Of course, the fluid pressure within cylinders **41**, **25** and **48** may be adjusted to the desired magnitudes both absolutely and in relation to each other. Adjustable relief valves are preferably provided on each cylinder so that if a counteracting force of predetermined magnitude is transmitted to the piston arm, the arm will automatically yield to such pressure thus eliminating danger of serious injury to the machine due to jamming.

The carriage **33** carrying the tool arm **36** is movable longitudinally of the frame of the machine and the log carried in the machine by means of power-driven chains **61** and **62**, segments of which are shown attached to the carriage in Fig. 1. The carriage driving mechanism is of conventional design and since in the preferred form of my invention it is identical with that shown in the modified form in Fig. 7, it is not described herein or illustrated in detail.

In the event that the knife should "dig into" the bark to an extent that undue strains are developed, provisions have been made for stopping the rotation of the log to avoid what is called "jamming." The fact that the knife, for example **34**, in my invention is pivotally mounted on pin **50**, so as to permit its limited swinging in a plane which contains the longitudinal axis of the log, permits the knife to automatically adjust itself so as to minimize the danger of "jamming." Also, the pivotal mounting of the knife in combination with the cylinder **48** providing for resilient operation, tends to minimize "jamming." I have found that the knife courses along the surface of the rotating log yielding both laterally and vertically to obstructions which in prior machines would result in jamming.

By having the pressure cylinder **41** operating the tool arm and by having the pressure cylinder **48** operating the knife holding member **45**, an advantage is gained from the combination greater than the sum of those components derived from each separately. The overlapping pressures exerted by the combination of the two cylinders results in a more constant contact of the knife **34** with the surface of the log, although such contact is still a yielding or resilient one.

Obviously, changes may be made in the forms, dimensions, and arrangement of the parts of my invention, without departing from the principle thereof, the above setting forth only preferred forms of embodiment.

I claim:

1. In a machine of the character described, a frame comprising end pedestal members, a beam having a track mounted thereon and joining said pedestal members, said beam being transversely inclined to a vertical longitudinally disposed plane through the machine, and a longitudinal support beam joining said pedestals and disposed intermediate the base of said pedestals, said longitudinal support member being in transverse section inclined to said vertical plane; chucking means mounted on the upper end portions of said pedestals, whereby a log to be barked may be rotatively held; driving means connected with one of said chucking means; and a tool carriage slidably mounted on said track, said tool carriage comprising a tool arm pivotally mounted thereon, pneumatic means pivotally carried by said carriage and pivotally connected to said tool arm, whereby said tool arm may be actuated toward the axis of rotation of said chucking means, knife holder means mounted on the upper portion of said tool arm, and a knife angularly movable in said knife holder means.

2. In a machine of the character described, a frame comprising end pedestal members, a beam having a track mounted thereon and joining said pedestal members, said beam being transversely inclined to a vertical longitudinally disposed plane through the machine, and a longitudinal support beam joining said pedestals and disposed intermediate the base of said pedestals, said longitudinal support member being in transverse section inclined to said vertical plane; chucking means mounted on the upper end portions of said pedestals, whereby a log to be barked may be rotatively held; driving means connected with one of said chucking means; fluid operated means connected with one of said chucking means which means is resiliently held by the pressure of said fluid during the debarking operation against the end of said log, whereby said chucking means may be applied to the end of a log and function as a safety means, whereby the development of rotational strains in excess of predetermined magnitude may be prevented; and a tool carriage slidably mounted on said track, said tool carriage comprising a tool arm pivotally mounted thereon, manually controlled pneumatic means pivotally carried by said carriage and pivotally connected to said tool arm, whereby said tool arm may be actuated toward the axis of rotation of said chucking means, knife holder means mounted on the upper portion of said tool arm, and a knife mounted in said knife holder means.

3. In a machine of the character described, a frame comprising end pedestal members, a beam having a track mounted thereon and joining said pedestal members, said beam being transversely inclined to a vertical longitudinally disposed plane through the machine, a longitudinal support beam joining said pedestals and disposed intermediate the base of said pedestals, said longitudinal support member being in transverse section inclined to said vertical plane; chucking means mounted on the upper end portions of said pedestals, whereby a log to be barked may be rotatively held; a carriage slidably mounted on said track; a tool arm pivotally mounted on the upper portion of said carriage; knife holder means mounted on the upper portion of said tool arm; a knife disposed in said knife holder means and a fluid pressure means connecting said tool arm to the lower portion of said carriage, whereby a knife in said knife holder means may be held against a log being debarked and whereby any forces that may be developed by contact of the knife with the rotating log, are cushioned by said fluid pressure means, so that a relatively light frame may be used.

4. In a machine of the character described, a

frame comprising end pedestal members, and a beam having a track mounted thereon and joining said pedestal members, said beam being transversely inclined to a vertically longitudinally disposed plane through the machine; chucking means mounted on the upper end portions of said pedestals, whereby a log to be barked may be rotatively held; driving means connected with one of said chucking means; and a tool carriage slidably mounted on said track, said tool carriage comprising a tool arm pivotally mounted thereon, pneumatic means pivotally carried by said carriage and pivotally connected to said tool arm, whereby said tool arm may be actuated towards the longitudinal axis of rotation of said log, knife holder means mounted on the upper portion of said tool arm, and a knife mounted in said knife holder means.

5. In a log barking machine the combination of a pivotally mounted tool arm; fluid pressure means connected with said tool arm whereby said tool arm may be resiliently actuated towards and away from the log being debarked in a plane radially disposed with respect to the longitudinal axis of said log; a knife holding member having a knife mounting recess of rectangular form; a knife of rectangular form and less size mounted in said knife holding member recess by a pivot, the pivotal axis of which extends in a direction substantially at right angles to the plane of the knife; and a chucking mechanism having a chucking spindle, pneumatic means automatically resiliently urging said spindle into a log and acting as a safety means while said log is being debarked, whereby when the strains develop upon the chucking means exceed a predetermined amount said pneumatic means operates as a safety means in releasing said log from the chucking means.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
198,327	Winn	Dec. 18, 1877
871,296	Russell et al.	Nov. 19, 1907
1,051,460	Simpson	Jan. 28, 1913
2,328,545	Bukowsky	Sept. 7, 1943
2,382,896	Medcoff	Aug. 14, 1945
2,453,947	Swift	Nov. 16, 1948
2,477,922	Emery et al.	Aug. 2, 1949
2,576,967	Pauley et al.	Dec. 4, 1951

FOREIGN PATENTS

Number	Country	Date
522,701	Germany	Apr. 13, 1931