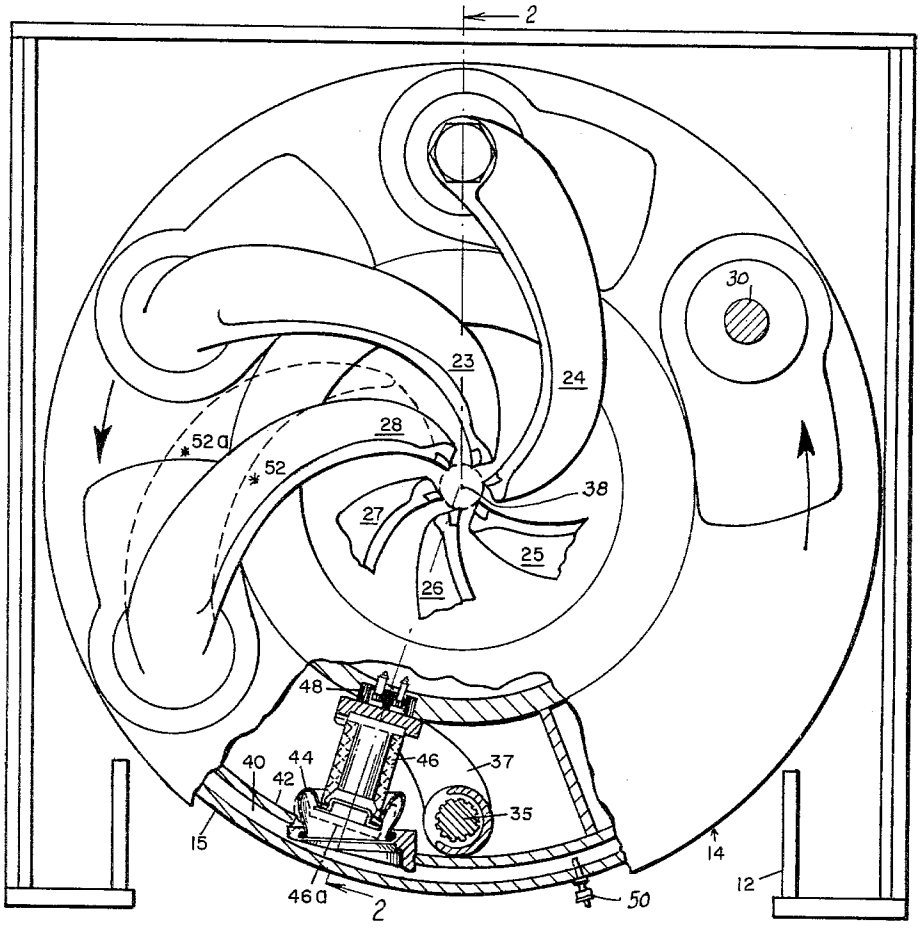
Feb. 22, 1966 J. P. RICH ETAL 3,236,273

BARKER

Filed March 18, 1963 2 Sheets-Sheet 1

FIG. 1



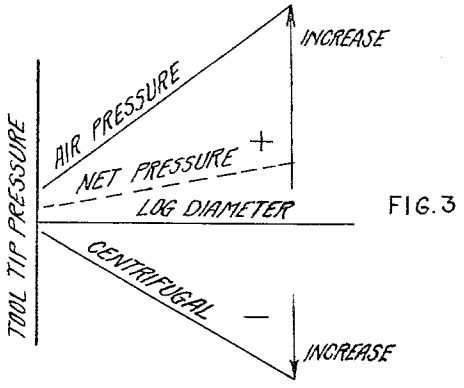


FIG. 3

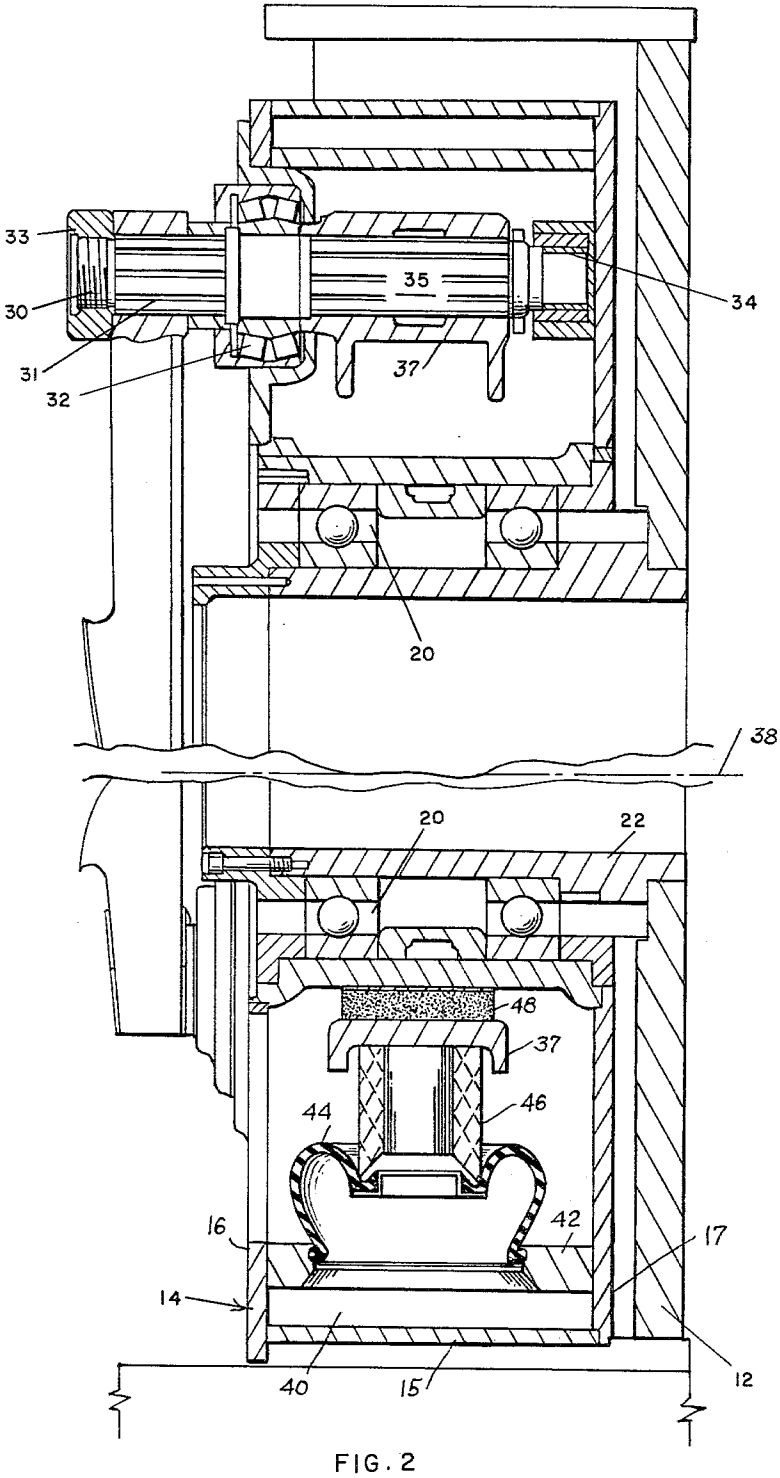


FIG. 2

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BARKER
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This invention relates to apparatus for removing bark from logs, and more particularly to barking machines of the type in which a plurality of pressure operated barking tools are carried by a rotatable hollow head, the log being fed through the center of the head for barking by tools elastically pressed against the log.

In such machines, the problem of providing optimum tool tip pressures over a wide range of log diameters has not heretofore been solved. The usual spring arrangements, for example, resulted in an undesirable increase in tool tip pressures as the springs were wound up upon an increase in log diameter. This resulted in a machine which was unable to bark both small and large diameter logs without readjustment, that is, one, which when adjusted to properly bark logs of an intermediate size, failed to remove bark from logs of small diameter because of too low tool tip pressures and which damaged the wood of logs of large diameter because of too high tool tip pressures.

Accordingly, it is a major object of the present invention to provide a novel barking apparatus of the hollow head type wherein a predetermined barking tool pressure may be applied to a log of any diameter, so that such pressure may be made uniform throughout a range of log diameters, or may be made to vary as desired, for example, to decrease as log diameter increases, or the contrary.

In one aspect of the invention, novel fluid pressure means are provided for urging a plurality of angularly spaced, pivotally mounted tool arms toward the axis of the rotating head. Such means comprises an annular fluid pressurized chamber having an inner wall mounted on said head, with a plurality of angularly spaced fluid pressure actuated means, preferably fluid springs, mounted on said inner wall, each fluid spring having its movable element connected to an arm at a point normally urging the tool mounted on the end of each arm toward the axis of the rotating head to provide the necessary barking force. It is a particular feature of the arrangement of the invention that the volume between the displaced positions of said fluid pressure actuated means be a fraction, preferably of the order of one fifth, of the volume of said annular chamber to provide a predetermined barking force regardless of log diameter.

In another aspect of the invention, the centrifugal forces produced by the rotation of the head are utilized to modify the barking force created by fluid or other means by creating a force in opposition to it which will increase at increasing log diameters and so may provide a successively larger modification in barking force. This is accomplished by providing a barking tool arm extending radially inwardly and having its effective center of centrifugal force displaced in a rearward direction relatively to the direction of rotation of said head from a radial line between its pivotal mounting and the axis of rotation of said head to urge said tool means away from said axis by reason of centrifugal force acting upon said arm upon rotation of said head, the increase in centrifugal force created upon outward movement of said arm thus modifying the tool barking forces created by said fluid pressure actuated means to establish a predetermined relationship between the tool barking force and log diameter, generally uniform, including slightly increasing or decreasing as desired.

The various objects and features of the invention will be fully understood from the following detailed description, together with the accompanying drawings of a preferred embodiment thereof.

In the drawings:

FIG. 1 is an end view partly broken away of the apparatus of the invention:

FIG. 2 is a side sectional view taken on the line 2—2 of FIG. 1; and

FIG. 3 is a diagram of barking force plotted against log diameter for typical apparatus according to the invention.

Referring to the drawings, a stationary frame **12** supports the rotatable head, generally designated **14**, which may be driven by any suitable means (not shown). Other apparatus, not herein shown or described, being well known in the art, are provided for feeding logs therethrough.

The rotatable head **14** is generally of annular shape of rectangular box section being made up of peripheral wall **15**, and end walls **16**, **17** and is mounted by means of suitable bearings **20** on the outer surface of a hollow cylindrical bearing support member **22** mounted on frame **12**.

The barking tools, of which six are shown in the present embodiment, are designated **23–28**. In general, these tools each consist of an arm member each having a tool tip for log barking. The arm members are each mounted on a shaft **30** which is supported in head **14** by suitable spaced bearings **32**, **34**. Shaft **30** is preferably provided with a splined cantilever end portion **31** onto which a mating spline of a tool arm **23–28** will fit and may be retained by any suitable means such as nut **33**. Shaft **30** is also provided with another splined portion **35**, on which is supported inner arm **37** which, in effect, together with shaft **30** and the cooperating one of arms **23–28**, forms a unitary lever arm through which forces are applied for barking. These elements as so far described, are well known to the art and form no part of the present invention, except as to certain modifications thereof as hereinafter set forth.

According to the present invention, the primary barking forces are provided by novel fluid means for urging the pivotally mounted tool arms **23–28** toward the axis of the rotatable head **14**, such axis being designated **38**. To this end, the rotating head **14** is provided with an inner wall **42** extending therearound between side walls **16**, **17** and spaced radially inwardly from outer peripheral wall **15**. Such inner wall **42**, together with end walls **16**, **17** and outer wall **15** provides an annular sealed chamber **40** within which a substantial volume of pressurized air may be introduced and maintained by means of a suitable valve **50**. Mounted in inner wall **42** in communication with chamber **40** are a plurality of elastic fluid springs **44**, one being provided adjacent each tool arm assembly for operation thereof, each of said fluid springs to this end having its inner element or piston **46** attached to inner arm **37**. Since the point of attachment of piston **46** to arm **37** is angularly displaced from the pivot point of shaft **30**, and on the same side of the pivot as is tool arm **23–28**, since such tool arms extend in a rearward direction relatively to the direction of rotation of head **14** as shown by the arrows in FIG. 1, a radially inward force applied to arm **37** will urge its arm **23–28** radially inwardly as well. For limiting the degree of movement of a tool arm **23–28** toward the axis **38** of the head **14**, a rubber stop **48** is provided, the fluid spring piston **46** being shown in contact with such stop in the drawings. However, at the outermost opening of an arm, as shown in dotted lines in connection with arm **28** in FIG. 1, the piston **46** assumes a position spaced radially outwardly from stop **48**, as shown at **46A** in FIG. 1.

Turning now to the utilization of the centrifugal forces

created on tools 23–28 in the novel manner according to the invention, it may be noted in FIG. 1 that such tools extend both radially inwardly and in a rearward direction relatively to the direction of rotation of the head as shown by the arrows in FIG. 1, so that they are displaced angularly relatively to their pivot shafts 30. Thus, their effective centers of centrifugal force, at point 52 on arm 28, for example, are displaced from a radial line between the pivotal mounting of arm 28 on shaft 30 and the axis of rotation 38 of head 14. Under these circumstances, upon rotation of the head, a radial outward force acting through point 52 will be created which force will tend to swing arm 28 outwardly about its pivot shaft 30 in opposition to the pneumatic force imposed on arm 28 by the air pressurized in chamber 40. Furthermore as the center of gravity 52 of an arm is moved radially outwardly, by an increase in log diameter, for example, to the position 52A shown in connection with the dotted line position of arm 28 in FIG. 1, the centrifugal force will increase, so that the centrifugal force in opposition to the air pressure force on an arm will tend to increase at increasing log diameter. This is shown in the graphical presentation of FIG. 3, wherein the air and centrifugal forces are plotted separately, as well as combined to provide an optimum log barking force at a given log diameter.

In operation, with the head 14 being rotated in the direction of the arrows in FIG. 1, the arms 23–28 will be maintained in their position shown in FIG. 1 by means of air pressure in the chamber, the pistons 46 resting against their stops 48 to prevent the tool tips from striking one another.

When a log is fed endwise through the head 14 by suitable log feeding devices not herein shown, the tool edges engage the peripheral corner of the oncoming log and are automatically swung outwardly and onto the surface of the log being fed, pressure being maintained on the tool tip to bark the logs by reason of the pressure in the annular fluid chamber acting through fluid springs 44, pistons 46 and the log barking arms, such pneumatic force throughout the range of log diameter being substantially greater than centrifugal forces created in opposition by the rotation of the arms.

Nevertheless, in accordance with the present invention, the centrifugal force is an important factor in providing a uniform tool barking force and, preferably, one which increases but slightly with an increase in log diameter. To this end, the effect of the volume of the annular chamber 40 in relation to the volume between the maximum and minimium piston and fluid spring positions must be considered, since, with the pistons in their innermost position nearest to axis 38, as shown in FIG. 1, the volume of the chamber 40 will be greater than it will be with the pistons displaced in their outermost position 46A. This change in volume will cause a change in air pressure which will in turn cause a change in tool tip pressure to affect but a slight increase in tool tip pressure as log diameter increases. The volume of the annular chamber 40 should be made so that the piston and fluid spring displacement will be a fraction, preferably of the order of one fifth, of the volume of the annular chamber.

Any remaining effect of air pressure increase on log diameter may be eliminated, according to the present invention, as is shown in FIG. 3, by utilizing centrifugal forces created in the rotating arms in such a direction as to oppose the fluid pressure forces, as has been explained hereinbefore. By this means, the increase in fluid force upon outward swinging of the arms due to an increase in log diameter can be greater than the increase in centrifugal forces so that the overall effect can be, and preferably is, to increase only slightly the tool tip forces throughout their range upon an increase in log diameter, as may be seen from the curve of FIG. 3.

This unique utilization of log barking forces, in accordance with the principles of the invention, makes possible for the first time a log barker of the rotating hollow head type wherein optimum log barking forces may be provided regardless of log diameter. Thus, with the apparatus according to the present invention, there need be no adjustment for optimum barking throughout the entire range of log sizes which the apparatus is capable of receiving. Various modifications within the spirit of the invention and the scope of the appended claims will be apparent to those skilled in this art.

What is claimed is:

1. In a barking machine of the hollow head type in which a log is fed through the head so as to be barked:

a stationary frame

a rotatable hollow head rotatably supported by the frame

a plurality of angularly spaced tool means each including an arm pivotally mounted on the head, said arm extending radially inwardly and having its effective center of centrifugal force displaced in a rearward direction relatively to the direction of rotation of said head from a radial line between its pivotal mounting and the axis of rotation of said head providing progressively increasing centrifugal force as said arm is moved radially outwardly as said tool means is moved away from said axis by introduction of logs of increasing diameter

fluid pressure means including annular pressurized chamber means normally closed to any external pressure source having wall means mounted on said head, a plurality of angularly spaced pressure actuated means each including a fluid diaphragm spring mounted on said wall means and having its movable element connected to a said arm at a point normally urging said tool means toward said axis, the volume size of the fluid actuated means and the annular chamber being related so that the volume between the displaced positions of said pressure actuated means is not more than about one fifth of the volume of said annular chamber providing a progressively increasing fluid force as said arms are moved radially outwardly throughout the range of log diameter, the progressive increase of said fluid force being in excess of and opposite to the progressive increase in centrifugal force created upon outward movement of said arm to modify the barking force to establish a generally uniform predetermined relationship between barking force and log diameter providing a generally uniform barking force with increasing log diameter.

2. In a barking machine as claimed in claim 1, wherein said predetermined relationship provides a slightly increasing barking force with increasing log diameter.

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