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FLUID PRESSURE OPERATED MECHANISM FOR ACTUATING
THE DEBARKING TOOLS OF A DEBARKING
MACHINE OF THE ROTARY-RING TYPE

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3 Sheets-Sheet 1

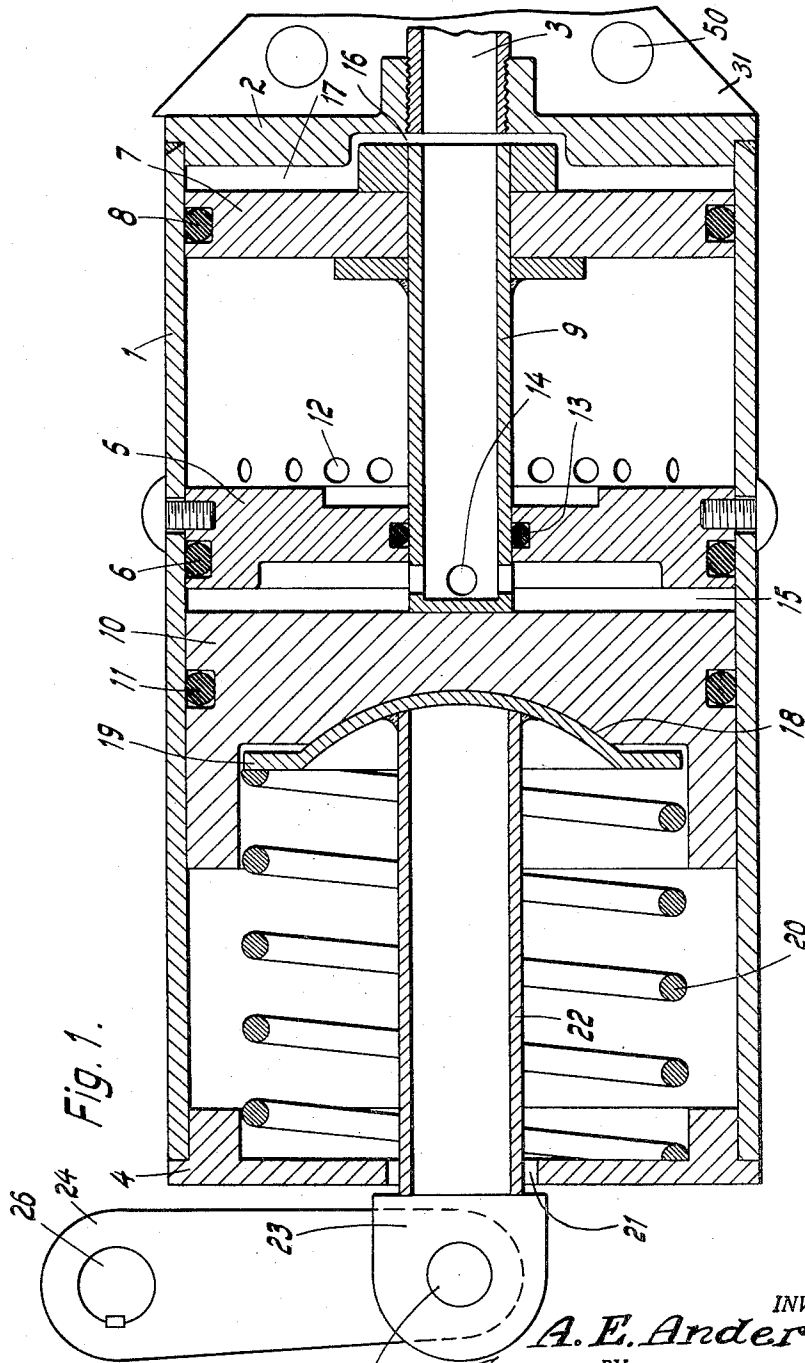


Fig. 1.

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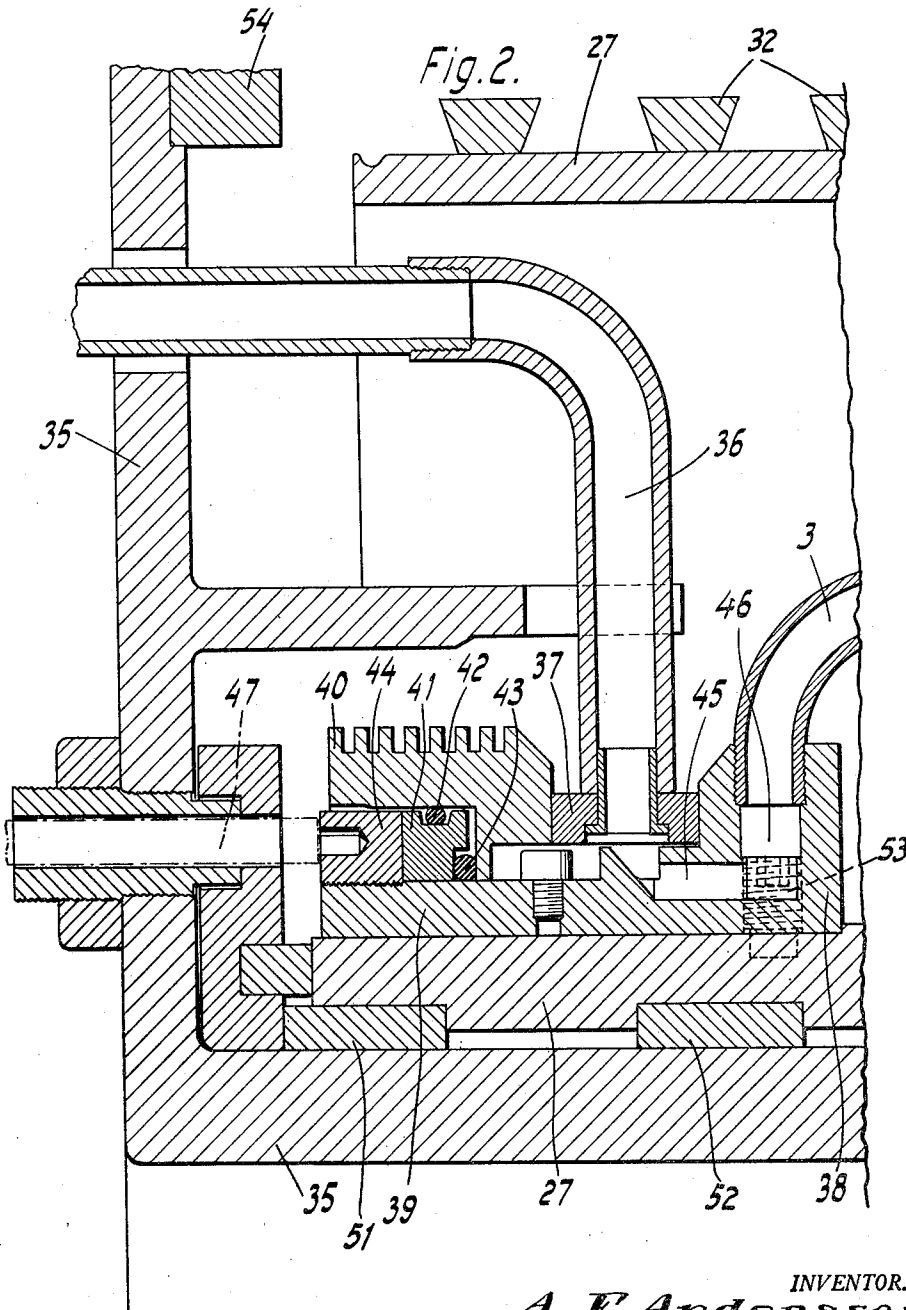
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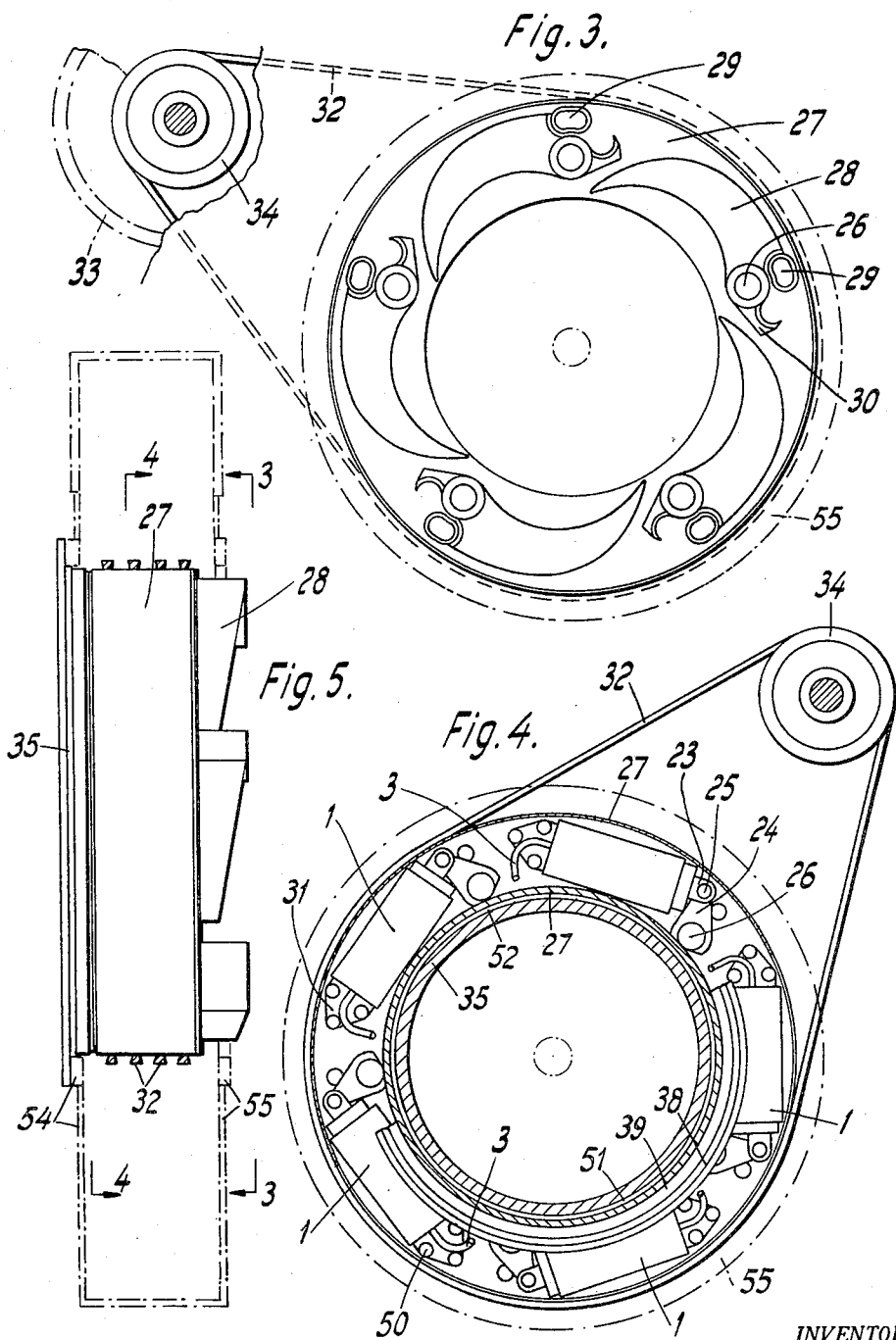
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FLUID PRESSURE OPERATED MECHANISM FOR ACTUATING THE DEBARKING TOOLS OF A DEBARKING MACHINE OF THE ROTARY-RING TYPE

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2 Claims. (Cl. 144-208)

The present invention relates to improvements in fluid pressure operated mechanisms for actuating the debarking tools of a debarking machine of the rotary ring type.

During the operation of such debarking machines it is desirable that the actuating pressure on the debarking tools be rapidly relieved or unloaded when changing from debarking large diameter logs to debarking logs of smaller dimension and to permit the arms carrying the debarking tools to be rapidly opened to provide a maximum gap when shutting off the liquid or gaseous pressure medium.

In such machines it has further proved to be very difficult, in certain cases, to attain the required actuating force within the space available for the cylinders of the pistons actuating the tools.

By the arrangement according to the present invention these demands have been carried out in an effective manner and the invention is principally characterized thereby, that the cylinder for each debarking tool, fed by the liquid or gaseous pressure medium, is provided with at least two cooperating pistons located in line with each other, each of said pistons being actuated by the pressure medium, the pressure action of said pistons being counteracted by a compression spring acting against one of said pistons.

Other characteristic features of the invention will be further explained in connection with the description of an embodiment of the arrangement illustrated on the attached drawings, in which:

FIG. 1 shows a longitudinal sectional elevation of an embodiment of the invention,

FIG. 2 illustrates the arrangement for feeding air under pressure to the cylinder arrangement shown in FIG. 1,

FIG. 3 shows the infeed side of a rotor of a debarking machine of rotary-ring type, having swingable debarking tools,

FIG. 4 shows the opposite side of said rotor illustrating the arrangement according to the invention for actuating the tools,

FIG. 5 is a view of the rotor seen from the side.

In the embodiment illustrated in FIG. 1 a cylindrical body or housing is designated by 1. At one end of this cylinder there is fixed by welding an end plate 2, into which opens a pipe 3 for supplying a liquid or gaseous pressure medium, preferably compressed air. At the opposite end of this cylinder 1 is detachably fixed an end plate 4. The cylinder 1 is divided into two chambers by means of a detachable partition wall 5, which at its circumference is provided with a groove into which is placed an O-ring 6 of synthetic rubber to guarantee tightening between these two chambers. A piston 7 is displaceable in each cylinder 1, and at the circumference of each piston 7 there is an O-ring 8 of synthetic rubber. To each piston 7 is welded a centrally arranged hollow piston rod 9, which with its free end bears against another piston 10 in the cylinder 1, and at the circumference of each piston 10 there is an O-ring 11 of synthetic rubber acting as a seal. Between the piston 7 and the partition wall 5 there are provided several holes 12 in the cylinder 1 intended for the draining of the right-hand

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chamber, FIGURE 1. In the partition wall 5, which is provided with a hole for the passage of the piston rod 9 there is provided an O-ring 13 of synthetic rubber sealing against the exterior of piston rod 9. At the free end of the pipe 9 there are four radial holes 14 for the passage of the pressure medium to the space 15 between the piston 10 and the partition wall 5. Between the opposite end of the rod 9 and the end plate 2 there is a space 16 which permits the supply of pressure medium to the chamber 17 between the end plate 2 and the piston 7. The face of piston 10 remote from rod 9 is provided with a spherical depression 18 serving as bearing for a washer 19 complementarily shaped to fit in said depression, against which bares a compression spring 20, the opposite end of which is biased against the inner face of end plate 4. In this end plate there is a central hole 21, through which a piston rod 22, which is welded to the washer 19, can freely move. The spherical contact of the washer 19 with the piston 10 permits a certain angular deviation of the rod 22 and is replacing a piston pivot. As is clear from the drawing the cross sectional area of the central opening 21 is greater than the cross sectional area of piston rod 22 so as to accommodate the angular deviation or movement of the rod with respect to the piston and cylinder. The free end of the rod 22 is fork-shaped with two shanks 23 in which is journalled an arm 24 by means of a bolt 25. The arm 24 is fixed to a shaft 26, which is journalled in the rotor 27 and on its opposite end carries a swingable arm 28, the free end of which is shaped as a debarking tool. Reference character 29 designates a cushion of rubber against which each arm 30 abuts when the tool arm 28 swings downwards toward the center line of the rotor. The end plate of the cylinder 1 is provided with a flange 31 for fastening of each cylinder to the end wall of the rotor 27. This rotor is driven by a belt means 32 trained over a pulley means 34 driven by an electric motor 33 (indicated by dotted lines).

As to be seen from FIG. 2 the rotor 27 is journalled on bearing rings 51, 52 in a stator 35 of which a part is illustrated in said figure. The compressed air is supplied by means of a pipe 36 in the stator 35, the free end of said pipe opening in a stationary ring shaped member 37 of inelastic material having good frictional properties. This ring shaped member 37 is in contact by one of its sides with a radial flange 38 of a ring shaped member 39 fixed to and rotating with the rotor 27 by stop pin means 53, while the opposite side of the stationary member 37 is in contact with a ring shaped member 40 axially displaceable on the ring shaped member 39. An O-ring 42 serves as a sealing means. The axially movable member 40 is held pressed against the member 37 by means of an O-ring 43 of synthetic rubber actuated by an axially displaceable ring shaped member 41, whereby the member 41 in its turn is axially adjusted by means of a member 44 threaded on the member 39. From the pipe 36 the pressure air passes through a channel 45 provided in the flange 38 of the ring shaped member 39 to an outlet 46 for communicating with the pipe 3. The details of the sealing means and supply arrangement for feeding air to the tubes 3 for the respective cylinders are further disclosed in Patent No. 2,945,706, dated July 19, 1960. To effect actual adjustment of the ring shaped member 44 the stator 35 is provided with an apertures to accommodate a pin means 47 shown diagrammatically. The outer face of the ring 44 is provided with a bore which when spaced in alignment with the aperture in the stator will receive the pin means 47. The ring 44 is then held fast and the rotor turned by hand to effect axial movement of ring 44 relative to ring member 39 so as to compress the O-ring 43.

The object of the compression spring 20 is as men-

tioned above to more or less relieve or unload the actuating pressure on the debarking tool when changing over to debarking of logs having smaller dimensions and for rapidly bringing the tools to a position to expose a maximum gap when shutting off the pressure medium, which is very advantageous also when the debarking machine is brought to a standstill. The arrangement with two pistons located in line with each other results in almost double the actuating force of one piston of same diameter, which, due to the limited space available for the cylinder, is particularly favorable. By arranging still more independent pistons in line with each other and separately actuating them by the pressure medium it is evident that the effect can be further increased while maintaining same diameter of the cylinders, whereby the supply of the pressure medium can be made by means of pipes provided on the outside of the cylinders. The invention further contemplates the provision of means co-operably related between the second piston 10 and the second piston rod means 22 permitting limited angular movement of the second piston rod with respect to the second piston.

The embodiment illustrated is to be considered as an example and it is evident that the same can be varied in different ways within the scope of the invention.

What I claim is:

1. In a debarking machine of the type wherein logs are fed axially to and through the machine, a frame, a rotor carried by such frame, a plurality of debarking tools mounted on the infeed side of such rotor for swinging movement about axes parallel to the axis of the rotor, lever means connected to the tools and means for moving such lever means in opposite directions to effect inward and outward movement of the tools with respect to the axis of the rotor comprising for each lever means a cylinder including opposite ends, a partition within the cylinder dividing the cylinder into two-piston-accommodating chambers, means for admitting fluid under pressure into the chamber at one end of the cylinder, the other end of the cylinder having an opening therethrough, a first piston within the chamber at said one end of the cylinder, a second piston within the other chamber, said partition having an opening therein, said second piston having a head facing said last-mentioned opening, a hollow piston rod extending through and connected to the piston in the chamber at said one end of the cylinder, and also extending away from said one end of the cylinder through the opening in the partition and terminating in a free end bearing against the head of the second piston, said hollow piston rod having openings therein adjacent its free end whereby fluid under pressure can flow through the hollow piston rod and act directly on said second piston, said second piston having a spherical depression in the face thereof remote from said one end of the cylinder, a complementary shaped washer seated in said depression, piston rod means connected to said washer and extending away from said second piston through the opening in the other end of said cylinder and connected to said lever means exteriorly of said cylinder, and spring means biased directly between said other end of the cylinder and said washer, whereby fluid under pressure moves said first piston and said second piston and said hollow piston rod in its movement applies pressure to the head of said second piston so that the force of both pistons is applied to said lever means to swing said tools inwardly and apply log debarking pressure thereto and when fluid pressure is relieved said spring means moves said second piston which in turn moves said hollow piston rod and thus said first piston towards said one end of the cylinder to impart opposite movement to said lever means to swing said

tools outwardly to expose a maximum opening in the rotor.

2. In a debarking machine of the type in which logs are fed axially to and through the machine for debarking purposes, a rotor structure including an annular member disposed perpendicular to the axis of the rotor, a plurality of tool-carrying shafts carried by such annular member and having their axes parallel to the axis of the rotor, debarking tool means carried by such shafts on the infeed side of said member, lever means connected to said shafts on the side of said annular member opposite said debarking tool means, and means for moving such lever means in opposite directions to effect inward and outward movement of the tools with respect to the axis of the rotor comprising for each lever means a cylinder including opposite ends, a partition within the cylinder dividing the cylinder into two piston-accommodating chambers, means for admitting fluid under pressure into the chamber at one end of the cylinder, the other end of the cylinder having an opening therethrough, a first piston within the chamber at said one end of the cylinder, a second piston within the other chamber, said partition having an opening therein, said second piston having a head facing said last-mentioned opening, a hollow piston rod extending through and connected to the piston in the chamber at said one end of the cylinder, and also extending away from said one end of the cylinder through the opening in the partition and terminating in a free end bearing against the head of the second piston, said hollow piston rod having openings therein adjacent its free end whereby fluid under pressure can flow through the hollow piston rod and act directly on said second piston, second piston rod means, means co-operatively related between said second piston and said second piston rod means permitting limited angular movement of said second piston rod means with respect to said second piston, said second piston rod means including a portion extending away from said second piston through the opening in the other end of said cylinder and connected to said lever means exteriorly of said cylinder, said opening in the other end of the cylinder having greater cross sectional area than the cross sectional area of said second piston rod means so as to accommodate, said limited angular movement, and spring means biased between said other end of the cylinder and the means cooperatively related between said second piston and said second piston rod means whereby fluid under pressure moves said first piston and said second piston and said hollow piston rod in its movement applies pressure to the head of said second piston so that the force of both pistons is applied to said lever means to swing said tools inwardly and apply log debarking pressure thereto and when fluid pressure is relieved said spring means moves said second piston which in turn moves said hollow piston rod and thus said first piston towards said one end of the cylinder to impart opposite movement to said lever means to swing said tools outwardly to expose a maximum opening in the rotor.

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