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TAPERING MECHANISM FOR SAWMILL KNEES

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2 Sheets-Sheet 1

Fig. 1.

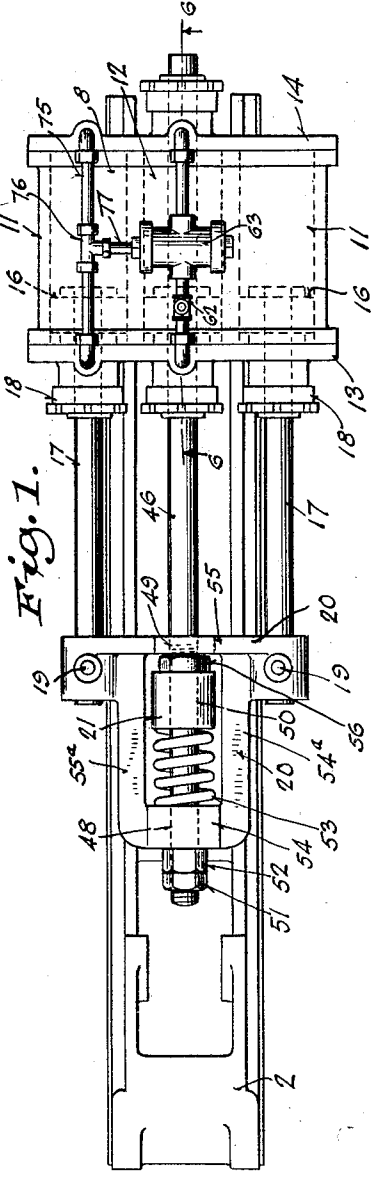
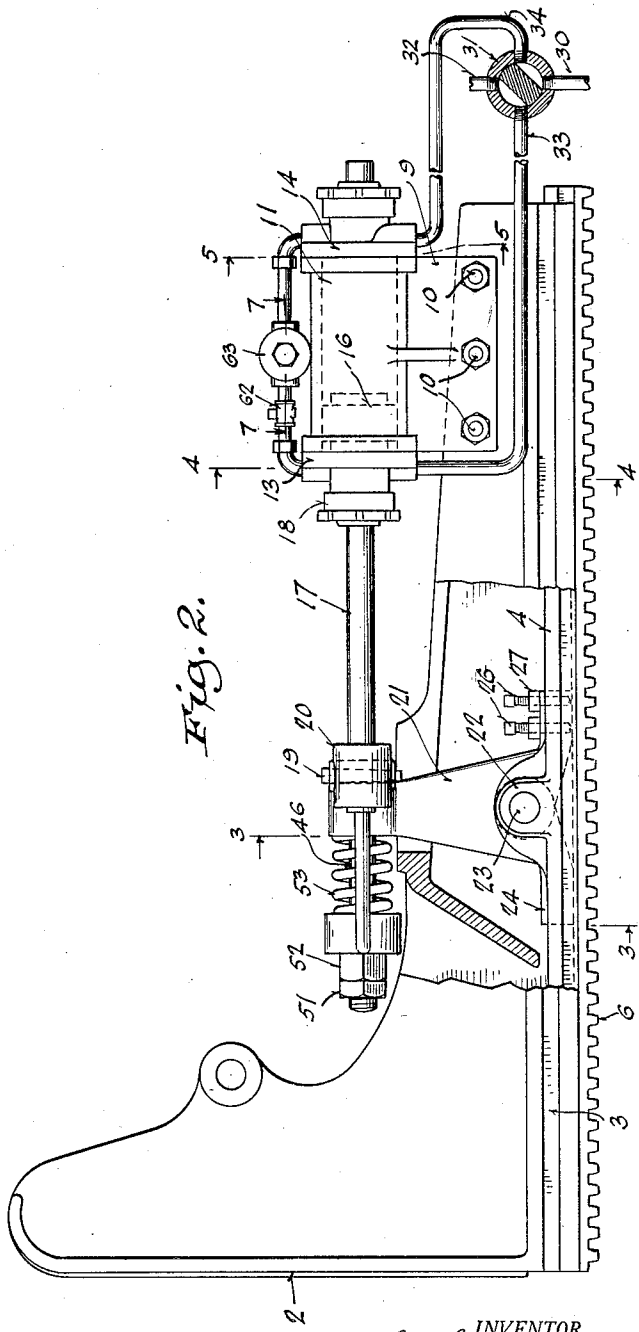


Fig. 2.



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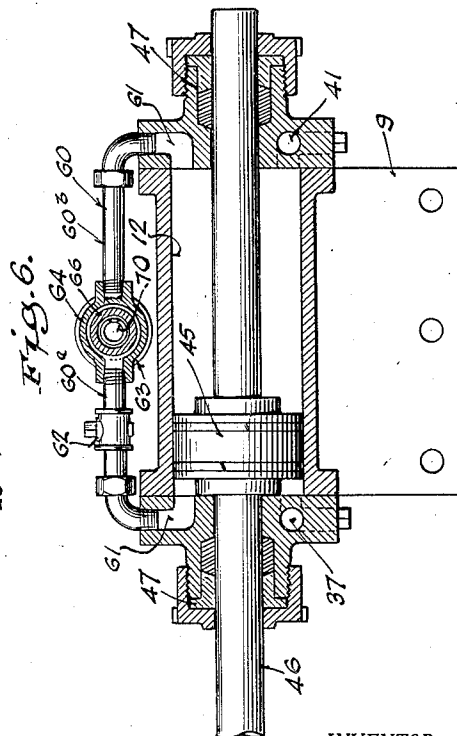
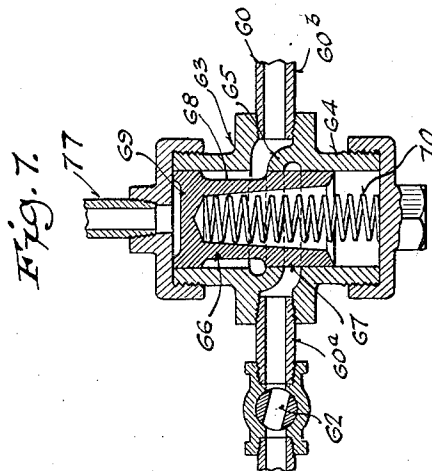
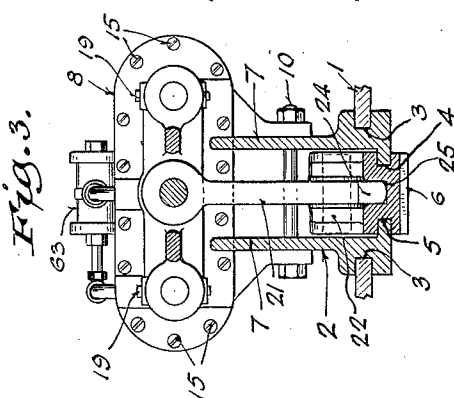
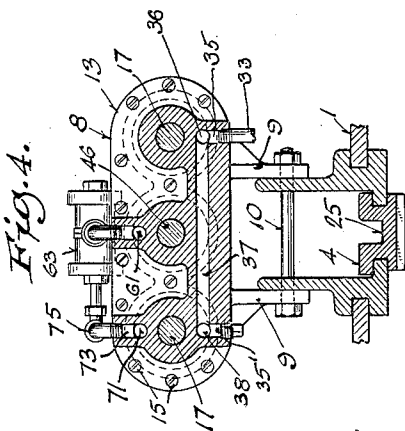
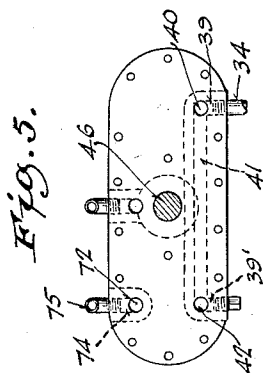
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2 Sheets-Sheet 2



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TAPERING MECHANISM FOR SAWMILL KNEES

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This invention relates to a tapering mechanism for the knees of saw mill carriages.

An object of the invention is to provide a tapering mechanism of this character wherein the tapering movement is imparted to the knees by power means, and yet the knees are automatically held in any position to which they are adjusted.

Another object is to provide a tapering mechanism which is simple and durable in construction, reliable, effective and readily controllable in operation and easy and comparatively inexpensive to manufacture.

A further object is to provide a tapering mechanism embodying cushioning means for absorbing the shocks and strains to which the knees are subjected, and especially for absorbing the shocks incident to the impact of the log with the knees.

In carrying out the present invention the knees on the saw mill are mounted on the head blocks for movement transversely of the carriage in the usual manner, and the slides, which may be racks, are fitted in the base of the knee for sliding movement in the conventional way. These slides are actuated from a set shaft, and the tapering is effected by adjusting the knees relative to the slides or racks.

In its broader aspects the present invention proposes the provision of fluid pressure actuated power means between the knee and the slide for moving the knee relative to the slide and in conjunction with this fluid pressure actuated power means utilizes holding means which tends to and unless released, does maintain the knee in fixed position relative to the slide. The holding means may comprise a cylinder fixed to the knee and a piston operating in the cylinder and connected with the slide. In the cylinder of the holding means a confined fluid is contained, and the cylinder and the piston of the holding means when moved relative to each other encounter the resistance of the confined fluid. A bypass, preferably somewhat restricted, is provided around the piston of the holding means, and in this bypass a shut-off valve is placed. The shut-off valve is biased to close position and is closed at all times except when

fluid pressure is applied to the power means, whereupon the shut-off valve is automatically opened by the fluid pressure as it is subjected to the action of the fluid pressure. The connection between the pistons of the power means and the slide or rack embodies suitable cushioning means such as a spring which serves to take up shocks and relieves the tapering mechanism and other elements of the saw mill of the stress incident to such shocks.

Other objects and advantages reside in certain novel features of the construction, arrangement and combination of parts which will be hereinafter more fully described and particularly pointed out in the appended claims, reference being had to the accompanying drawings forming a part of this specification, and in which:

Figure 1 is a plan view showing a knee of a saw mill equipped with a tapering mechanism embodying the present invention.

Figure 2 is a view partly in side elevation and partly in section further showing the knee and tapering mechanism of Figure 1.

Figures 3, 4 and 5 are views in transverse section taken on lines 3—3, 4—4 and 5—5 respectively of Figure 2.

Figure 6 is a view partly in side elevation and partly in section taken on line 6—6 of Figure 1, and

Figure 7 is a fragmentary view in horizontal section taken on line 7—7 of Figure 2 and illustrating the construction of the metering valve and pressure controlled shut-off valve of the bypass associated with the holding cylinder.

Referring to the drawings, the numeral 1 (see Figures 3 and 4) designates a portion of the head block of a saw mill carriage. A knee is designated generally at 2 and has guides 3 in its base, the guides 3 being slidably interfitted with the portions 1 of the head block. A slide 4 is also slidably interfitted as at 5 with the base of the knee to permit the knee to partake of tapering movement, that is, sliding movement back and forth along and relative to the slide 4. This slide 4 is shown as having on its under face a rack 6 designed for coaction with the pinion (not shown) on the usual set shaft. It

is to be understood, however, that the slide 4 may be actuated from the set shaft in any conventional manner.

As illustrated to advantage in Figures 3 and 4, the knee 2 has side plates 7 and on these side plates 7 a cylinder assembly indicated generally at 8 is mounted by means of depending attaching brackets 9 integrally formed with or otherwise rigidly secured to the cylinder assembly and bolted as at 10 to the side plate 7 of the knee.

The cylinder assembly 8 includes two power cylinders 11, one at each side of the assembly, and an intermediate holding cylinder 12 located between the power cylinders 11. End plates or heads 13 and 14 are provided for the cylinder assembly and are fastened in position by any suitable means, as for instance by stud bolts 15. Suitable packing, such as the usual gaskets, may be interposed between the ends of the cylinder assembly 8 and the heads 13 and 14. In each power cylinder 11 a power piston 16 is operatively fitted, each power piston having a piston rod 17 slidable through a stuffing box 18 provided on the head 13.

The piston rods 17 are fixed, as for example, by means of pins 19 to a cross head designated generally at 20, and the cross head is connected in a manner which will be hereinafter more fully described with the upper end of a standard 21. The base of the standard 21 is received between apertured ears 22 provided on the slide 4 and within a groove 25 formed in the slide 4, the standard being secured to the ears 22 by a pin 23 which passes through the ears 22 and through the standard. The base of the standard 21 is somewhat elongated, and one end 24 of the elongated base bears against the base of the groove 25, while the other end of the elongated base has set screws 26 threaded therethrough and held in adjusted position by nuts 27. The lower ends of the set screws are rounded and bear against the bottom of the groove 25 to secure the standard 21 in proper position on the slide 4.

Means is provided for supplying fluid under pressure, such as compressed air, to the power cylinders 11, and consists of a fluid pressure supply line 30 leading from any suitable source of fluid under pressure to a control valve 31 which may be of any suitable conventional type. The control valve 31 has a vent 32 leading to the atmosphere and also connects with pipes 33 and 34 leading to the cylinder heads 13 and 14 respectively (see Figure 2). As shown in Figure 4, the pipe 33 communicates with a short vertical passage 35 provided in the front cylinder head 13, and this passage 35 communicates directly with a port 36 leading into the front end of the cylinder 11 on one side of the assembly. The passage 35 also communicates with a transverse branch passage 37,

which in turn communicates with a port 38 leading into the forward end of the other power cylinder 11. Similarly, the pipe 34 communicates with a short passage 39 in the rearward cylinder head 14 and the passage 39 directly connects with a port 40 leading into the rearward end of one power cylinder 11. The passage 39 also communicates with a transverse branch passage 41 which in turn connects with a port 42 leading into the rearward end of the other power cylinder 11. To make the heads 13 and 14 interchangeable they are formed with plugged passages 35' and 39' communicating with ports 38 and 42 respectively. With this arrangement the valve 31 may be adjusted to simultaneously admit fluid pressure to the forward ends of both power cylinders, and to permit the fluid pressure to exhaust from the rearward ends of both power cylinders, thereby causing the cylinders and the knee to move forwardly, the knee being advanced toward the saw line. Then again, the valve 31 may be adjusted to admit fluid pressure to the rearward end of both power cylinders 11 and permit the fluid pressure to exhaust from the forward ends of both power cylinders 11, whereby cylinders 11 are moved rearwardly and the knee retracted.

For the purpose of holding the knee in any adjustment a piston 45 is operatively fitted in the cylinder 12 (see Figure 6) and has a piston rod 46 secured thereto and projecting through stuffing boxes 47 provided on the heads 13 and 14 of the cylinder assembly.

The cylinder 12 is filled with oil or other incompressible fluid which, being confined, holds the piston 45 and cylinder 12 against relative movement and consequently prevents movement of the cylinder 12 and the knee 2 relative to the slide 4.

The forward end of the piston rod 46 is extended through openings 48 and 49 provided therefor in the front and rear cross members 54 and 55 respectively of the cross head 20, and also through an opening 50 provided in the upper end of the standard 21, the piston rod slidably fitting in the openings 48 and 50 but passing freely through the much larger opening 49. As shown, the upper end of the standard 21 is located in the space between the front and rear cross members 54 and 55 and the side members 54^a and 55^a of the crosshead 20. The forward extremity of the piston rod 46 projects beyond the front cross member 54 of the crosshead and has nuts 51 and 52 threaded thereon, the nut 52 engaging the cross head and the nut 51 engaging the nut 52. A coil spring 53 encircles the portion of the piston rod 46 located between (and also engages) the forward cross member 54 of the crosshead 20 and the upper end of the standard 21.

The rearward face of the upper end of the standard 21 is engageable with a stop nut 56

suitably fixed to the piston rod 46, this nut 56 limiting the forward movement of the crosshead 20 relative to the standard 21. Figure 1 shows the crosshead 20, standard 21 and nut 56 in the normal or rest position of these parts. Upon impact of a log on the face of the knee 2, the knee and cylinder assembly are forced rearwardly and exert a rearward thrust or pull on the piston rods 46 and 17. The shock of this force or thrust is taken up by the spring 53, which yields slightly at this time. As the spring 53 yields the crosshead 20 moves rearwardly relative to the standard 21, the piston rod 46 sliding through the standard 21. However, immediately after impact, the spring again expands and moves the crosshead 20, piston rods 17 and 46, the cylinder assembly 8 and the knee 2 forwardly until the stop nut 56 engages the standard 21. The opening 49 is larger than the nut 56 to allow nut 56 to pass through the opening in the assembly. It is to be understood that in lining up the knees the nuts 51 and 52 may either be backed off to some extent or may be tightened up as may be necessary to effect the required adjustment. This arrangement of the crosshead 20, standard 21, nuts 51 and 52, spring 53 and stop nut 56 also provides a cushioning connection between the knee 2 and the rack or slide 4.

In order to permit movement of the knee 2 at the proper time a bypass 60 is provided and extends from one end of the cylinder 12 to the other, the bypass communicating with the cylinder through passages 61 in the cylinder heads 13 and 14. In this bypass 60, a metering valve 62 of any suitable construction is incorporated to restrict the passage of fluid through the bypass to a desirable degree.

A pressure controlled shut-off valve 63 is also incorporated in the bypass 60 and comprises a valve casing 64 having a ported partition 65 therein. The sections 60^a and 60^b of the bypass 60 communicate with the interior of the valve casing 64 on the opposite sides of the partition 65. A piston valve 66 is fitted in the casing 64 for sliding movement, and it has a portion 67 of such size and so machined or otherwise formed as to snugly engage the inner periphery of the lower portion of the valve casing and also the inner periphery of the ported partition 65 to block the passage in the valve casing and shut off any flow of fluid in the bypass in the closed position of the valve. Above this portion 67, the valve 66 has a peripheral recess 68 which, when the valve is lowered to align the recess 68 with the partition 65 permits the oil or other fluid to flow past the ported partition 65 and through the valve casing and consequently also through the bypass. The upper end of the piston valve 66 is closed by a head 69. An expansible coil spring 70 is positioned

in the valve casing 63 with one end engaging the lower end of the valve casing and its other end engaging the head 69 of the piston valve 66, whereby the spring 70 serves to move the valve to the closed position shown in Figure 7, wherein the portion 67 of the valve blocks the flow of oil through the bypass.

To cause the valve 66 to be automatically opened when sufficient fluid pressure is supplied to either end of the power cylinders to cause tapering, the heads 13 and 14 of the power cylinders have ports 71 and 72 therein (see Figures 4 and 5), the ports 71 and 72 communicating with passages 73 and 74, which in turn communicate with the ends of a pipe 75. A T 76 is incorporated in the pipe 75 and communicates with a pipe 77 which leads into the valve casing 63 adjacent the head 69 of the valve 66. Thus, whenever fluid pressure is supplied to the cylinders 11, it flows into one end or the other of the pipe 75, and from the pipe 75 into the pipe 77 and acts on the head 69 of the piston valve 66 to move the valve 66 against the action of the spring 70 whereby to open the valve 66 and the bypass 60. This permits the oil to pass from one end of the cylinder 12 to the other, and consequently permits the cylinder 12 to move relative to its piston 45. Until the cylinder 12 is free to move, the power cylinders are locked in position thereby, but with the arrangement described, whenever the valve 31 is manipulated to admit fluid under pressure to the power cylinders, the bypass is automatically opened to release the holding means. However, even when the bypass is opened, the metering valve 62 continues to exercise its function to check the movement of the cylinders and knee, thereby insuring an even and steady motion and preventing the setting up of undesirable momentum in the moving parts or a high rate of flow in the oil. As soon as the valve 31 is turned to a position to shut off the supply of fluid pressure the spring 70 automatically closes the valve 66, thereby blocking the bypass and locking the parts in adjusted position.

The invention claimed is:

1. A tapering device for a sawmill knee having a slide through which the knee is set and comprising power and check cylinders fixed to the knee, pistons fitted in the cylinders and having piston rods projecting exteriorly thereof, a cross head fixed to one or more power cylinder piston rods, a check cylinder piston rod being slidable through said cross head, means for limiting the movement in one direction of said last mentioned piston rod relative to the cross head, a standard fixed to the slide and having an opening in which said last mentioned piston rod is slidably fitted, a spring between the standard and the cross head, and means for limiting the movement in one direction of the last mentioned piston rod relative to the standard.

2. A tapering device for sawmill knees having a slide through which the knee is set and comprising power and check cylinders fixed to the knee, pistons fitted in the cylinders and having piston rods projecting exteriorly thereof, a cross head fixed to one or more power cylinder piston rods, said cross head including front and rear cross members and a lengthwise opening between said cross members, said cross members also having openings through which a check cylinder piston rod extends, adjustable means on the forward end of said last mentioned piston rod engageable with the front cross member for limiting the movement in one direction of said last mentioned piston rod relative to the cross head, a standard fixed to the slide and projecting up into the lengthwise opening of the cross head, said standard having an opening at its upper end in which the last mentioned piston rod is slidably fitted, a spring on the last mentioned piston rod having one end abutting the front cross member of the cross head and having its other end abutting the standard, and a stop collar secured to the last mentioned piston rod and engageable with the standard, the rear cross member having its opening sufficiently large to permit of passage of said stop collar there-through.

In witness whereof, we hereto affix our signatures.

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STANLEY B. LANGILL.

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