Nov. 10, 1925. 1,561,341

F. E. MARTIN

TAPERING MECHANISM

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Fig. 1.

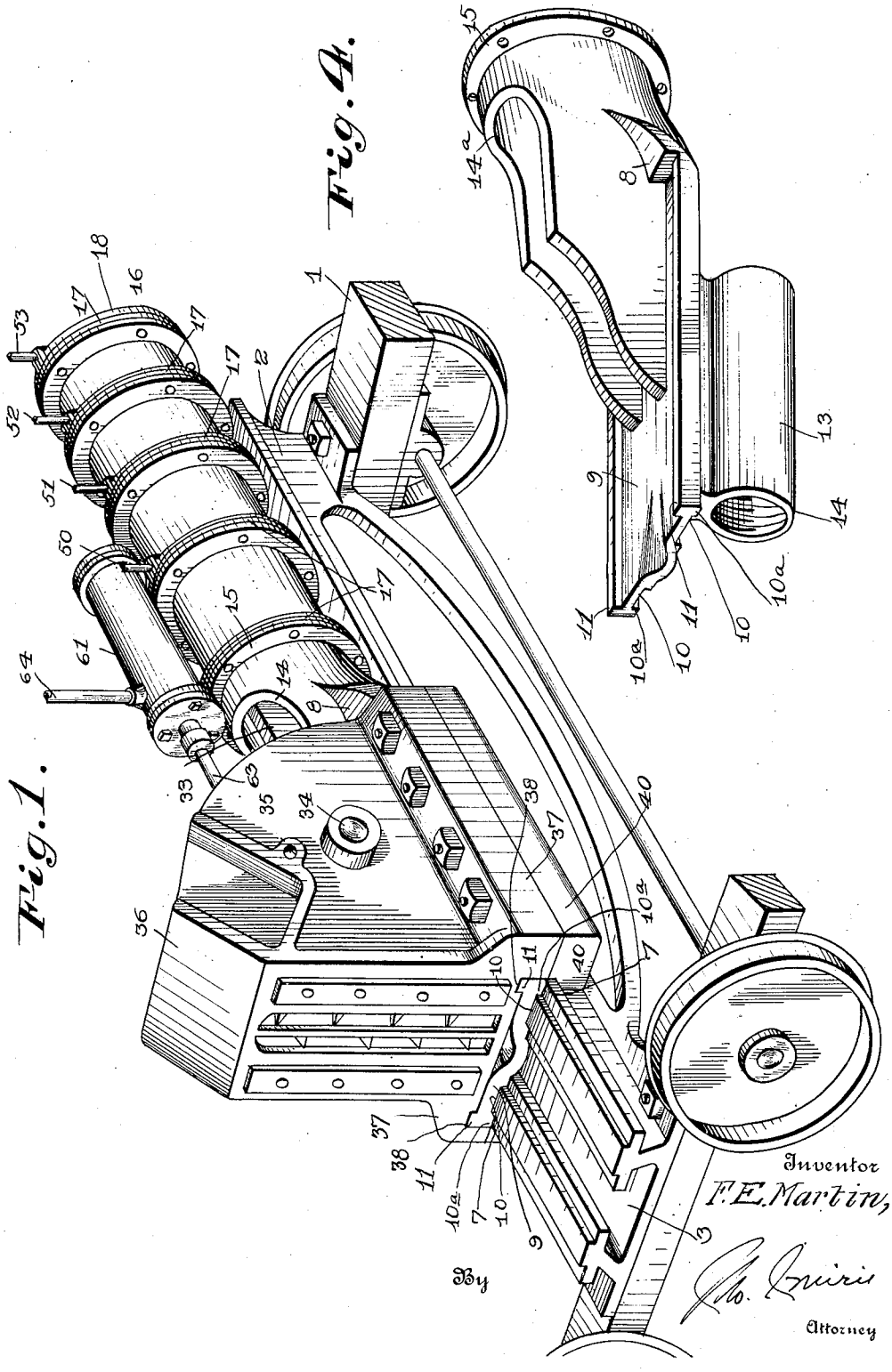


Fig. 4.

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TAPERING MECHANISM

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Fig. 3.

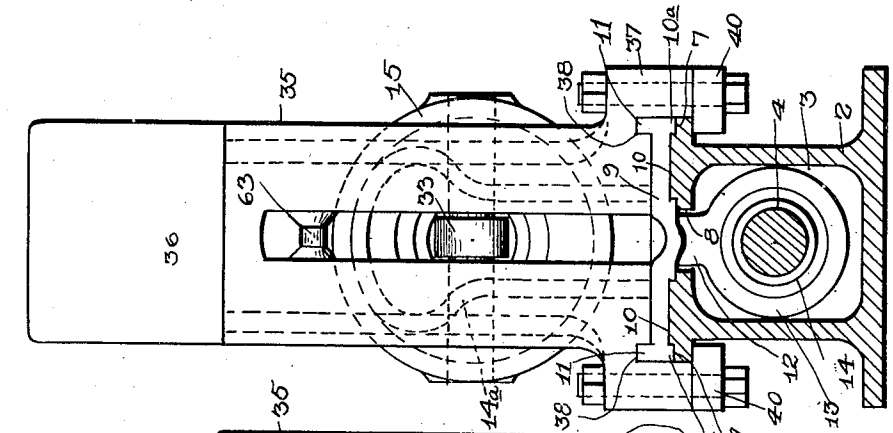
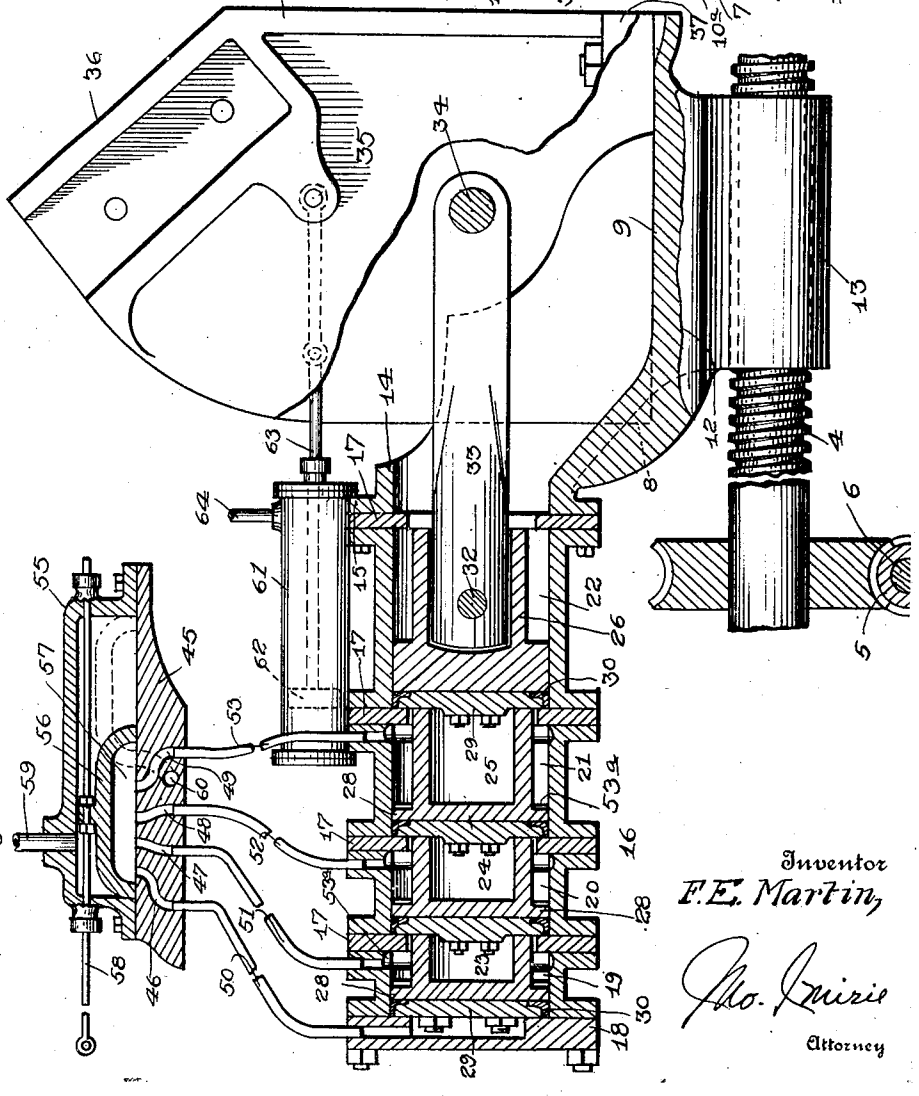


Fig. 2.



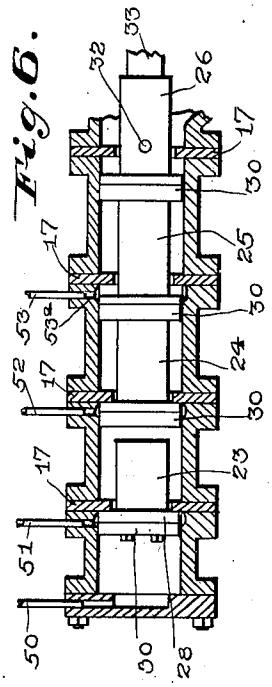
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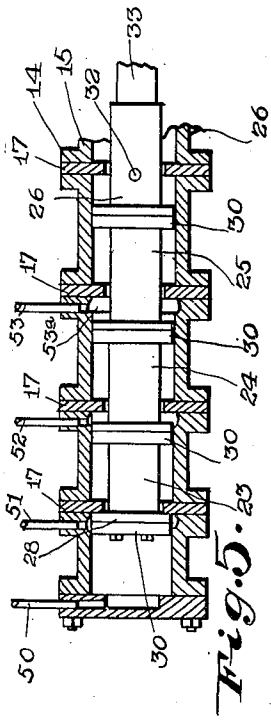
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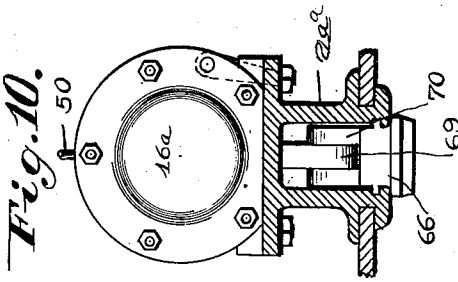
F. E. MARTIN

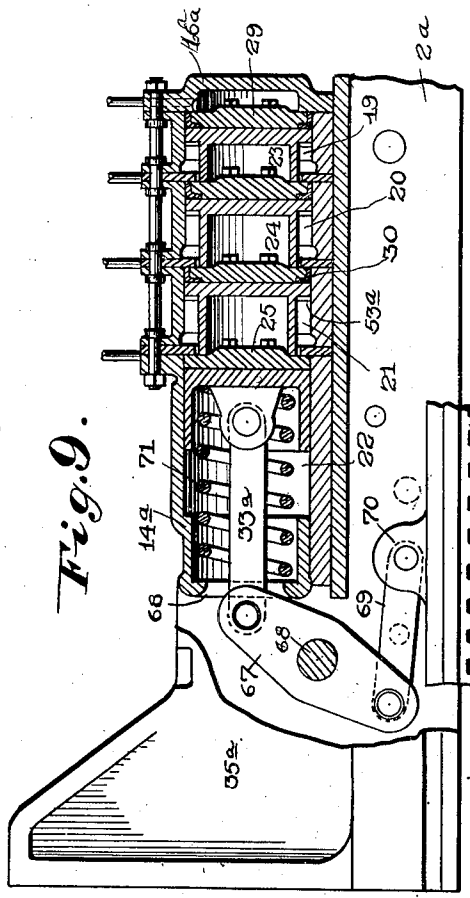
TAPERING MECHANISM

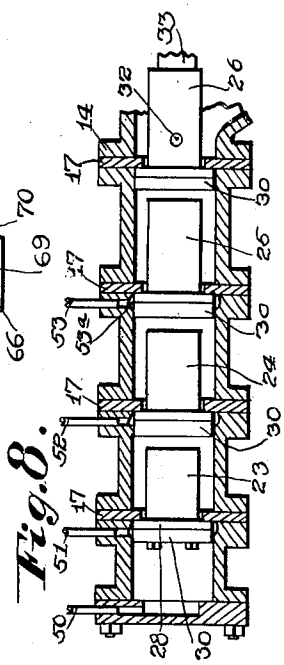
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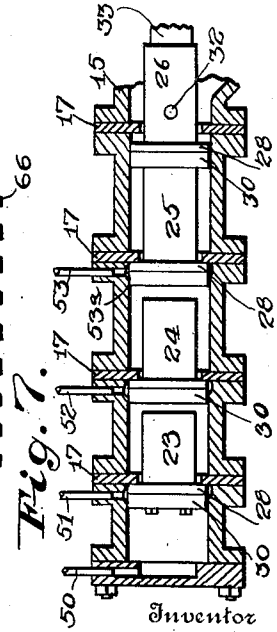












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By

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Patented Nov. 10, 1925. 1,561,341

UNITED STATES PATENT OFFICE.

FREDERICK E. MARTIN, OF SAN FRANCISCO, CALIFORNIA, ASSIGNOR TO MARTIN AIR DOG COMPANY, OF SAN FRANCISCO, CALIFORNIA, A CORPORATION OF CALIFORNIA.

TAPERING MECHANISM.

Application filed November 19, 1923. Serial No. 675,706.

To all whom it may concern:

Be it known that I, FREDERICK E. MARTIN, a citizen of the United States of America, residing at San Francisco, in the county of San Francisco and State of California, have invented certain new and useful Improvements in Tapering Mechanism, of which the following is a specification.

This invention relates to improvements in saw mill machinery, particularly with reference to the means employed for tapering a log, and cushioning the parts against the blow when placing a log on the carriage.

This invention relates primarily to fluid pressure tapering mechanism for saw-mill carriages and is designed to provide a step by step movement of a knee or knees to vary the degree of taper of a log, a feature which is not only essential but is of great practical commercial importance in a sawing operation. In the tapering mechanism as now used on saw mill carriages, the degree of movement of a knee for a taper is uncertain, which in many instances presents practical objections and difficulties, both as to operation, economy, and application.

One of the objects of the present invention is to provide tapering mechanism for a saw-mill carriage so constructed and arranged as to provide means by which an operator of the set works can control the position of a knee or knees to obtain a predetermined taper of a log, the mechanism being such that an operator may readily increase or decrease the taper movement of the knee or knees to properly locate the log with reference to the saw to secure desired taper.

Another object of the present invention is the provision of positively actuated means, so arranged as to permit of an operator, by the manipulation of a control element, to move a knee or knees, step by step, in either of two directions, to obtain the desired position of the knees to properly locate a log to be cut on a saw mill carriage.

The improved mechanism contemplates the use of fluid pressure for directly operating on a saw mill knee step by step for tapering purposes, to overcome the uncertainty of the position of a log on a carriage, and at the same time provide the necessary strength and support to successfully resist the rough usage and sever strains the parts are subjected to in use.

In carrying out the preferred embodiment of my invention, it is contemplated to provide a slide mounted on the knee block and forming a part of the usual set works, to support and form a guide for the knee, the slide carrying and supporting the mechanism for moving the knee step by step for tapering purposes, and at the same time forming an interlocking connection between the knee and the set works when the carriage is in normal use.

Another object of this invention is the provision of particular means for returning a knee to normal position, said means operating in opposition to the means which advances the knee step by step for a taper set.

The invention also has for its object the provision of specially constructed means for operating a knee for effecting a taper set, and also providing a buffer to relieve the shock and strain when loading a log.

The invention also comprehends improvements in the details of construction and arrangement of parts, which will be hereinafter described and particularly pointed out in the claims.

In the accompanying drawings:—

Fig. 1 is a perspective view of a saw mill knee and head block, showing the parts somewhat distended to better illustrate the invention.

Fig. 2 is a partial section through the knee and slide supporting the same on the head block.

Fig. 3 is an end view of the knee and head block, the head block being shown in section, the dogs for holding the log on the carriage being omitted.

Fig. 4 is a detail perspective view of the slide.

Fig. 5 is a diagrammatic view showing the first step by step movement of the knee.

Figs. 6 to 8 are similar views showing the position of the pistons in the successive step movements when adjusting the knee for taper purposes.

Fig. 9 is a central section of a modified form of the invention used primarily in connection with a saw mill carriage employing a rack for adjusting the knee.

Fig. 10 is a rear view of the same.

The numeral 1 indicates a portion of a saw mill carriage, and 2 a head block formed with a guideway 3, in which operates a screw 4. The screw is rotated through the medium of gears 5, operated from the set

shaft 6. The top surface of the side flanges of the head block is formed with guides 7—7. The numeral 9 indicates a slide which is substantially equal in width to the width of the head block and supported entirely by the latter. On the under surface of the slide are formed grooves 10, and end gibs 10^a, the grooves receiving the central portions of the flanges of the head block, while the gibs are seated and slide in the grooves 7—7, while extending upwardly from the top edges of the slide are flanges 11. Depending from the central portion of the slide is a rib 12, and formed on the same is a nut housing 13, which receives a nut 14, adapted to receive and cooperate with the screw 4.

Integral with and extending rearwardly from the slide is a frame 14^a, formed with an annular flange 15 and abutments 8—8. Bolted or otherwise fastened to the annular flange 15, is a composite cylinder 16, comprising a series of short cylinders with intermediate inwardly extended flanges 17, and a head 18. As shown, the composite cylinder is composed of four divisions or compartments 19, 20, 21, and 22, defined by the interposed annular flanges 17, the compartments progressively increasing in length from the head 18 to the frame 14, as shown. While but four divisions or compartments are shown, this is not to be construed as a limitation, as it is evident more or less compartments may be employed, the number being determined by the number of stepped movements required on any particular saw mill rig. Operatively supported in the compartments are pistons 23, 24, 25 and 26, each being exactly alike, except each succeeding piston from the head is longer than the preceding one to correspondingly fit in the respective compartments and abut one against the other, hence a description in detail of one will suffice.

Each piston is shown hollow, and its major portion is open at one end and is of such diameter as will move freely in the opening in its cooperating flange 17, while its opposite end is closed and flanged at 28 to form a diameter equal to the interior diameter of the cylinder. Bolted to the closed end of the piston is a disc 29, and clamped between it and the flange of the closed end of the piston, is a cup washer 30 to prevent leakage between the parts.

Fitting in and bolted to the foremost piston, at 32, is a rod 33, which extends through the frame 14, and is bolted at 34 between the spaced sides of a knee 35. The knee comprises side walls which are connected at their upper forward portions by a cross member 36, and at the lower ends of the sides are overhanging depending flanges 37, which embrace the edges of the sides and flanges of the head block. In the bottom portion of the side plates are grooves 38, which receive the flanges 11 on the slide, to prevent lateral spreading of the knee members.

Bolted or otherwise fastened to the under surfaces of the depending flanges 37, are inwardly extending gibs 40, which engage under the lateral flanges of the knee block to form guides for the knee in its movement on the slide or knee block.

The control means for controlling the movement of the knee will be located convenient to the setter. This control comprises a base 45, formed with four ports 46, 47, 48, and 49, one for each of the compartments in the cylinder, and connected by flexible pipes 50, 51, 52, and 53, to introduce fluid pressure to the respective compartments to operate on the discs to successively advance the pistons in the cylinder, hence the knee. The cylinder and the flanges of the pistons are provided with grooves 53^a adjacent the ports receiving the flexible pipes to readily admit and exhaust pressure to and from the cylinders. Fitted on the base is a valve casing or chest 55, and operating in same is a slide valve 56, provided with the usual cavity 57 and disposed so as to slide over the ports 46 to 49. The valve may be reciprocated through the medium of a handle 58 arranged convenient to the operator, and if found more convenient, a rotary or any other form of valve may be used.

Fluid pressure is admitted to the chest through a pipe 59, and exhausts through a port 60.

Mounted conveniently on the composite cylinder 16, is a small return cylinder 61, in which operates a piston 62, connected by a piston rod and link 63 with the knee. The pressure in this cylinder is continuous, and is admitted through pipe 64. This pressure is less than the pressure necessary to actuate the pistons in the composite cylinder, and is of course in opposition thereto, as will be explained later on.

In the modification shown in Figs. 9 and 10, a construction is disclosed which is primarily adapted to rigs employing set works which include a rack and pinion for adjusting the knee. In this instance, certain changes from the construction previously described are essential to permit of ready application of the invention, but the principles of the improvements are nevertheless present.

In these figures, 2^a indicates a head block, 35^a the knee, and 66 the usual set works rack and pinion connection. Extending from and supported on the knee is a composite cylinder 16^a, provided with a forwardly projecting housing 14^a. Mounted to reciprocate in the compartments in the composite cylinder are pistons, and to the end

piston is pivoted a link 33ª, which extends through the housing and is pivoted at its free end to a lever 67, pivoted between the cheeks of the knee at 68, and connected at its lower end by a link 69, which in turn is pivoted to a lug, at 70, to the rack.

In lieu of fluid pressure to return the knee and pistons to normal position, I show in these figures a spring 71, located between the head of the housing and the first piston head. It is evident this form of return means for the piston is applicable to the preferred form shown, in lieu of the fluid pressure means described.

In the operation of the structure disclosed in Figs. 1 to 7, let it be assumed that the parts are in normal position, as shown in Figs. 1 and 2, that is, with the knee up against the abutments 8, and it is desired to move the knee one step to a taper position. The valve 56 is moved to uncover port 46, which admits pressure to the end of the compartment 19 adjacent the head 18, and moves the piston 23 until its flange 28 contacts with the flange 17 defining the compartment, as shown in Fig. 5. As the pistons are all in alignment and contact with each other, movement of the first piston advances all the pistons in the composite cylinder, and through the connection 33, the knee is correspondingly advanced. While this is the first taper movement for ordinary use, it frequently happens that all the knees will be set to this position, so that when loading large logs on the carriage, the pressure in the first compartment acts as a buffer to relieve the blow and strain incident to the log striking a knee or knees. If a further movement of the knee is required, the valve 56 is moved to uncover the port 47, which admits pressure between pistons 23 and 24, and around piston 23 to the flanged end of piston 24, and advances the latter in its compartment until its flange contacts with the corresponding flange 17, which correspondingly moves pistons 24, 25, and 26, a distance equal to the difference between the lengths of the pistons 23 and 24, as shown in Fig. 6. Further movement of the valve moves the piston 25 a distance equal to the difference between the lengths of pistons 24 and 25 as shown in Fig. 7, and if further movement is desired, the valve is moved to uncover the last port 49, which moves the piston 26 a further distance equal to the difference in the lengths of pistons 25 and 26. In any and all these step by step movements, the knee is correspondingly moved so that any one movement or the combined movements will act directly on the knee to set it for taper purposes. In every instance, the pressure behind the pistons establishes a buffer to relieve the shock and strain when a log is rolled against a knee. While the knee is positioned by movement of the pistons, the constant pressure in cylinder 61 is exerting force in the opposite direction to promptly retract the knee when movement of the valve is reversed. Obviously therefore, if the knee is to be retracted for a selected set or to normal position, the valve 56 is reversely moved to afford communication between the respective ports and the exhaust port 60, and pressure in cylinder 61 will withdraw the knee to the desired position.

In these operations, the knee operates on, and is entirely supported on, the slide plate 9, consequently the relationship of the parts with the set works remains the same, and the knee and slide can be set by the usual setting mechanism wholly independent of the action of the pistons. The construction is such that the side plates of the knee are locked together at the bottom by the flanges 11, and are thereby prevented from spreading laterally, while upward movement of the knee and slide from the knee block is prevented by the plates or flanges 40. Then again, the construction and arrangement of the grooves and gibs between the slide and head block are such that the slide is held against lateral movement and yet an effective guide is formed for the slide on the head block when using the usual setting mechanism. The construction affords opportunity to make the parts of as heavy metal as may be found desirable to resist rough usage and strains of the logs to be handled, and this without in any way relinquishing any of the essential room required for the assembly of necessary elements on the carriage. This is particularly advantageous in rigs employing a screw and nut as a part of the set works, as the construction and arrangement are such as to permit of distribution of the metal at a point remote from the screw and placing it where the strain will be the greatest.

Where large logs are being sawed and fall heavily against the knees, the buffer action of the pistons and composite cylinder is of tremendous practical value, as the thrust is removed from the mechanical operating parts and is reduced to a minimum.

It is to be particularly noted that the operating mechanism is carried by the slide and that the knee in turn is supported on and is reciprocated on the slide, thus maintaining the parts in relation to be operated by the set works, irrespective of the position of the knee when operated by the usual set works.

Of course it will be understood that provision will be made to mount log-engaging dogs on the knees.

In the operation of the modified form of the invention, the control valve is operated in the same way as previously described, but in lieu of the fluid actuating mechanism

being carried on a slide and the knee so mounted as to reciprocate on the latter, the mechanism is carried by the knee, and is, through the links and levers described, connected to the rack. The result however, of the actuation of the fluid pressure means is the same. In this instance, the spring acts as the means to return the parts to normal position, in lieu of the constant pressure described in connection with the preferred form.

Claims:

1. In mechanism for tapering a log on a saw mill carriage, including a head block and a knee movable relative thereto, means having a tendency to impart to the knee a range of travel, comprising a succession of limited motions, and means for controlling the application of said first mentioned means to permit its continued operation for any desired number of said motions.

2. In mechanism for setting and tapering a log on a saw mill carriage, the combination of a knee and head block, set works including means to adjust the knee on the head block, one element of the set works having a slide operable on the head block, on which slide the knee is mounted, operating means having a tendency to impart to the knee a range of travel, comprising a succession of limited motions, and means for controlling the application of said operating means to permit its continued operaton for any desired number of said motions.

3. In mechanism for tapering a log on saw mill carriages, a head block having flanges, a slide movably supported on the head block, a knee movably supported on the slide and having guiding cooperation with the head block, operating means for the knee having a predetermined limit of movement divided into a series of independently limited successve steps, and means whereby the operating means may be actuated for continued operation throughout any desired number of such steps.

4. In mechanism for tapering a log on saw mill carriages, a head block having flanges, a slide movably supported on the head block, a knee movably supported on the slide and having guiding cooperation with the head block, operating means to impart taper adjustment to the knee on the slide and having a maximum limit of travel divided into a series of limited successive steps, each of which defines a taper adjusted position of the knee, and means for actuating the operating means throughout any desired number of such steps successively, said latter means forming a cushion at each successive step actuation of the operating means to resist the thrust of a log against the knee.

5. A saw mill carriage, a head block, a knee movable relative thereto, and tapering mechanism for the knee, comprising operating means connected to the knee and having a predetermined range of travel made up of a series of independent predetermined steps of movement, and power means whereby the operating means may be actuated for continued operation for any desired number of such steps of movement in succession.

6. A saw mill carriage, a head block, a knee movable relative thereto, and tapering mechanism for the knee, comprising operating means connected to the knee and having a predetermined range of travel made up of a series of independent predetermined steps of movement, and power means whereby the operating means may be actuated for continued operation for any desired number of such steps of movement in succession, said power means forming a cushion at each successive step of movement of the operating means to resist the thrust of a log against the knee

7. In mechanism for tapering a log on a saw mill carriage, the combination of a knee and head block, means for advancing the knee comprising a cylinder having a series of compartments which progressively increase in length, a series of pistons in the compartments progressively increasing in length in proportion to the compartments, means for conducting fluid pressure to the individual pistons in the compartments, a single valve for progressively controlling the fluid pressure conducting means, and means independent of the aforesaid fluid pressure means for returning the pistons to normal position.

8. In mechanism for tapering a log on saw mill carriages, the combination of a head block having flanges, a slide supported on the top of the head block, a knee entirely supported on the slide and provided with guides to engage under the flanges of the head block, and means between the knee and the slide to prevent lateral spreading of the knee.

9. In tapering mechanism for saw mill carriages, the combination with a knee and head block, a composite cylinder, a frame between the knee and composite cylinder for retaining the latter in relation to the knee, a plurality of flanges extending inwardly from the composite cylinder and located different distances apart to provide a plurality of compartments which progressively increase in length, pistons mounted in the compartment and operating through the flanges, the pistons having end flanges to cooperate with the inwardly extending flanges to limit the movement of the pistons, a connection between one of the end pistons and the knee, and controlled means for progressively admitting pressure to the compartments to move the knee step by step.

10. In mechanism for tapering a log on saw mill carriages, the combination of a

head block having flanges formed with parallel guides, a slide supported on top of the head block flanges, said slide having under guides to engage the guides on the flanges, a knee entirely supported on the slide and provided with depending guides to engage under the flanges of the head block, the slide having upwardly extending end flanges which engage in grooves formed in the under part of the knee to prevent lateral spreading of the knee.

11. In mechanism for setting and tapering a log on a saw mill carriage, a head block, a knee, set works, one element of the set works having formed with it a slide operable on the head block and on which the knee is movably supported, and a motor for operating the knee, constructed to move the knee to a predetermined taper position, said motor being supported wholly by the slide and connected with the knee, and forming the sole connection between the slide and knee in the operation of the set works.

12. In a saw mill carriage, a head block, a knee movable thereon for taper purposes, a cylinder, a series of pistons operating in the cylinder, said pistons being aligned in the cylinder and operating in the same direction and adapted in operation to impart respectively predetermined taper movements to the knee, and means independent of the pistons for returning the knee and the actuated piston to normal positions.

13. In a saw mill carriage, a head block, a knee movable thereon for taper purposes, a cylinder, the knee being movable relative to the cylinder in taper movement, and a series of disconnected pistons operating in the cylinder, said pistons being aligned in the cylinder and operating in the same direction and each capable in operation of imparting a taper movement to the knee in correspondence with the particular piston movement.

14. In a saw mill carriage, a head block, a knee movable thereon for taper purposes, a motor mechanism including a cylinder, the knee being movable independently of the cylinder for taper purposes, a series of independent pistons arranged in the cylinder and each having an inherent predetermined limit of movement, said pistons being arranged in alignment and operative in the same direction to exert a moving pressure on the knee.

15. In mechanism for setting and tapering a log on a saw mill carriage, a knee, set works, a motor associated with the knee, said motor comprising a plurality of aligned pistons arranged to advance the knee to predetermined tapering positions, and means acting on a piston or pistons to advance the knee a distance in exact accord with the linear movement of the piston or pistons.

16. In mechanism for setting and tapering a log on a saw mill carriage, a knee, set works, a motor associated with the knee, said motor comprising a plurality of movable elements arranged to advance the knee to predetermined selected tapering positions, control means capable of advancing an element or elements to position the knee for a predetermined selected tapering position, and means independent of the control means for returning the elements and the knee to normal position.

17. In mechanism for setting and tapering a log on a saw mill carriage, a knee, set works, a motor associated with the knee, said motor comprising a plurality of aligned pistons, only one of which cooperates directly with the knee, and control means capable of actuating any piston to its inherent predetermined extent, or combinations of said pistons to advance the knee to a predetermined selected position, and means independent of the control for returning the knee and piston or pistons to normal position.

18. In mechanism for setting and tapering a log on a saw mill carriage, a knee, a head block, a slide on the head block, a motor carried by the slide, said motor comprising a plurality of aligned pistons, one of which is provided with a member which extends beyond the motor and directly cooperates with the knee, means to maintain cooperation of the element with the knee, and means for controlling the movement of the plurality of pistons to advance the knee to a selected predetermined position.

19. In mechanism for tapering a log on a saw mill carriage, including a head block and a knee movable relative thereto, of a motor for operating the knee, including a series of operating elements successively of increased range of movement, and means for operating a series of such elements in a substantially simultaneous operation to thereby directly affect the knee by that member of the series having the maximum movement without directly affecting the knee by the operated members of the series having a less movement.

20. In mechanism for tapering a log on a saw mill carriage, a head block, a knee movable relative thereto, a motor for operating the knee having a series of operating elements of successively increased range of movement, and means for admitting a motive fluid to any selected number of said elements at substantially the same moment, whereby the element of the selected series having the maximum movement will be directly operated to affect the knee while the elements of the selected series having a less movement will be idly operated.

21. In mechanism for setting and tapering a log on a saw mill carriage, a knee, a head block on which the knee is movable, a motor including a series of aligned unidi-

rectional pistons having relatively different lengths of stroke, a connection between the knee and the piston of maximum stroke, fluid pressure means for operating the pistons in succession to the limits of their respective strokes, and means for controlling the fluid pressure means to limit the maximum movement of the knee in correspondence with the maximum movement of any one piston of those operated successively.

22. Knee tapering mechanism for saw mill carriages having a head block and a knee movable relative thereto, of a motor for imparting tapering movement to the knee and including a series of aligned pistons operative in one direction and relatively limited in stroke, and means for operating the pistons to correspondingly operate the knee, independent means for operating the knee in opposition to the pistons.

23. In a knee tapering mechanism for saw mill carriages, having a head block and a knee movable relative thereto, of a motor for operating the knee relative to the head block and comprising a cylinder to which the knee is relatively movable, and a series of pistons operative in alignment in the cylinder, each of the pistons having a limited knee-affecting stroke, and means for admitting fluid pressure to the cylinder in operative relation to each piston.

24. A knee tapering means for saw mill carriages having a head block and a knee movable relative thereto, mechanism having a knee taper stroke made up of a series of independently limited aggregative strokes acting through mutual contact in the same direction and in line, and fluid pressure means for inducing one or any number of said limited strokes.

25. In mechanism for tapering a log on a saw mill carriage, including a head block and a knee movable relative thereto, means having a tendency to impart to the knee a range of travel, comprising a succession of limited motions, means for controlling the application of said first mentioned means to permit its continued operation for any desired number of said motions, and means for operating the knee in a direction opposite that of said first-mentioned means.

26. In mechanism for tapering a log on a saw mill carriage, a plural aligned piston motor wherein each piston has an inherently limited taper producing movement, and fluid pressure means for operating such pistons, the fluid pressure means for any operated piston serving as a buffer for the log impact on the knee.

27. In a saw mill carriage, a head block, a knee, a motor comprising a series of alined pistons having inherently limited advance positions for imparting taper movements to the knee, and fluid pressure means for imparting advance positions to the pistons at will and simultaneously providing a variable flexible buffer against the return of the piston or pistons, whereby to cushion the knee against the impact of the log being loaded on the carriage.

28. In a saw mill carriage, a buffer means for log impact, including an element to directly receive the impact of the log, a plural piston motor wherein the pistons are disconnected and operate accretively in the same direction to advance the element, and yielding pressure means acting on a piston or pistons of such motor to advance the element and simultaneously provide a buffer means against the movement of the element under log impact.

29. A buffer means for saw mill carriages, comprising a plural motor cylinder, wherein each piston has an inherently limited advance movement, and acts accretively and means whereby a piston or pistons may be operated to its or their advance positions, with said means when operating to advance a piston or pistons simultaneously providing a buffer against the opposing movement of said piston or pistons.

In testimony whereof I affix my signature.

FREDERICK E. MARTIN.