United States Patent

[11] 3,603,362

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[54] **LOG CARRIAGE APPARATUS**
12 Claims, 11 Drawing Figs.

[52] **U.S. Cl.** **143/105,** 143/25, 143/52
[51] **Int. Cl.** **B27b 29/08**
[50] **Field of Search** 143/1, 19, 17, 25, 38, 52, 105, 125

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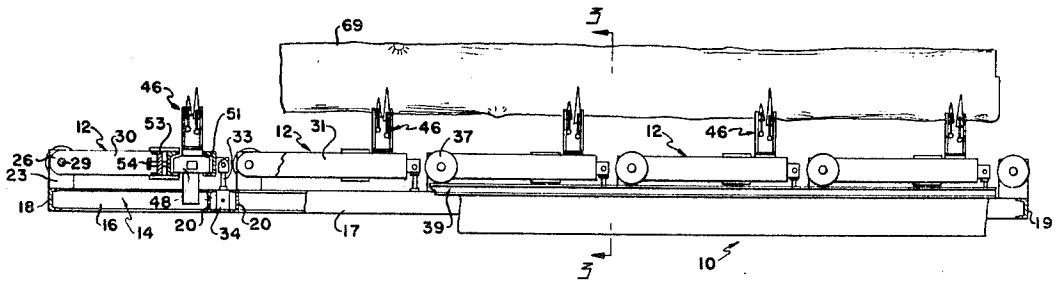
ABSTRACT: Apparatus for gripping and transporting logs past cutting elements for accurate cutting thereof. The apparatus grips and holds each log in a substantially horizontal plane, the gripping taking place along the lower portion of the log so that cutting elements, such as saws and/or chipper heads, can cut the log from above on both sides.



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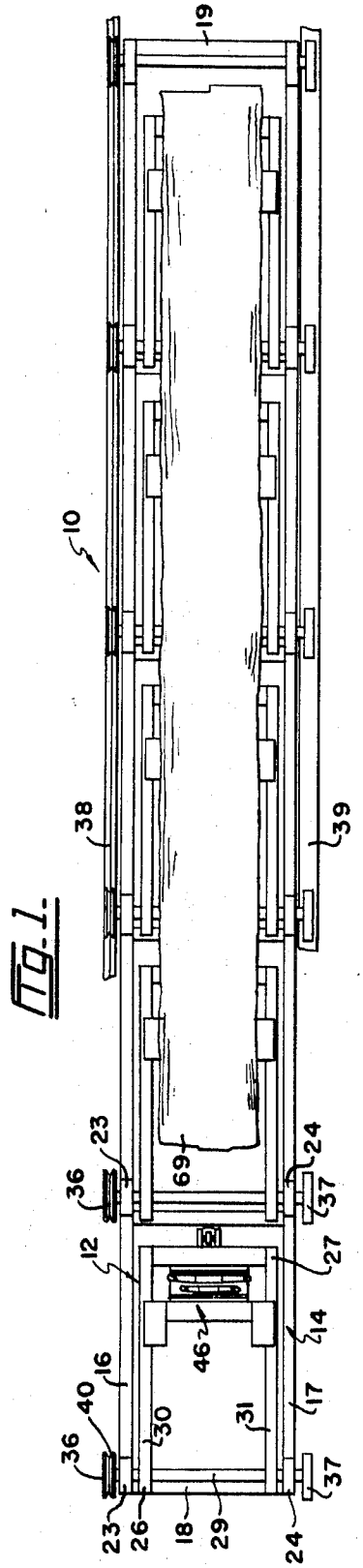

FIG. 1.

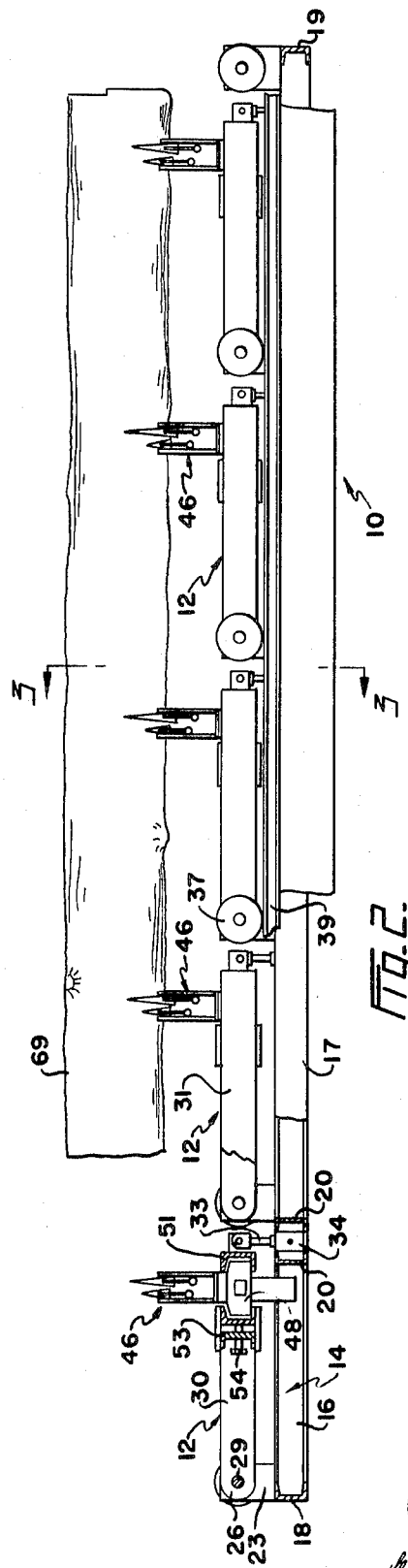

FIG. 2.

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Fig. 3.

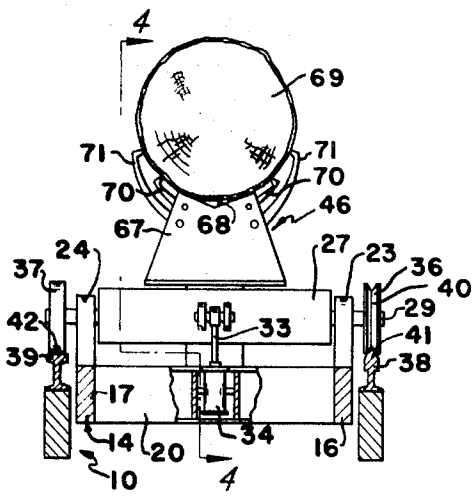
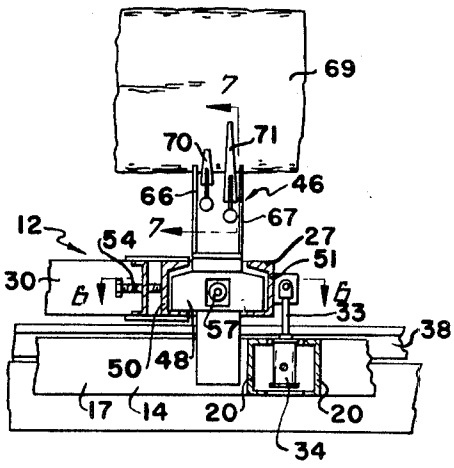


Fig. 4.



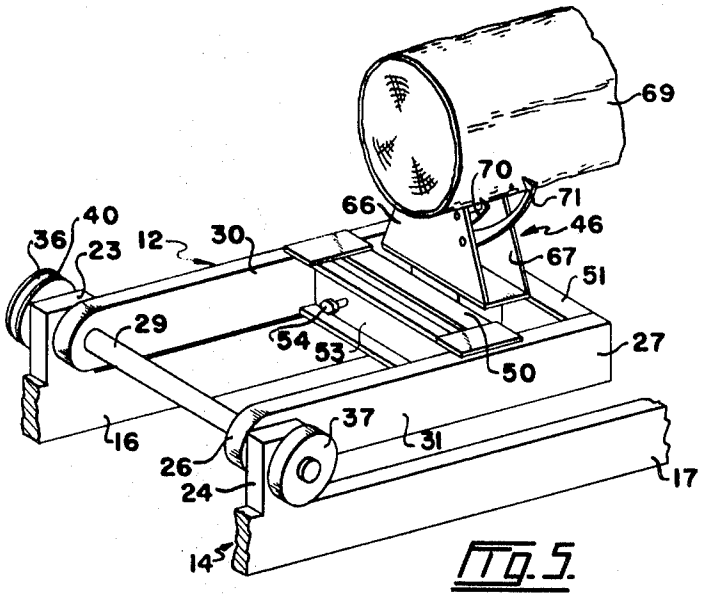


Fig. 5.

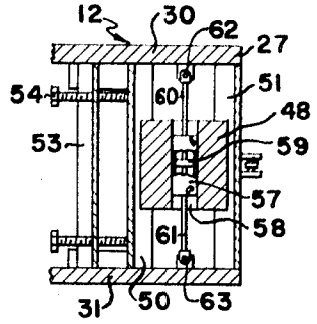


Fig. 6.

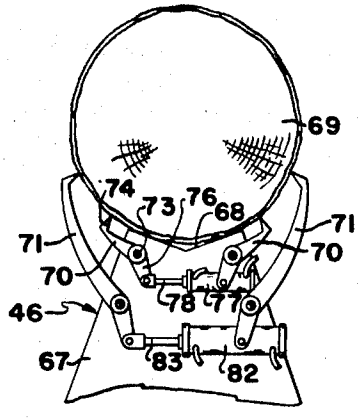


Fig. 7.

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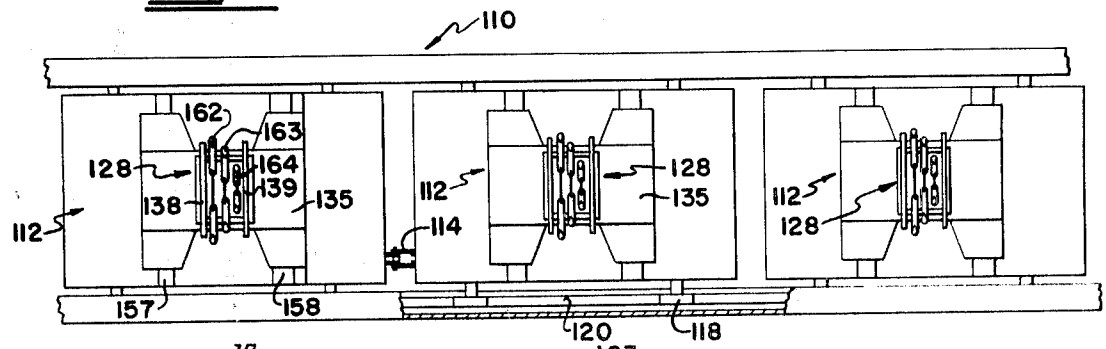
Fig. 8.



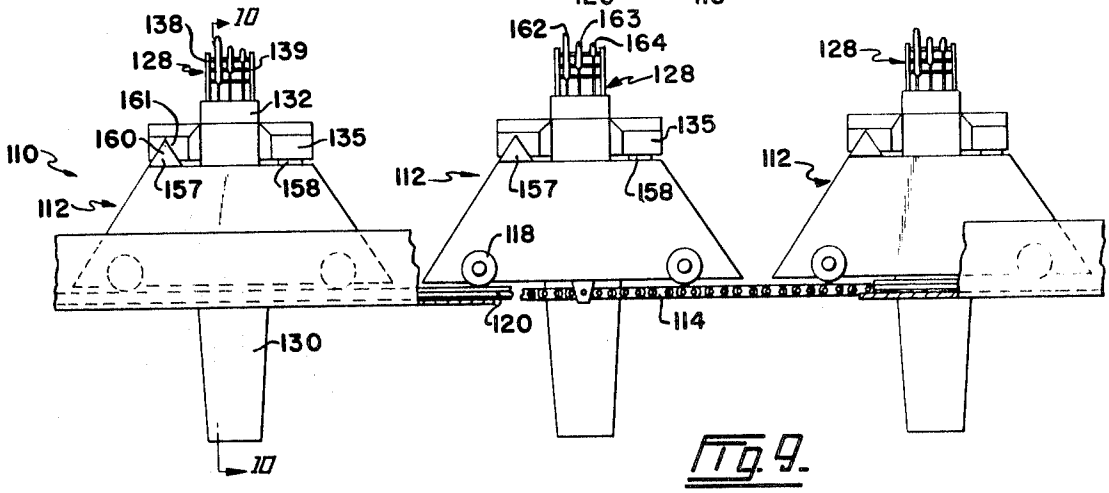


Fig. 9.

Fig. 10.

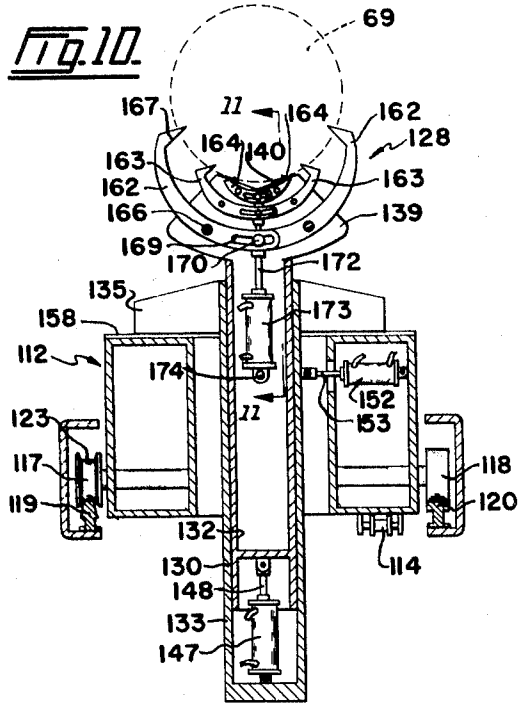
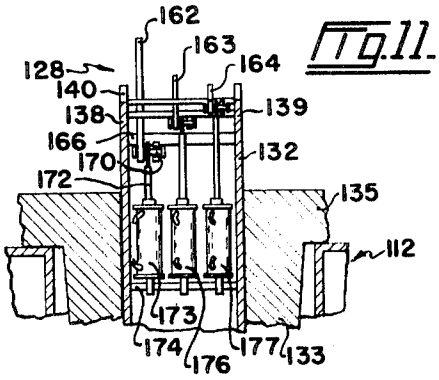


Fig. 11.



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LOG CARRIAGE APPARATUS

BACKGROUND OF THE INVENTION

This invention relates to apparatus for gripping and transporting logs past cutting elements for accurate cutting thereof so that the wood of the log can be quickly and continuously converted into boards and/or pulp wood chips.

The breakdown of a log in a sawmill commences at a head saw. The standard practice is to place the log on a standard sawmill carriage which grips the log along the top and bottom surfaces thereof from a side edge. The log is shifted transversely of the carriage until its opposite edge projects from the carriage side so that when the carriage moves past the head saw, the latter cuts the log in a longitudinal direction. Because of the way the log is gripped on the carriage, it is possible to cut only one side of the log during each trip past the saw. This greatly limits the number of logs that can be handled at the head saw in a given time, and if the mill has only one head saw, this limits the speed of the entire operation of the mill. Another disadvantage is that the carriage is stationary while a log is being placed thereon and first gripped by the gripping dogs, no cutting taking place during this time. The standard carriages are reciprocated past the saw, and this usually represents a waste of time during the backstroke of the carriage, although some mills use bandsaws with cutting teeth on both edges thereof so that cutting can take place each time the carriage moves past the saw in either direction. The standard sawmill carriages have been used for a great many years, and the only improvements thereto have been made relative to the gripping mechanisms, speed of movement, and the controls for the different operations that take place at the carriage. The previous improvements have left untouched the basic problem resulting from the fact that you can cut from one side only of the log during each cutting operation, and that the carriage has to be stopped and the log rotated around its longitudinal axis before another side area thereof can be cut.

SUMMARY OF THE INVENTION

This log-carriage apparatus is designed greatly to reduce or eliminate the above-noted problem associated with the standard sawmill carriage. This carriage apparatus can be built with a rigid frame to be reciprocated in the usual manner, or it can be set up in an endless chain configuration which always moves in one direction. Two or more logs may be carried by this apparatus at a time, and logs can be continuously removed therefrom and placed thereon without stopping the apparatus so that when a log is being positioned on the carriage apparatus, another one thereon is being cut. Another great advantage of the present apparatus is that each log is gripped from beneath so that two or more cutting elements can be working on the log at a time. For example, angularly arranged head saws can be placed at right angles to each other so as to cut two slabs or boards off the log at the same time from the upper surface thereof. Actually, a plurality of pairs of saws can be positioned along the path of movement of the log so that two, four or more boards can be cut therefrom at substantially the same time. In addition, a pair of angularly arranged chipper heads can be placed ahead of the saws with reference to the direction of movement of the carriage apparatus so as to remove the slab material as pulp chips while two or more boards are substantially simultaneously being cut from the log. This operation leaves two flat surfaces on the log extending at right angles to each other, and following this, the log can be turned over and shifted into apparatus for repeating the same simultaneous cutting action so that the log is broken down in two stages, one immediately following the other without any waiting for loading and unloading operations, or one cutting operation delaying the other.

Apparatus according to the present invention comprises base means supported by guide means for movement longitudinally thereof. A plurality of chairs are mounted on and spaced apart longitudinally of the base means and project upwardly therefrom, said chairs being adapted to support a log resting thereon and extending longitudinally of the base means. The apparatus also includes gripping means on the chairs reaching upwardly to the log and operable to grip said log from beneath.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a plan view of one form of log-carriage apparatus according to this invention,

FIG. 2 is a side elevation of this apparatus,

FIG. 3 is an enlarged vertical section taken on the line 3—3 of FIG. 2,

FIG. 4 is a vertical section taken on the line 4—4 of FIG. 3,

FIG. 5 is a perspective view of a portion of this apparatus,

FIG. 6 is a horizontal section taken on the line 6—6 of FIG. 4,

FIG. 7 is a vertical section taken on the line 7—7 of FIG. 4,

FIG. 8 is a plan view of an alternative form of log-carriage apparatus according to this invention,

FIG. 9 is a side elevation of the apparatus of FIG. 8,

FIG. 10 is an enlarged section taken on the line 10—10 of FIG. 9, and

FIG. 11 is a vertical section taken on the line 11—11 of FIG. 10.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to FIGS. 1 to 7, 10 is one form of log-carriage apparatus according to the present invention and including base means in the form of a plurality of bases 12 arranged in series or one after the other. Suitable means is provided for interconnecting these bases for movement in unison. In this example, a rigid frame 14 is provided for this purpose. Frame 14 includes side members 16 and 17 connected at ends of the apparatus by transverse end members 18 and 19. Suitable crossbraces 20 extend between side members 16 and 17 throughout the length thereof. Each base can be mounted for vertical movement relative to frame 14 or, as shown, one end only of the base can be moved up and down. Frame 14 is positioned below the level of bases 12, and has pairs of lugs 23 and 24 projecting upwardly from side members 16 and 17 thereof adjacent each base 12. Each pair of lugs 23 and 24 are positioned near and outside the adjacent end 26 of a base 12, as clearly seen in FIG. 5. In this example, end 26 of the base is swingably mounted on frame 14 so that the opposite end 27 of the base can move up and down relative to said frame. In this example, a shaft 29 extends through sides 30 and 31 of base 12 and through adjacent lugs 23 and 24 so that said sides are swingably mounted on the shaft. The opposite end 27 of base 12 is supported by a piston rod 33 of a fluid cylinder 34 which is mounted upon a crossbrace 20 of frame 14. Cylinder 34 can be energized to eject or retract rod 33 to raise or lower the end of base 12.

Guide means is provided for supporting the base means or bases 12 or apparatus 10. In this example, the guide means comprises wheels 36 and 37 mounted on each shaft 29 outwardly of adjacent lugs 23 and 24, said wheels riding on rails 38 and 39, said rails being supported in any suitable manner, and extending along the path along which apparatus 10 is to move. Lateral displacement of the apparatus is prevented in any desired manner. In this example, wheel 36 is formed with a groove 40 in the periphery thereof, and rail 38 is provided with a mating ridge 41 on its upper surface which rides in groove 40. Each wheel 37 and track 39 may be formed in the same manner, although this is not absolutely necessary, and in the illustrated apparatus, wheels 37 ride on a substantially flat upper surface 42.

Each of at least some of the bases 12 has a chair 46 mounted thereon and projecting upwardly therefrom. It is preferred to provide a chair on each of the bases, as shown. Each chair 46 includes a base section 48, see FIGS. 4 and 6, mounted in base 12 adjacent end 27 for movement transversely thereof. In this example, base section 48 is slidably mounted in channel mem-

bers 50 and 51 which extend transversely of the base. Channel 51 is fixedly mounted on the base, while channel 50 is adjustable towards and away from channel 51. A bar 53 extends between and is secured to sides 30 and 31 of the base adjacent channel 50, and adjusting bolts 54 threaded through this bar bear against channel 50 to shift it towards channel 51. Channel 50 can be retracted to permit base section 48 of the chair to be inserted into and removed from its base 12.

A fluid cylinder 57 is mounted in a passage 58 extending transversely through base section 48 and is fixedly secured to the latter. A piston 59 in this cylinder has rods 60 and 61 projecting outwardly from opposite ends of the cylinder and connected to base sides 30 and 31 at 62 and 63, see FIG. 6. Cylinder 57 can be energized to shift the base section and chair 46 transversely of base 12.

Each chair 46 includes a pair of spaced supports 66 and 67 projecting upwardly from base section 48 and above base 12. The upper ends of each of the supports 66 and 67 are formed with V-shaped seats 68, see FIGS. 3 and 7, for logs of different diameters, such as log 69 extending longitudinally of and supported by apparatus 10. The chair is provided with suitable gripping means for gripping the log from beneath. This gripping means comprises one or more pairs of opposed gripping dogs, movably mounted on supports 66, 67. In this example, there are two pairs of dogs 70 and 71, the latter being longer or higher than the former so that the dogs grip the log at two different levels, as shown in FIGS. 3 and 7.

Each of the dogs 70 is pivotally mounted at its inner end at 73 on supports 66 and 67 of the chair, and has a prong 74 at its opposite end facing inwardly therefrom and adapted to be pressed into the log. A lug 76 is connected to each dog 70 and projects downwardly below pivot 73 thereof, and a fluid cylinder 77 is pivotally connected to one of these lugs and has a piston rod 78 extending outwardly therefrom and pivotally connected at its outer end to the other of the lugs. When piston rod 78 is retracted, dogs 70 are swung outwardly clear of the log, and when said piston rod is extended, the dogs are swung inwardly until prongs 74 bite into the log.

Dogs 71 are pivotally mounted in the same manner as dogs 70 and are operated by a cylinder 82 and its piston rod 83 which are connected to downwardly extending lugs 84 of said dogs 71.

Carriage apparatus 10 may be reciprocated on rails 38 and 39 by any of the standard mechanisms for this purpose. On the other hand, the rails may be endless and arranged in a somewhat loop manner so that the carriage is moved continuously in a forward direction by suitable means. In fact, several of the devices can be arranged in series so that more than one log is transported at a time. Cylinders 34, 57, 77 and 82 are usually hydraulic cylinders, although they can be pneumatic cylinders, and in any case, the operating fluid is directed to and from the cylinders by apparatus now in existence so that this does not need description herein.

The operation of apparatus 10 is quite simple. Log 69 is placed on the chairs of a plurality of the bases 12 so that it rests in the seats 68 of these chairs. Either cylinder 77 or 82 is energized to cause either dogs 70 or 71 firmly to grip the log along the lower surface thereof as shown in FIG. 2 and 3. The dogs used depend on the size of the log to be gripped. The position of the log on the apparatus is adjusted by shifting the chairs laterally relative to their respective bases 12 by means of cylinders 57, and the vertical position of the log is adjusted by operating cylinders 34 to swing ends 27 of the bases 12 up or down. The lateral shift of the chairs can be used to properly locate the log so maximum recovery can be effected. These adjustments can be made with logs of any irregular shape, such as curved (sweep) logs, logs with excessive or irregular butts, or irregularly shaped logs. Thus, the log can be quickly and firmly gripped in the apparatus as the gripping takes place beneath, and the gripping means can be adjusted to conform to the taper and irregularities in the log.

Referring to FIGS. 8 to 11, 110 is an alternative form of log-carriage apparatus. Apparatus 110 is basically the same as apparatus 10, but the base means thereof comprises a plurality of bases 112 interconnected in any suitable manner, such as by means of a flexible member 114, for example a roller chain. The vertical and lateral shifting of the chairs of these bases is done in a different way than in apparatus 10.

Each base 112 has guide means in the form of a plurality of wheels 117 and 118 riding respectively on tracks 119 and 120. Lateral displacement of the base can be prevented by providing a groove 123 in each wheel 117 and shaping track 119 to fit in this groove, as shown in FIG. 10.

Each base 112 has a chair 128 mounted thereon and projecting upwardly therefrom. The chair is made up of a vertical support 130 comprising inner and outer telescopic members 132 and 133. Outer member 133 is secured to and hangs downwardly from a base section 135, while inner member 132 slidably fits in the outer member and projects upwardly above said base section. A pair of spaced vertical supports 138 and 139 mounted on and project upwardly from the upper end of inner member 132, and each of these supports is V-shaped at its upper end to form a seat 140 for receiving a log 69.

Inner member 132 is shifted up and down by a fluid cylinder 147 mounted in outer member 133 and having a piston rod 148 projecting upwardly therefrom and connected to a lower portion of said inner member 132. Chair 128 and base section 135 are shifted laterally of base 112 by a fluid cylinder 152 connected to said base and having a piston rod 153 extending laterally therefrom and connected at its outer end to outer member 133 near the upper end thereof, or, if desired, directly to base section 135 see FIG. 10. A pair of tracks 157 and 158 are mounted on the top of and extend transversely of each base 112, and base section 135 of chair 128 rests upon and is adapted to slide along these tracks. Track 157 is formed with a ridge 160 extending along the upper surface thereof which fits into a corresponding groove 161 formed in base 135 and extending transversely thereof. Track 158 may also be shaped to fit in a groove in the base section, although in this example, track 158 is flat and the base section rests on the upper surface thereof.

One or more pairs of gripping dogs are mounted on each chair 128. In this example, three pairs of dogs 162, 163 and 164 are mounted on the supports 138 and 139 of the chair. Dogs 162 are relatively large or long, dogs 163 are a little shorter, and dogs 164 are shorter still. These dogs are adapted to grip logs of different diameters. The pairs of dogs are mounted on supports 138 and 139 in the same manner, and only one pair will now be described in detail. Dogs 162 are pivotally mounted on pins 166 intermediate their ends, said pins being carried by supports 138 and 139, see FIG. 11. The outer ends of each of these dogs is formed with an inwardly extending prong 167, while the inner end of the dog is formed with a slot 169 in which a pin 170 slidably fits, said pin being common to both dogs 162. This pin is carried by the upper end of a piston rod 172 of a fluid cylinder 173 pivotally mounted at its lower end on a pin 174 carried by inner telescopic member 132. When piston rod 172 is extended dogs 162 are moved outwardly and away from the log, and when said piston rod is retracted, the prongs 167 of the dogs are driven into the log resting on the seat 140. Dogs 163 and 164 are operated by cylinders 176 and 177, shown in FIG. 11.

Apparatus 110 consisting of a plurality of bases 112 may be reciprocated along tracks 119 and 120 by standard mechanism for this purpose, but the tracks can be arranged in a loop so that the bases always move in the same direction. In this case, it is preferable to have enough bases so that two or more logs can be carried at one time. With this arrangement, one log can be positioned on some of the chairs while another log on other chairs is being cut by the cutting elements. The height and lateral position of the log can be adjusted by extending and retracting telescopic members 132 and 133, and by shifting base sections 135 and, consequently, the chairs laterally of base 11 by means of cylinder 152. The hydraulic or pneumatic connections for cylinders 147, 152, 173, 176 and 177 are standard and do not need any description herein.

Apparatus 110 is used to move logs past one or more cutting elements, not shown. As each log is gripped from beneath, it can be worked on simultaneously by one or more of the cutting elements, which usually are head saws and/or chipper heads.

I claim:

1. Apparatus for gripping and transporting logs past cutting elements for accurate cutting thereof, comprising a plurality of bases arranged longitudinally in series, each base being swingably mounted adjacent one end thereof to permit its opposite end to be moved up and down, guide means supporting said bases for movement longitudinally thereof, means interconnecting said bases for movement in unison, an upwardly projecting chair mounted on each base adjacent said opposite end thereof, said chairs being adapted to support a log resting thereon and extending longitudinally of the series of bases, gripping means on the chairs reaching upwardly to the log and operable to grip said log from beneath, and power means connected to each base near said opposite end thereof for shifting the latter end and therewith the chair mounted on said each base up and down.

2. Apparatus for gripping and transporting logs past cutting elements for accurate cutting thereof, comprising a plurality of bases arranged longitudinally in series, a frame extending longitudinally of and past the bases and interconnecting said bases for movement in unison, guide means supporting said bases for movement longitudinally thereof, an upwardly projecting chair mounted on each base, said chairs being adopted to support a log resting thereon and extending longitudinally of the frame, gripping means on the chairs reaching upwardly to the log and operable to grip said log from beneath, pivot means swingably connecting one end of each base to the frame and permitting its opposite end to be moved up and down, the chair of each base being mounted thereon adjacent said opposite end, and power means connected to each base near said opposite end thereof for shifting the latter end and therewith the chair mounted on said each base up and down relative to the frame.

3. Apparatus for gripping and transporting logs past cutting elements for accurate cutting thereof, comprising base means, guide means supporting the base means and for movement longitudinally thereof, a plurality of chairs on and spaced apart longitudinally of the base means and projecting upwardly therefrom, said chairs being adapted to support a log resting thereon and extending longitudinally of the base means, gripping means on each of said chairs reaching upwardly to the log and operable to grip said log from beneath, each chair being mounted for both transverse adjustment and vertical adjustment on the base means, first power means for shifting each of said chairs transversely on the base means independently of others of said chairs, and second power means for vertically shifting each chair independently of the others of said chairs.

4. Apparatus as claimed in claim 1 in which said base means comprises a plurality of bases arranged in series, and means interconnecting said bases for movement in unison, each chair being mounted on one of said bases.

5. Apparatus as claimed in claim 1 in which each chair has an upper end shaped transversely of the base means for cradling the portion of said log supported by said each chair.

6. Apparatus as claimed in claim 1 in which said gripping means comprises at least one pair of opposed gripping dogs movably mounted on each chair for movement towards and away from each other, and including power means for shifting said dogs towards and away from each other.

7. Apparatus as claimed in claim 1 in which the chair is mounted for transverse adjustment on said each base, and including power means connected to said chair for shifting the latter transversely of the base.

8. Apparatus as claimed in claim 7 in which said gripping means comprises at least one pair of opposed gripping dogs pivotally mounted on each chair for movement towards and away from each other, and including power means for shifting said dogs towards and away from each other.

9. Apparatus as claimed in claim 7 in which said gripping means comprises a plurality of pairs of opposed gripping dogs pivotally mounted on each chair for movement towards and away from each other, the dogs of each pair being of a different length than the dogs of each other pair so that the dog pairs grip logs at different levels relative to the longitudinal center of the logs, and including power means for shifting the dogs of each pair towards and away from each other.

10. Apparatus as claimed in claim 1 in which said interconnecting means comprises a frame extending longitudinally of and past said bases, and means connecting each base to the frame.

11. Apparatus as claimed in claim 2 in which said pivot means comprises a horizontal shaft extending through the one end of said each base and a portion of the frame.

12. Apparatus as claimed in claim 11 in which said guide means comprises wheels mounted on said shafts.