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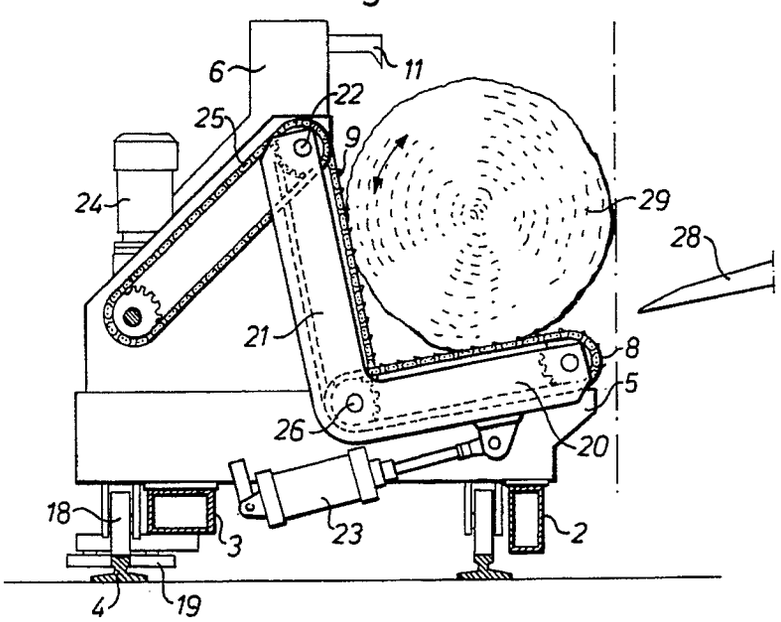
(54) A timber rotator.

(57) A timber rotator intended for a log carriage operative to feed timber workpieces through a sawmill. The timber rotator includes two arms (20, 21) which are provided with means for rotating a timber workpiece and capable of receiving and carrying a workpiece and, when necessary, to rotate the workpiece through a given angle. To this end the arms are fixated at a given, appropriate, angle relative to one another such as to form a substantially L-shaped cradle for accommodating a workpiece. The cradle is pivotally suspended at one upper end of the substantially vertically orientated leg (21). There is also provided a device (23) for swinging the cradle (20, 21) around the suspension point (22) in conjunction with receiving, rotating or laying-off a workpiece (29).

Fig. 4



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The present invention relates to a timber rotator intended for a log carriage operative to feed timber-pieces through a timber-sawing machine, said timber rotator comprising two arms which have mounted thereon timber-rotating devices and which are mutually connected to form an angle with one another, such as to be able to receive and support a timber workpiece and to rotate said workpiece through a desired angle when required.

In order, among other things, to obtain the best yield from logs when sawing the logs into planks and boards, it is necessary to be able to rotate the logs to desired positions, the aforesaid log rotator being used to this end. By timber workpiece, as used above and in the following, will be understood to include complete logs and blocks or the like sawn from logs.

A log is normally rolled-in from one side of a log carriage and stopped on the carriage by log holders provided on said carriage and displaceable laterally in relation to the forward direction of the carriage, for the purpose of setting desired saw measurements. A vertical surface on the log holders is used as a reference surface to this end. For the purpose of rotating the logs, the log carriage is provided with raisable arms provided with spiked chains for co-action with the logs, see for instance FR 1060252 and DE 150394. Since the logs are rotated against a stationary surface, log rotation generates large frictional forces, in addition to which logs tend to jam as a result of their irregular shape and general unevenness. A similar solution is illustrated and described in DE 1728164. This solution, however, requires the provision of a relatively powerful pneumatic piston-cylinder device 13, since the whole weight of the log shall be lifted by an arm located beneath the log.

Another serious drawback with the known arrangements is that the logs roll-in against and into impact with the vertically extending log holders, which are therewith liable to be damaged or deformed, which may influence the measurement accuracy of the sawn products.

In order to facilitate log rotation, it has also been proposed to permit the log to be supported entirely by arms equipped with spiked chains. One such proposal is set forth in DE 1209272. Such solutions, however, are usually encumbered with the disadvantage of requiring several, separate piston-cylinder units for the purpose of manoeuvring the arms. These piston-cylinder units must also be of powerful construction, since they are normally required to support a substantial part of the weight of the logs. Furthermore, the spiked chains provided on the arms are often driven separately, therewith requiring, inter alia, the provision of controlling and synchronizing devices.

The main object of the present invention is to provide a timber-rotator which can be fitted to a log carriage and which overcomes the aforesaid drawbacks.

Accordingly, the timber-rotator shall be configured so that when a log is rolled onto the carriage, the timber-rotator will receive the logs without damage to the log holders, and so that arms equipped with spiked chains or the like are able to rotate or twist the logs in the absence of any Friction or jamming tendencies. Furthermore, it shall be possible to manoeuvre the arms with the aid of a relatively weak piston-cylinder device.

This object is achieved with a timber-rotator of the kind described in the introductory paragraph and which, in accordance with the present invention, is characterized in that the arms are fixated at a given angle to one another, such as to form a substantially L-shaped cradle for accommodating a timber workpiece; in that said cradle is pivotally suspended at one upper end of the substantially vertically extending leg; in that means are provided for pivoting the cradle about its suspension point in conjunction with receiving, rotating or depositing a timber workpiece. The cradle legs will preferably form essentially a right angle with one another.

Preferably, the timber-rotator will be mounted on the log carriage so as to be embraced on both sides by a log holder provided with an essentially vertical reference surface, said log holders being displaceably transversely in relation to the movement direction of the carriage, and an associated, essentially horizontal support surface on said log carriage. In this case, when the cradle is at rest, the respective substantially horizontal and substantially vertical legs of the cradle will be located slightly beneath and slightly behind the support surfaces on the log carriage and the reference surfaces on the log holders. The cradle is therewith conveniently adapted so as to be able to swing forwards and upwards when receiving and possibly rotating a workpiece, so that the workpiece carried by the cradle will pass free from the support and reference surfaces of the log carriage and the log holders.

When a log is rolled onto the log carriage, the log will be caught by the timber rotators, without coming into contact with the log holders. Any required rotation of the log is effected by the log rotators in this position and without contact of the log with the log holders or the log carriage.

The cradle is preferably swung with the aid of a piston-cylinder device acting between the log carriage and the substantially horizontal leg of the cradle. Since a large part of the weight of the log is taken-up by the journal at the upper end of the vertical leg, the piston of said piston-cylinder device need not be required to exert a large force.

The two legs of the cradle are conveniently

provided with synchronously-driven spiked chains or corresponding devices. Preferably, the spiked chain of the substantially vertical leg is driven by a drive wheel which rotates around the pivot axis, and that the other leg is provided with two mutually parallel, spiked chains which are driven by the first mentioned chain via a drive wheel positioned at the junction point of said legs.

To facilitate handling timber of both large and small dimensions, the timber rotator may also include an upwardly swingable arm equipped with at least one spiked chain or corresponding device and mounted on the outer end of the substantially horizontal cradle-leg. This arm is manoeuvred appropriately with the aid of a piston-cylinder device acting between the arm and the substantially horizontal leg.

The invention will now be described in more detail with reference to exemplifying embodiments thereof illustrated in the accompany drawings.

Figure 1 is a schematic view, from above, of a log carriage equipped with an inventive timber rotator.

Figure 2 is a side view taken on the line II-II in Figure 1.

Figure 3 is a view taken on the line III-III in Figure 1.

Figures 4 and 5 illustrate an inventive timber rotator at work.

Figure 6 illustrates the use of a timber rotator in ejecting a residual block.

Figures 7-9 illustrate a modified embodiment of an inventive timber rotator and show the timber rotator during three different working moments.

In Figure 1, the reference numeral 1 identifies generally a log carriage built on two beams 2 and 3 which extend in the longitudinal direction of the carriage. The carriage is movable reciprocatingly in the direction of the arrow A on two rails 4, for the purpose of feeding a log carried by the carriage through, for instance, a bandsaw several times, so as to saw the log into blocks, planks and boards.

The log carriage 1 also includes transverse support beams 5 and tower-like holders 6 which are displaceable along said transverse beams in the direction of the arrows B and which function to hold firmly logs rolled-in onto the carriage in the direction of the arrow c. Stationary but pivotally mounted between the log-holder towers 6 are timber rotators 7, each of which has two substantially horizontal spiked-chains 8 and one substantially vertical spiked-chain 9 for rotating the timber-workpieces fed onto the carriage 1.

As will best be seen from Figure 2, each of the tower-like log-holders 6 includes a vertical reference surface 10, against which a log carried by the support beams 5 abuts while being held firmly with the aid of pairs of mutually co-acting holding devices 11, 12, in a known manner. The reference 10 can be replaced with the leading edge 13 of a straight edge 14 mounted on respective towers 6 and displaceable in parallel, particularly when sawing the last parts of a log. The straight edge 14 is manoeuvred with the aid of a pneumatic piston-cylinder device 15.

The reference numeral 16 identifies a motor which is operative to move the log-holding tower 6, via a chain 17, backwards and forwards along the beam 5, in the transverse direction of the carriage, for the purpose of setting desired saw measurements. When the log carriage is moved towards and away from a bandsaw, the carriage runs on wheels 18 co-acting with the rails 4. In this respect, the reference 19 identifies lateral-guide wheels.

Figure 3 is an illustration of an inventive timber rotator in which part of the casing has been cut away. The timber rotator includes two arms provided respectively with spiked chains 8 and 9. The arms are rigidly connected together at one end thereof, to form an L-shaped cradle which functions to receive and rotate a timber workpiece. The arms, or legs 20, 21 of the cradle form a fixed angle with one another, suitably an angle of 90°. The cradle is pivotally suspended from a pivot pin 22 at the upper end of the leg 21.

Pivoting of the carriage between the position shown in full lines and the position shown in chain lines is effected by means of a pneumatic piston-cylinder device 23 which acts between the leg 20 and the frame of the log-carriage. The spiked chain 9 extending along the leg 21 is driven by a motor 24, via a chain 25, and a spocket wheel rotatable about the pivot pin 22. The spiked chain 9, in turn, synchronously drives the two spiked chains 8 extending along the leg 20, via an axel 26 and spocket wheel 27. The reference 28 identifies a path operative to feed logs onto the log carriage.

Figure 4 shows the position occupied by the timber-rotator when a log 29 is rolled onto the log carriage. In this position, the cradle 20, 21 has been swung by the pneumatic piston-cylinder device 23, forwards and upwards around the journal pin 22. The leg 20 is thus located at a slightly higher level than the support beams 5 of the carriage, whereas the leg 21 is located slightly in front of the reference surfaces 10 on the log-holding towers 6. Thus, the log 29 has been caught by the timber rotators and brought to a standstill without striking the reference surfaces on said towers, thereby protecting said towers against damage and deformation.

In the position illustrated in Figure 4 the log is not in abutment with a stationary surface and can thus be readily rotated with the aid of the spiked chains 8 and 9. The spiked chains are driven synchronously, by one and the same motor 24.

The L-shaped cradle 20, 21 can be swung-out quite easily with the aid of a single, relatively small pneumatic piston-cylinder device 23, since the major part of the weight of the log 29 is taken-up by the journal pin 22 of the leg 21. Consequently, the piston-cylinder device 23 need only exert a very moderate lifting force. Neither is it necessary to provide complicated steering or control means for synchronizing the various separate movements.

When the log 29 has been rotated to the correct position, it is laid-off and clamped firmly between the log-holding tower 6 and the support beams 5. To this end, solely the cradle 20, 21 is again swung downwards under the control of the piston-cylinder device 23, to the cradle rest-position, in which the legs 20, 21 are respectively located beneath and behind the support beams 5 of the carriage and the reference surfaces 10 of the towers 6. The log will therewith rest on the beams 5.

In the Figure 5 illustration, the cradle 20, 21 has again been swung forwards, so as to rotate a timber-block 30 from which a number of planks and boards have already been sawn. Subsequent to achieving the desired position of rotation, the cradle is permitted to return so that the timber block will be placed on the support beams of the carriage, where the block can again be clamped. Because of the spocket wheels 27 mounted on the common axel 26, the mutual movement directions of the chains 8, 9 will always be correct, irrespective of the direction in which a log or block is rotated.

Figure 6 illustrates schematically the position adopted by the log-holding tower 6 in relation to the timber rotators when sawing the last part of a block 31. The Figure illustrates particularly that the cradle 20, 21 can again be swung forwards and upwards at the end of a sawing operation, so as to assist in ejecting the residual block 31 from the support beams 5.

Figures 7-9 illustrate a modified embodiment in which the substantially horizontally leg 20 of the cradle has been extended with a short, upwardly pivotal arm 33 provided with a spiked chain 32. This enables one and the same equipment to be used readily for sawing logs of mutually different dimensions. Figure 7 illustrates the receipt and rotation of a log of very large diameter, wherewith the arm 33 is held in line with the horizontal leg 20 of the cradle.

When handling logs of smaller dimensions, see Figure 8, the arm 33 is swung slightly upwards, whereas when clamping a block in accordance with Figure 9, the arm can be swung-up to a fully vertical position.

The two positions shown in Figures 8 and 9 can be readily achieved with the aid of a twin pneumatic piston-cylinder device comprising two pistons and piston rods, which may have working strokes of mutually different lengths. In the Figure 8 illustration, solely the piston-cylinder device 35, which has the shorter length of stroke, has been activated, whereas in Figure 9 the pistons of both piston-cylinder devices 35 and 36 have been driven to their outer end positions.

Although the invention has been described in the aforegoing with reference to exemplifying embodiments illustrated in the accompanying drawings, it will be understood that these embodiments may be modified in various respects, without departing from the inventive concept and while remaining within the scope of the invention as defined in the following Claims. For instance, the log-receiving cradle may be provided with workpiece-rotating devices other than spiked chains. Pivotal movement of the cradle can also be achieved in a manner other than with the aid of the illustrated pneumatic piston-cylinder device. The number of timber rotators provided on a log carriage can also be any desired number. An inventive timber rotator can also be used in other contexts where a corresponding function is desired.

Claims

1. A timber rotator intended for a log carriage (1) operative to feed timber workpieces through a sawmill, said timber rotator comprising two arms (20, 21) which are provided with means for rotating a timber workpiece (20, 30, 31) and which are mutually connected to form an angle with one another such as to be able to receive and carry a workpiece and, when necessary, to rotate said workpiece through a given angle, **characterized** in that said arms are fixated at a given angle relative to one another such as to form a substantially L-shaped cradle for accommodating a workpiece (29, 30, 31); in that said cradle is pivotally suspended at one upper end of the substantially vertically orientated leg (21); and in that a device (23) is provided for swinging the cradle around the suspension point (22) in conjunction with receiving, rotating or laying-off a workpiece.

2. A timber rotator according to Claim 1, **characterized** in the cradle legs (20, 21) form essentially right angles with one another.

3. A timber rotator according to Claim 1 or 2, **characterized** in that the timber rotator is mounted on the log carriage (1) so as to be embraced on both sides by a log holder (6) provided with a substantially vertical reference surface (10), said log holders being displace-

able in a direction transversely to the forward direction of the log cradle, and an associated essentially horizontal support surface (5) on the log carriage.

4. A timber rotator according to Claim 3, **characterized** in that in the rest position of the cradle, the substantially horizontal (20) and substantially vertical (21) legs of the cradle are located respectively slightly beneath and behind the support surfaces (5) on the log carriage (1) and the reference surfaces (10) on the log holders (6) respectively.

5. A timber rotator according to Claim 4, **characterized** in that the cradle (20, 21) is intended to be swung forwards and upwards when receiving and possibly rotating a timber workpiece (29, 30, 31), so that the workpiece carried by the cradle will pass free from the support and reference surfaces (5, 10) on the log carriage (1) and the log holders (6) respectively.

6. A timber rotator according to Claim 5, **characterized** in that the cradle (20, 21) is intended to be swung with the aid of a piston-cylinder device (23) acting between the log carriage (1) and the substantially horizontal leg (20) of said cradle.

7. A timber rotator according to any one of Claims 1-6, **characterized** in that the cradle legs (20, 21) are both provided with synchronously driven spiked chains (8, 9) or corresponding devices.

8. A timber rotator according to Claim 7, **characterized** in that the spiked chain (9) of the substantially vertical leg (21) is driven by a drive wheel which is rotatable about the pivot axel (22); and in that the other leg (20) is provided with two, mutually parallel spiked-chains (8) which are driven by the first mentioned spiked chain (9) via drive wheels (27) positioned in the junction point of the cradle legs (20, 21).

9. A timber rotator according to any one of Claims 1-8, **characterized** in that an upwardly swingable arm (33), provided with at least one spiked chain (32) or corresponding device, is provided at the outer end of the substantially horizontal leg (20) of the cradle.

10. A timber rotator according to Claim 9, **characterized** in that said arm is manoeuvred with the aid of a piston-cylinder device (35, 36) acting between said arm and the substantially horizontal leg (20) of said carriage.

Fig.1

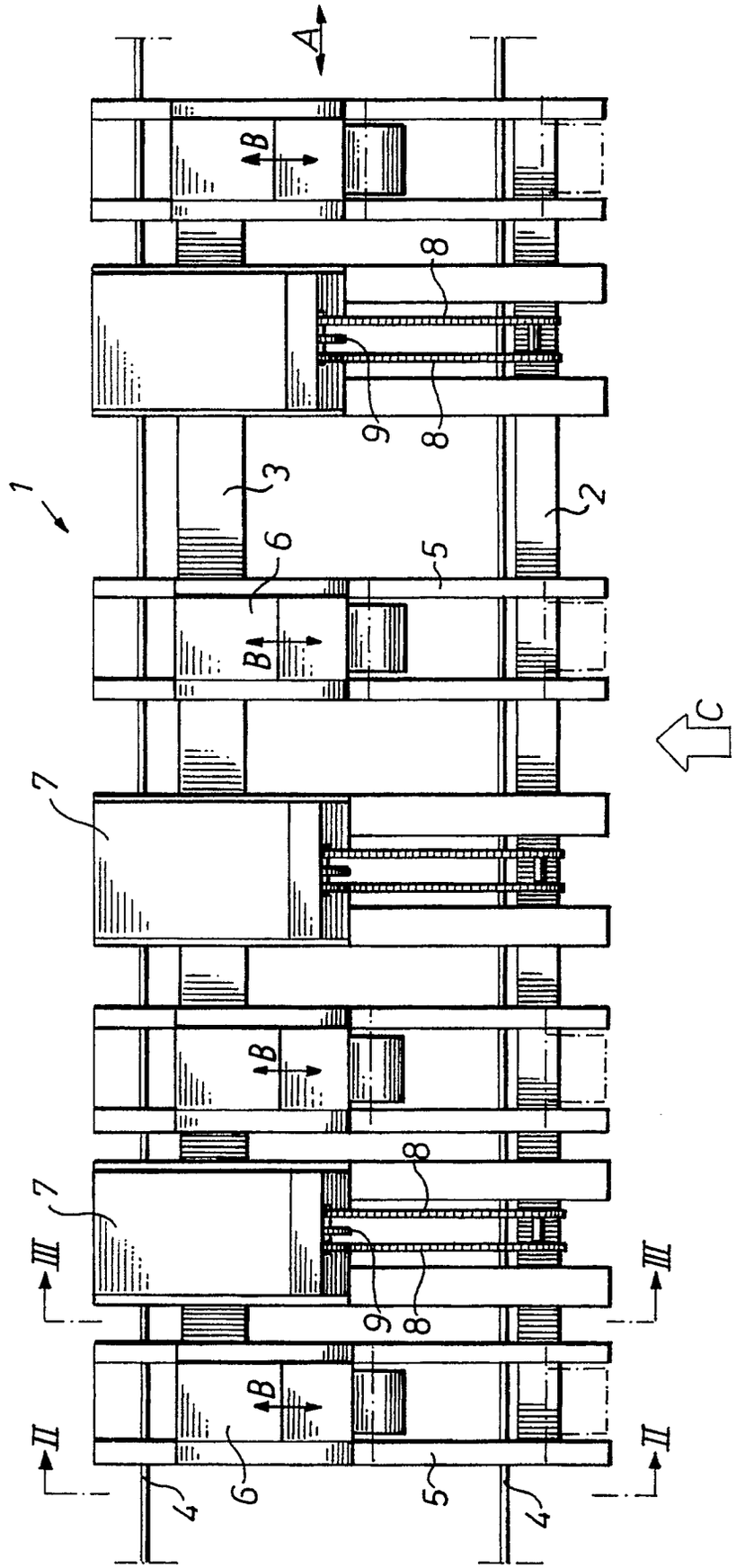


Fig. 2

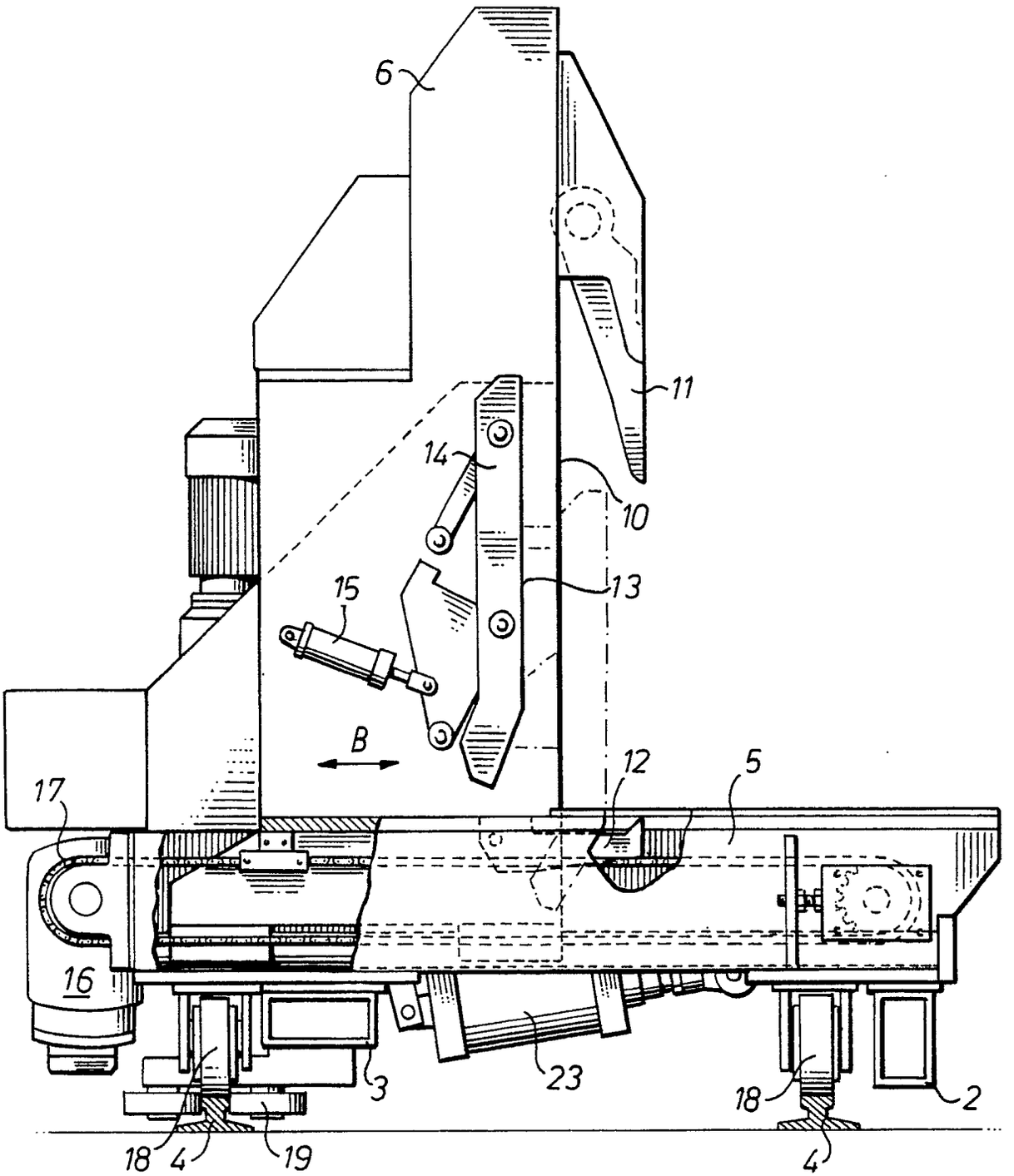


Fig. 3

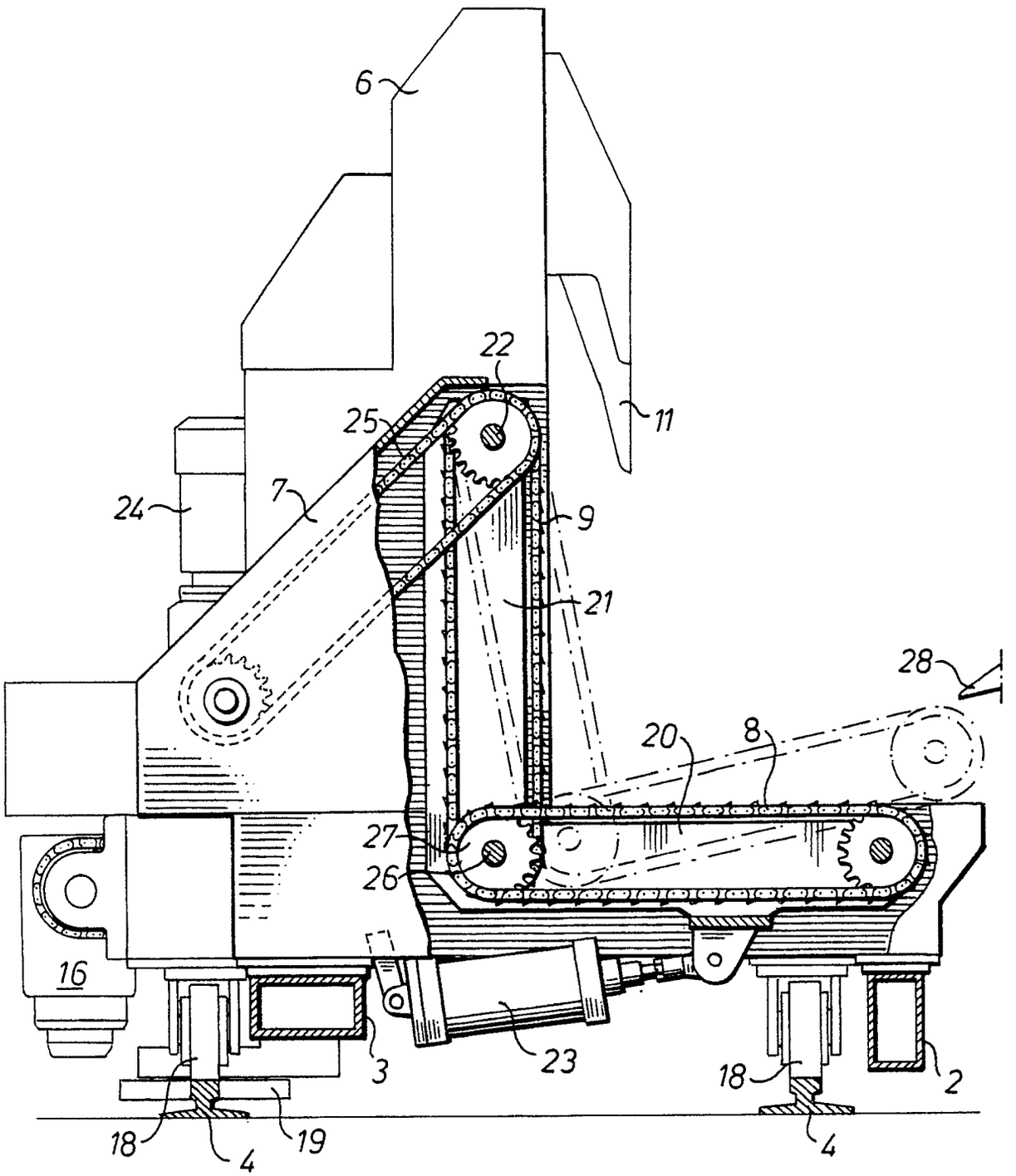


Fig. 4

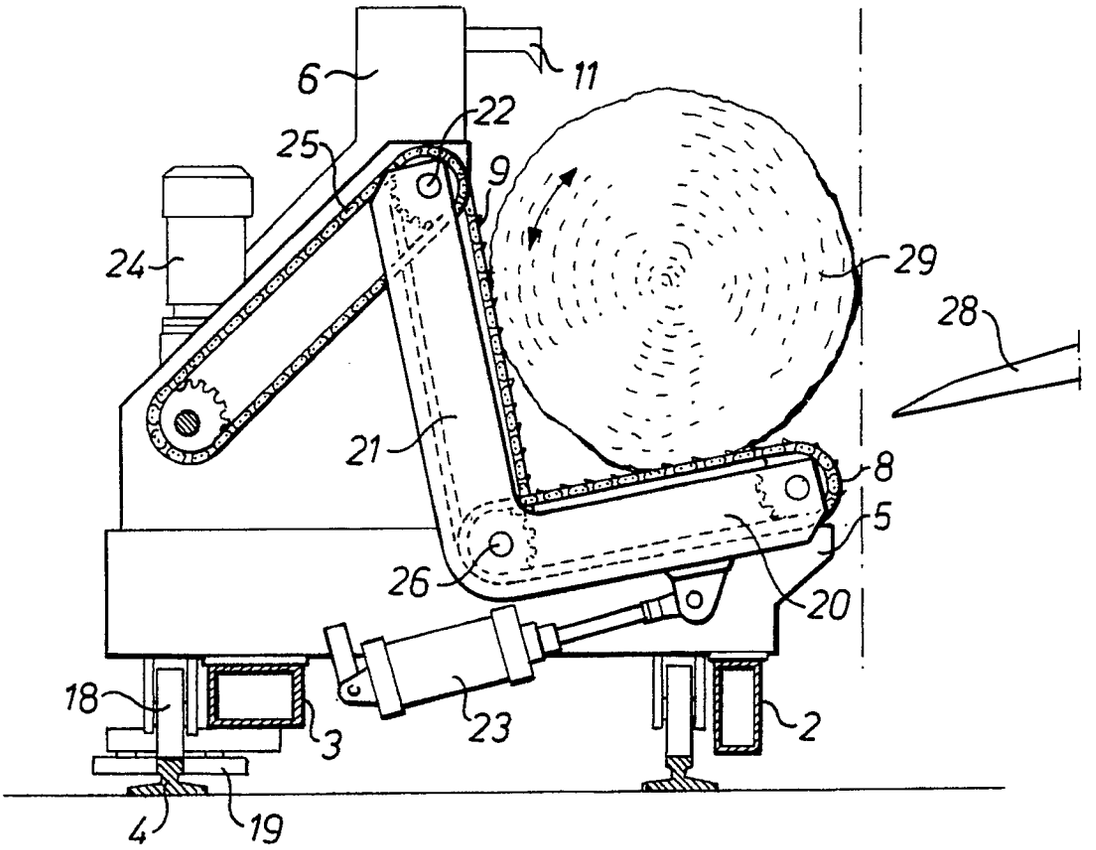


Fig.5

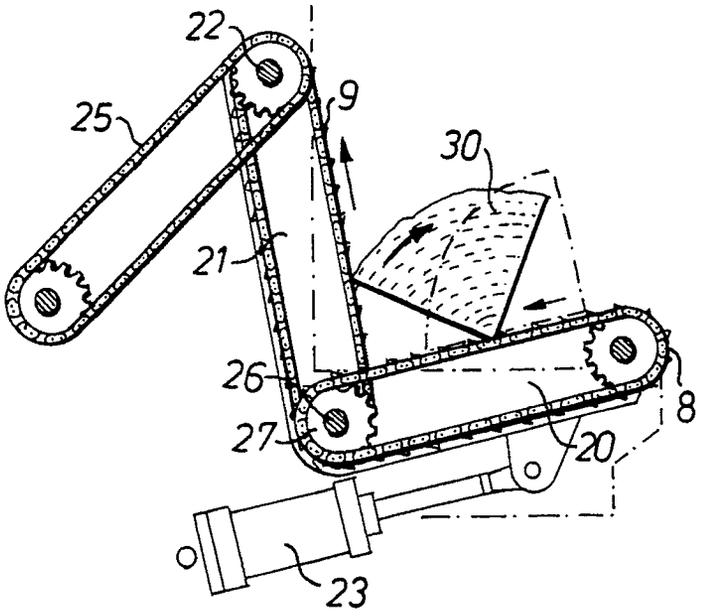


Fig. 6

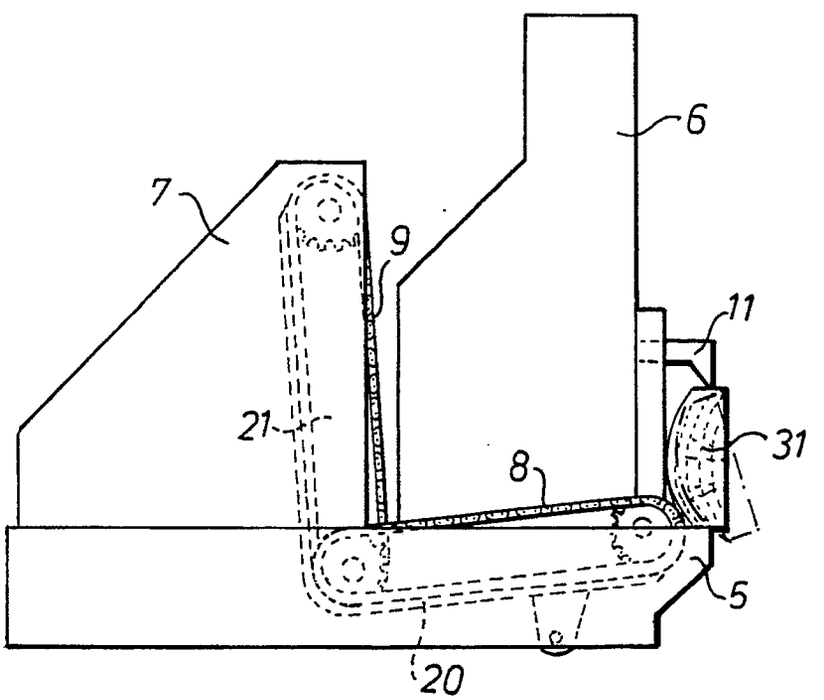


Fig. 7

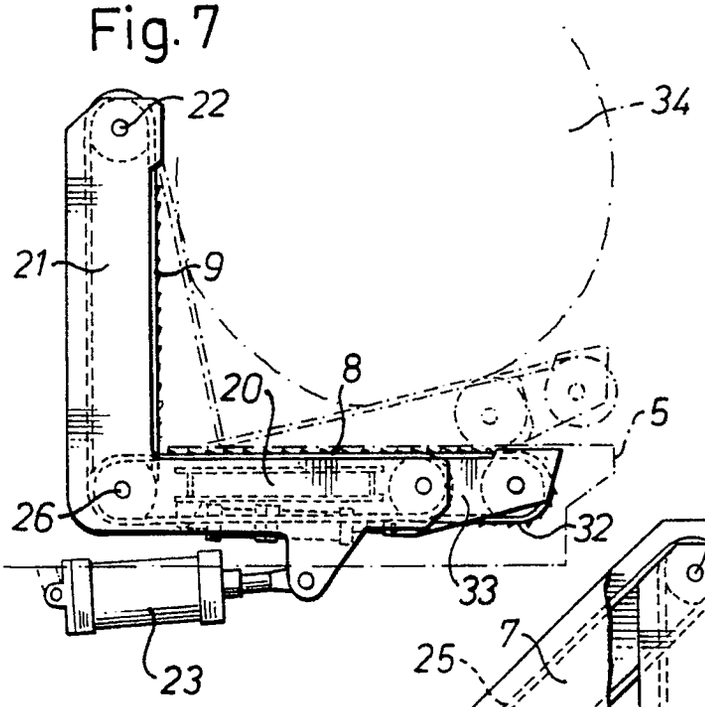


Fig.8

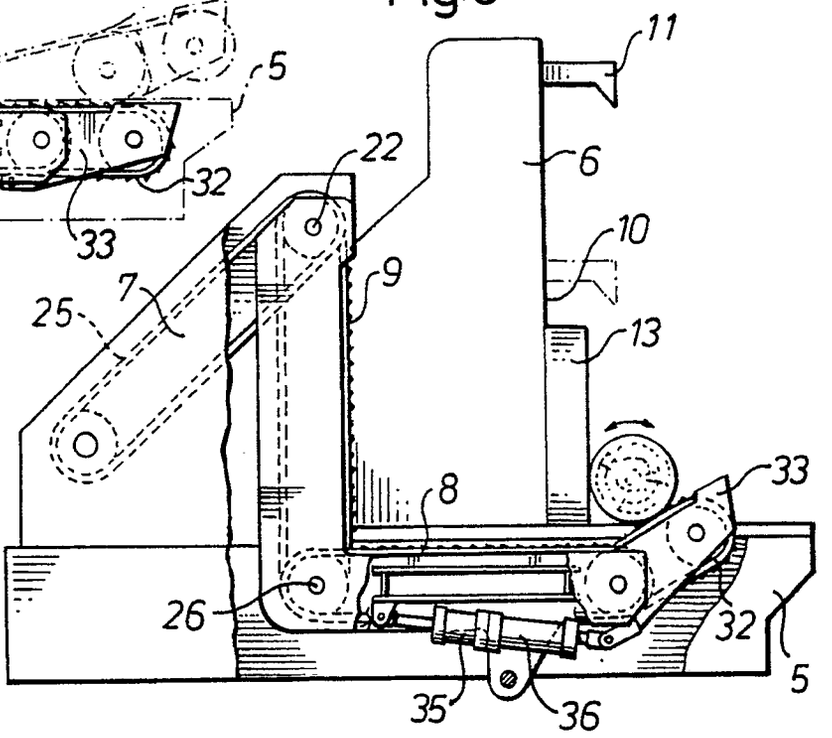
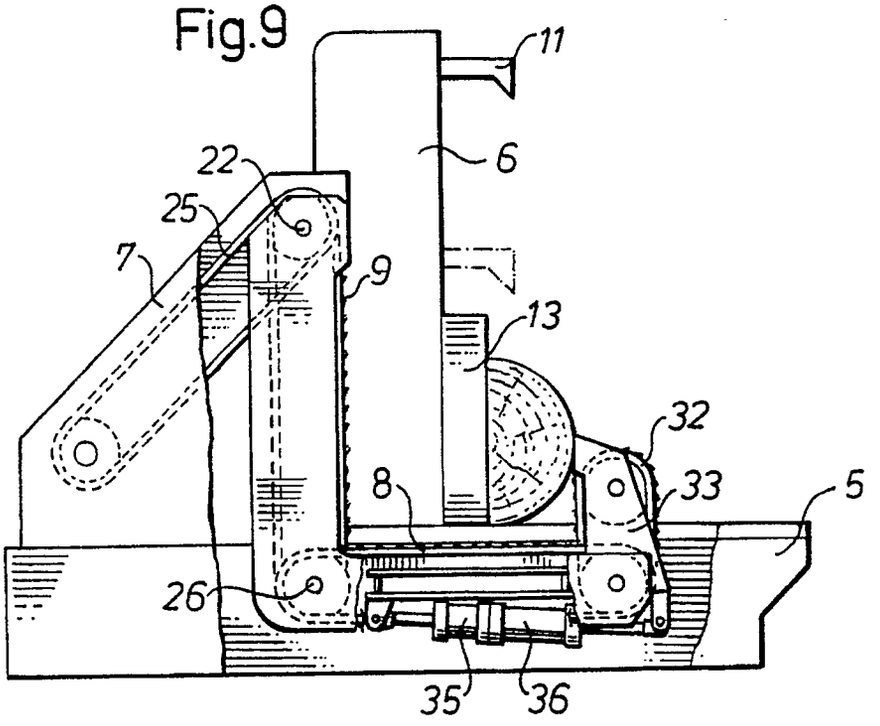


Fig.9



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EUROPEAN SEARCH REPORT

Application Number

EP 90 85 0160

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
A,D	FR-B-1 060 252 (R.-E. RENNEPONT) * Abstract; figures 1,2 *	1,3-7	B 27 B 29/08 B 27 B 31/04
A	FR-A-1 434 149 (ETABLISSEMENT ANDRE VIGNEAU) * Abstract; figure 3 * & DE-A-1 503 945	1,3,9	
A,D	DE-B-1 209 272 (E. SCHULTE) * Claim 1; figure 1 *	1,3,9	
A,D	DE-A-1 728 164 (A. SANDBICHLER) * Claims 1,2,5; figure 2 *	1,3-5	
A	FR-A-2 360 392 (G. CANALI) * Claim; figures 1-4 *	1,3,7	
A	US-A-2 950 742 (C.O. WEIKEL) * Claim 1; figures 1,2 *	1,3,7	

TECHNICAL FIELDS SEARCHED (Int. Cl.5)

B 27 B

The present search report has been drawn up for all claims

Place of search	Date of completion of search	Examiner
The Hague	25 October 90	SOEHNLEN T.J.E.

CATEGORY OF CITED DOCUMENTS

X: particularly relevant if taken alone
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