(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 1 454 721 A2

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
08.09.2004 Bulletin 2004/37

(51) Int Cl.[7]: **B27B 29/04**

(21) Application number: **04425139.5**

(22) Date of filing: **02.03.2004**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IT LI LU MC NL PL PT RO SE SI SK TR
Designated Extension States:
AL HR LT LV MK

(30) Priority: **04.03.2003 IT MO20030052**

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(54) Tree trunks seizing plant, for use in a sawmill

(57) The invention concerns a tree trunk seizing trolley, to be used in a sawmill, and which is formed by several aligned modules (5) running on rails (7A,7B). Each module (5) includes a vice (4), tree trunk rotating means (9), and other devices necessary to seize, to rotate, and to position the tree trunk (8). The modules (5) are not rigidly fixed to a support frame, but can be selectively connected to a draft rope (10), including the possibility of arranging them at selectable distances to each other, according to the needs.

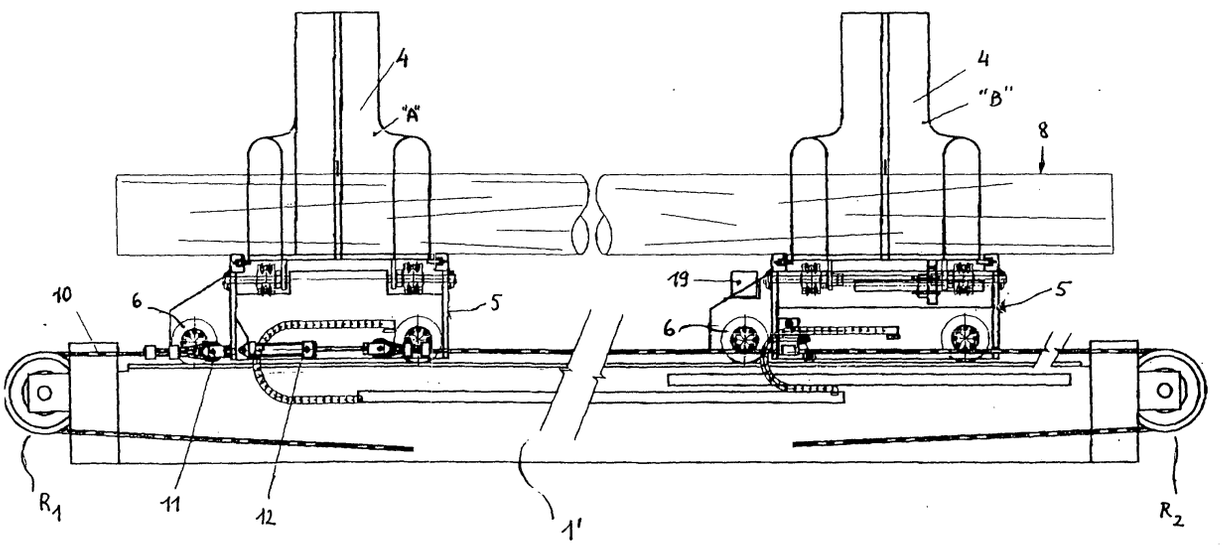

Fig. 2

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Description

Technical Field

[0001] The present invention relates to a tree trunks seizing plant to be used in a sawmill, including several modules onto which a tree trunk may be hooked.

Background Art

[0002] Tree trunk seizing trolleys, like those commonly used in sawmills, have been known for long time; they comprise (see Fig. 1) a movable frame 1 carrying, on its lower part, wheels which move along a rail (not shown) fixed onto the floor, whereas on top of said frame 1 there are mounted one or more vices 4 (Fig. 1 shows four of them) suited to seize a tree trunk.

[0003] The frame 1, supporting all of this, has a length depending on the maximum length of the tree trunks to be sawed in the sawmill, while the number of vices 4 is directly related to the length of the trolley's frame 1; actually, in some kinds of trolleys it is possible, within certain limits, to displace one or two vices 4 so as to reduce or increase their mutual distance.

[0004] Said trolley 1 can be moved alternately in opposite directions along the rail by an appropriate mechanism, usually consisting of a motorised steel rope rigidly connected to the trolley 1.

[0005] The principal problems inherent in these known solutions are:

the length of the trolley, after its manufacturing, cannot be varied (adapted); this implies the following:

a) if during a certain period only short trunks need be sawn, there is a useless waste of time and energy because a long and heavy trolley must be displaced;
b) if tree trunks longer than usual have to be sawn, difficulties are encountered, and sometimes the task becomes impossible if the trolley size is too short;
c) if the trolley has been designed only for three vices, it cannot be adapted; it is neither possible to remove a vice, nor to add a fourth vice;
d) the mutual distance between a vice and the next one can only be varied within predefined limits, and the maximum distance between the first and last vices is bound by the frame's longitudinal size.

[0006] In fact, in some known solutions the vices 4 of the trolley 1 can be moved (adjusted) only after loosening respective bolts and tightening the same bolts in other predetermined positions, and after effecting in this way a series of operations that are both tedious and time consuming. The displacements obtained in this manner, of the various vices 4, are indeed limited. In practice, the manufacturers of this kind of trolleys provide for this adjustment possibility in order to increase the number of sold products (trolleys) rather than for solving a practical problem. Actually, hardly ever are these vices 4 displaced on the trolley 1, to vary their mutual distances by so small amounts.

[0007] In other cases, as mentioned above, the vices are even integral with the structure of frame 1.

Disclosure of Invention

[0008] The main object of the invention is to overcome the problem of being forced to use a movable frame that limits the number of vices and the choice of their mutual distances.

[0009] A further object of the invention is to devise a system allowing to combine together several modules having respective vices, while choosing at will their number and mutual distances, so that these modules will accomplish the task currently accomplished by a trolley; this entails the advantage that, according to the number of modules being used, and depending on their mutual distances, they will have the same functionality as a whole range of trolleys with different lengths.

[0010] A further object is to be able to use only two modules during the processing of short tree trunks.

[0011] Still another object is to reduce production costs and limit transport problems during delivery, by eliminating the restraint to a specific frame.

[0012] Still a further object is to provide substantially identical modules, so that they can be produced on large scale and the production costs will drop.

[0013] A last object, in particular, is to be able to increase the degree of acceptance, by those who work on commission, in respect of the work flexibility that follows from the possibility of choosing and employing a number of modules best fitting to the intended work.

[0014] These and other objects are attained by providing a plant according to the present invention, which is characterised by:

a stationary basement, preferably formed by the sawmill's floor itself;
at least two modules, supported on the basement, each having at least four wheels running on a fixed rail of the basement, as well as a vice suited to seize a tree trunk;
a connection device, connected to a module, and apt to selectively engage or disengage a draft rope;
means provided at the basement, apt to transmit a to-and-fro motion to said draft rope;

wherein at least one of these modules comprises a brake, integral with the module, and suited to prevent the rotation of at least one of said module's wheels;

at least one module including also an automatic tension device for tensioning the rope, and the remaining modules having guide means for the rope, in order

to centre the same with respect to said connection device for connection to the rope; and

a distance sensor, or distance detector, being also provided, that measures and indicates on a display the distance separating the various modules from each other.

Brief Description of Drawings

[0015] Further features and advantages of the invention will more clearly result from the description of a preferred and non-limitative embodiment of the tree trunk seizing plant, for use in a sawmill, which is illustrated for exemplificative and non binding purposes in the annexed drawing, wherein:

Fig. 1 schematically shows a perspective view of a conventional trolley, equipped with four vices, where the wheels and the rail on which the trolley moves are omitted, and the trunk sawing machine is illustrated laterally;

Fig. 2 is a front view of the plant according to the present invention, including at least two modules and a mechanism suited to drive them;

Fig. 3 shows, seen from one side, one of the modules of Fig. 2, and one type of device allowing its connection to the draft rope;

Fig. 4 shows, on an enlarged scale, the above mentioned device that allows to selectively connect one of the modules to the draft rope.

[0016] In the various figures, the same alphanumeric symbols indicate the same elements or parts.

Best Modes of Carrying out the Invention

[0017] Referring to the drawings, 1' denotes a fixed basement, preferably formed by the sawmill's floor itself, and 5 generally indicates a module supported on wheels 6 rolling along a rail 7/a - 7/b, the latter being for instance built in the floor 1' of the sawmill.

[0018] Two rollers R_1 and R_2, one being idle and the other motorised, are used to drive a rope 10 that draws the modules 5, these rollers being located at the ends of the basement 1'.

[0019] In practice, the basement 1' coincides with the floor of the factory (sawmill) that receives the plant of the present invention, and the two rollers R_1 and R_2 will then be lodged - in this case - inside respective ditches or the like, below the level of the floor 1'.

[0020] Each module 5 includes:

- a vice 4, suited to immobilise a tree trunk 8 to be sawn;
- a tree trunk rotating device 9;

and every other kind of device used on already known tree trunk seizing trolleys, in order to immobilise, rotate, and position a tree trunk with respect to the blade of the sawing machine (not illustrated in Figs. 2-4) designed to dissect the tree trunk.

[0021] All these known apparatuses, and their respective motorizations, are neither included in the drawings nor described herein.

[0022] The object of the present invention consists in the realisation and in the association of two or more modules 5 on the fixed basement 1', these modules being substantially identical with each other except for the device that connects them to the draft rope 10. There will be a first module "A", which may be referred to as "head module" or "reference module", which is placed at, and made integral to, one end of the draft rope 10, by means of any known means 11. Both ends of the rope 10 are interconnected by the interposition of a connecting device (for instance an oil-operated linear actuator 12 whose circuit includes an accumulator), suited to elastically tension the rope 10 to a sufficient degree.

[0023] The remaining modules 5 (named "B modules") are provided with pliers (Fig. 4), including two jaws 13/a - 13/b that are linked at 14 on the structure of the module 5; these pliers are - for instance - actuated by an oil-operated actuator 15, and with their aid it is possible to selectively engage (to selectively hook) each module "B" to the rope 10, at any point whatsoever of the rope 10, in order to vary, from time to time, the mutual distance between these modules, and the distance to the module "A", according to the length of the tree trunks to be sawn, also by actuating the drive means R_1 and R_2 of the rope 10 that are located at the fixed basement 1'.

[0024] The modules "B", by means of suitable brackets 16 connected to their structure, support a channelled pulley 17 which is idly mounted on a pin 18, and whose function is to maintain the rope 10 in a centred position, so as to insure grasping by the pliers 13/a-b and their correct operation - which pliers form the device for the selective connection of each module B-.

[0025] According to this embodiment, on at least one of the four wheels of each module 5 of the "B" type there is provided a brake (not shown) that could be realised in many known configurations, whose function is to stop the modules 5 of the "B" type that are temporarily "off duty".

[0026] Reference numeral 19 denotes distance sensors, allowing to determine the mutual distance at which the various modules 5 are being placed.

[0027] The operation and use of the plant according to the invention will now be described. When a plurality of tree trunks must be sawn (e.g. in order to obtain wooden boards from the trunks), it is necessary, first of all, to subdivide these trunks into various "families" according to their length, if we want to avoid to be forced to continuously vary the arrangement of the modules 5 along the draft rope 10.

[0028] After having decided which trunk length has to be cut first, the question must be settled about how many modules 5 of type "B" are needed, and at which distance with respect to the reference module "A" (which is always fixed to the rope 10) they should be placed. After having determined the number of modules and having positioned them at the right distances, according to the length of the tree trunks to be sawn, the tree trunks can be sawn by operating specific devices available in the sawmill.

[0029] At the end of this work, a second family of tree trunks is processed (differing from the former one in its length); specifically, a new "combination" of "B" modules is provided, that could differ from the former combination in the number of modules and/or in their mutual distances; then, the sawing operation is carried out on this second family of trunks, and so on, until all tree trunks have been sawn.

[0030] It may be appreciated that by providing an adequate number of "B" type modules in the sawmill, and using only the required number in each case, and by arranging them at any required mutual distances, it is possible to reach a complete flexibility which allows optimisation of the work both in respect of the work schedule and the necessary time, thereby lowering final costs.

[0031] The invention, in the manner it has been devised, is susceptible of a number of modifications and variants; moreover, its details can be replaced by other ones, that are equivalent under the technical point of view.

Industrial Applicability

[0032] The present invention provides for an extreme flexibility in comparison with already known trolleys. The size of the floor 1' of the sawmill is practically unlimited with respect to all conceivable lengths of the tree trunks. Adding, if necessary, one or more modules of the "B" type, simply by laying them on the rails 7a, 7b, this plant can be adapted to any trunk length. The distances between these B-modules may then be varied at will, by amounts of the order of metres, centimetres, or millimetres, without restraint.

Claims

1. A tree trunk seizing plant for use in a sawmill, **characterised by**:

   - a basement (1'), usually formed by the floor of the sawmill, on which rails (7a, 7b) are fixed or built in;
   - drive members (R1; R2), for driving longitudinal draft means (10) used to draw at least two modules (5; A, B), these modules (5; A, B) having each at least four wheels (6) movable on the rails (7a, 7b);
   - a vice (4) for each module (5; A, B), suited to seize a trunk;
   - a selective hooking/unhooking device (13a, 13b; 14, 15), for selectively engaging a respective module (5; B) to the longitudinal draft means (10), this selective hooking/unhooking device being provided on at least one module (5; B);

   wherein the said drive members (R1, R2) are apt to rectilinearly displace the modules (5; A, B) to-and-fro, and can be used, in association with said selective hooking/unhooking devices (13a, 13b; 14, 15), for obtaining a predetermined arrangement of a subset of the modules (5; A, B) on said rails (7a, 7b), depending on a tree trunk size and on the cutting operations to be performed.

2. A plant according to claim 1, wherein said longitudinal draft means (10) form a rope.

3. A plant according to claim 2, wherein at least one module (5; A) has an automatic tension device (12) for tensioning said rope (10).

4. A plant according to claim 3, wherein each module (5; B) which does not have said automatic tension device (12), is provided with guide means (16, 17, 18) for said rope (10), which maintain the rope centred with respect to said selective hooking/unhooking devices (13a, 13b; 14, 15).

5. A plant according to claim 4, wherein each of said modules (5; B) has a brake integral with the module structure, suited to prevent the rotation of at least one of said wheels (6).

6. A plant according to claim 5, wherein each module (5; A, B) carries a distance sensor, or distance detector, which automatically indicates on a display the distance between the various modules.

7. A plant according to anyone of the preceding claims, wherein each module (5; A, B) includes, besides the vice (4), at least tree trunk positioning means, tree trunk rotating means, and means for controlling the advancement and closing of the vice (4).

8. A plant according to claim 1, wherein said selective hooking/unhooking device (13a, 13b; 14, 15) for selectively engaging the rope (10), includes pliers provided with jaws, that are controlled by means of a linear actuator (15) operated by a pressurised fluid, or by means of an electromechanical actuator, in order to connect the rope (10) to the module (5; B) at any selected point, thereby varying the distance between the modules (5; A, B) according to current

needs.

9. A plant according to claim 8, wherein at least another module (5; A) which does not have said selective hooking/unhooking device (13a, 13b; 14, 15), is connected to the rope (10) in a non-releasable manner by a thimble or any other equivalent means.

10. A plant according to claims 8 and 9, wherein the plant includes only one module (5; A) connected in a non-releasable manner to the rope (10), while the remaining modules (5; B) are used to prepare a sort of tree trunk seizing trolley, proportioned to the length of the tree trunk to be sawn.

11. A plant according to claim 3, wherein said automatic tension device (12), for tensioning the rope (10), may consist of an oil-operated linear actuator (12), whose control circuit includes an accumulator, in order to insure both the continuity of the presence of a tension in the rope (10), and the compensation of a possible length increase of the rope (10); this actuator (12) interconnecting two ends of the rope (10), one of which (11) is fixed in a non-removable manner to the structure of the module (5; A).

12. A plant according to claim 4, wherein said guide means (16, 17, 18) of said rope (10) include one or more channelled pulleys (17) that are idly mounted on a respective pin (18), the latter being supported by an arm which is rigidly connected to the structure of the respective module (5; B), or alternatively, said guide means comprising a sleeve that internally guides the rope (10), or else, said guide means embodying any other suitable means, which is always located in the vicinity of said selective hooking/unhooking device (13a, 13b; 14, 15) of the rope (10).

13. A plant according to anyone of the preceding claims, wherein each module includes a hydraulic, oil-operated central control unit, rapidly connectable connectors for feeding pressurised fluids and electric energy, and remote-controlled detectors, to individually or simultaneously actuate said vices (4) and all other devices carried by the modules (5; A, B).

14. A module (5; A, B) for seizing a tree trunk, adapted to be combined with other modules of the same kind in a plant according to the foregoing claims 1 - 13, **characterised in that** it includes a frame, with at least four wheels (6), at least one vice (4), and finally, either a selective hooking/unhooking device (13a, 13b; 14, 15) for selectively engaging or disengaging the draft means (10), or a device (11) that connects the module in a non-releasable manner to said draft means (10).

15. A module (5; A) according to claim 14, wherein the module (5; A) comprises a tension device (12) for tensioning said draft means (10).

16. A module (5; B) according to claim 14, wherein said module comprises guide means (16, 17, 18) for guiding said draft means (10).

17. A module (5; A, B) according to anyone of the claims 14 to 16, wherein the module comprises a distance detector.

18. A module (5; A, B) according to anyone of the claims 14 to 17, wherein the module includes means for centring a tree trunk, means for rotating a tree trunk, and mechanisms for controlling the advancement and closing of the vice (4).

19. A module (5; A, B) according to anyone of the claims 14 to 18, wherein a hydraulic, oil-operated central control unit is provided for, together with rapidly connectable connectors for feeding pressurised fluid and electric energy, and remote control detectors being also provided for, to enable the operation of the vice (4) and of other devices.

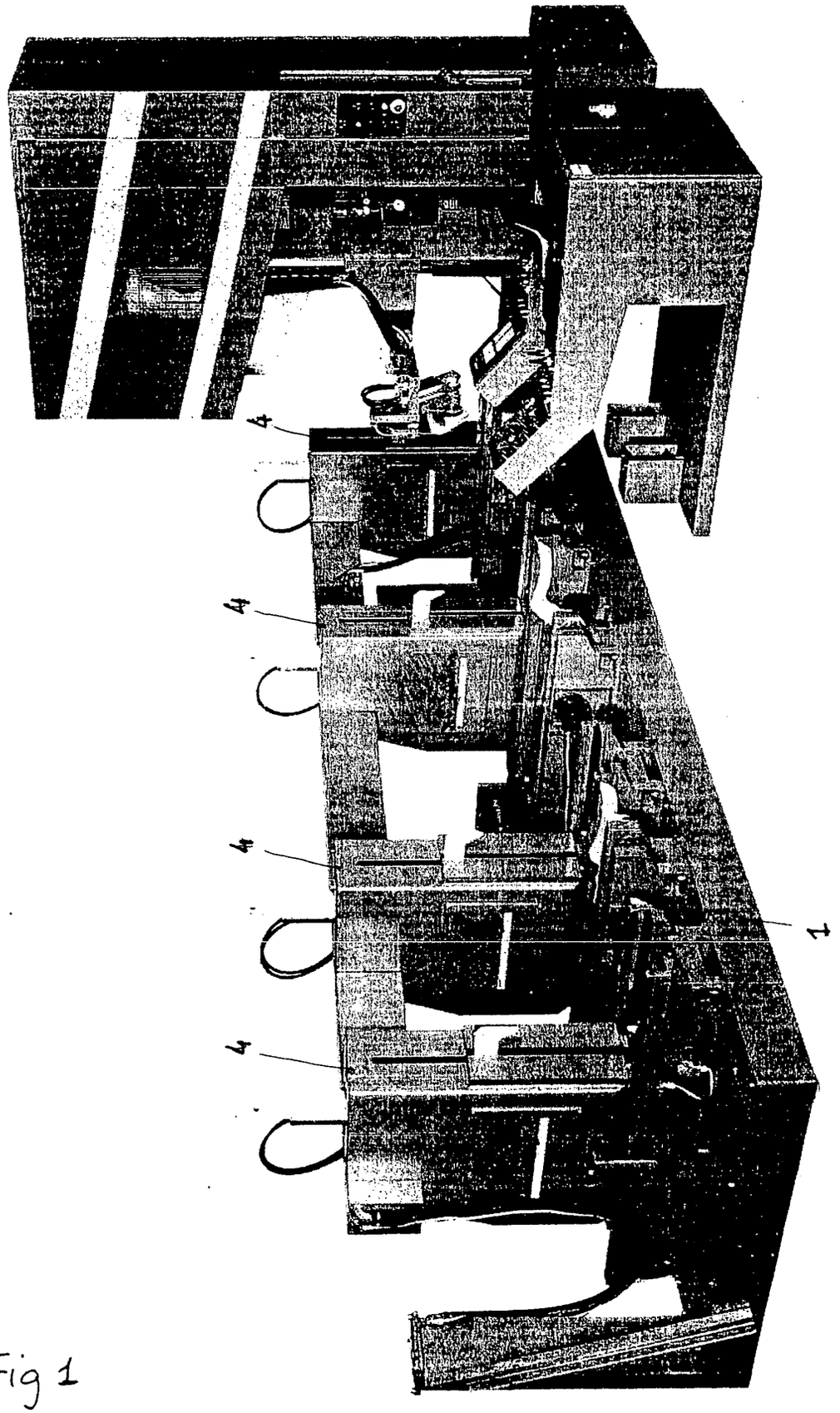

Fig 1

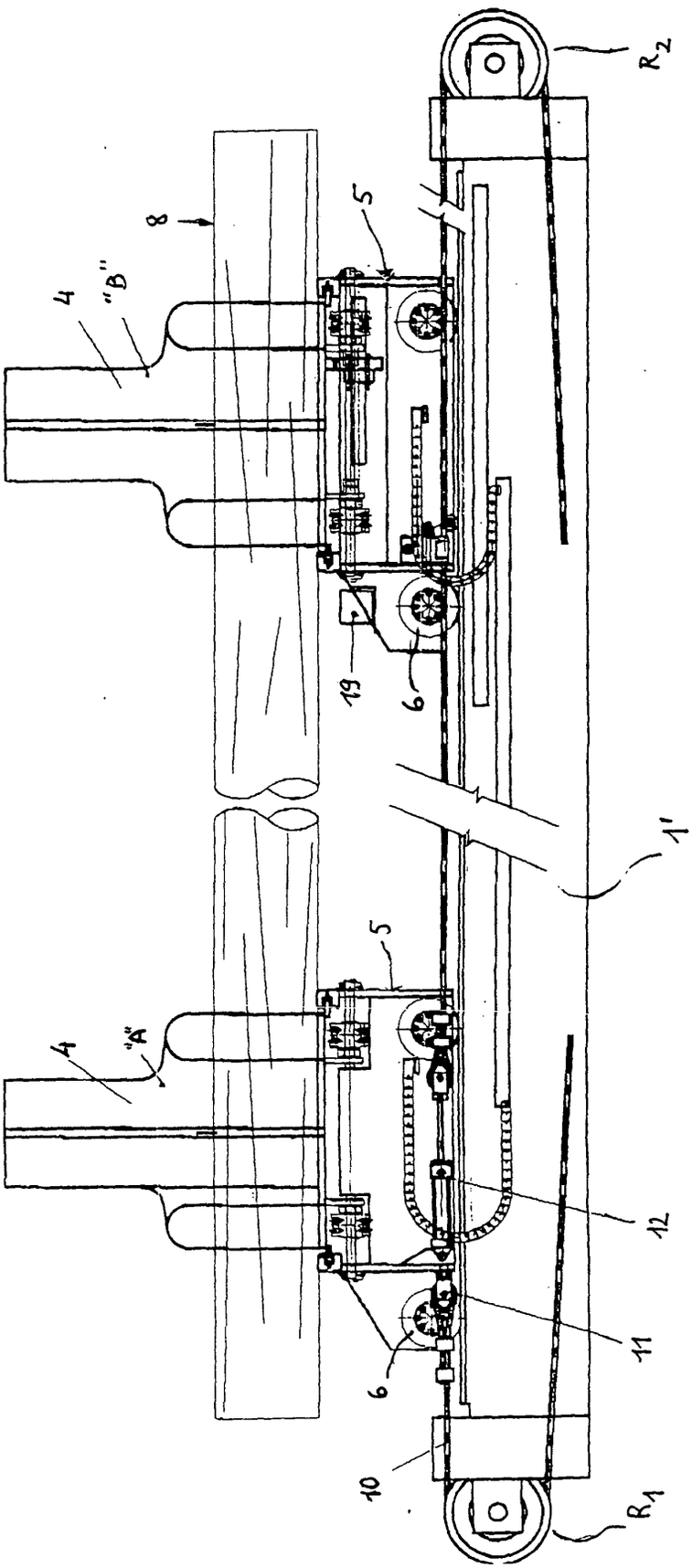

Fig. 2

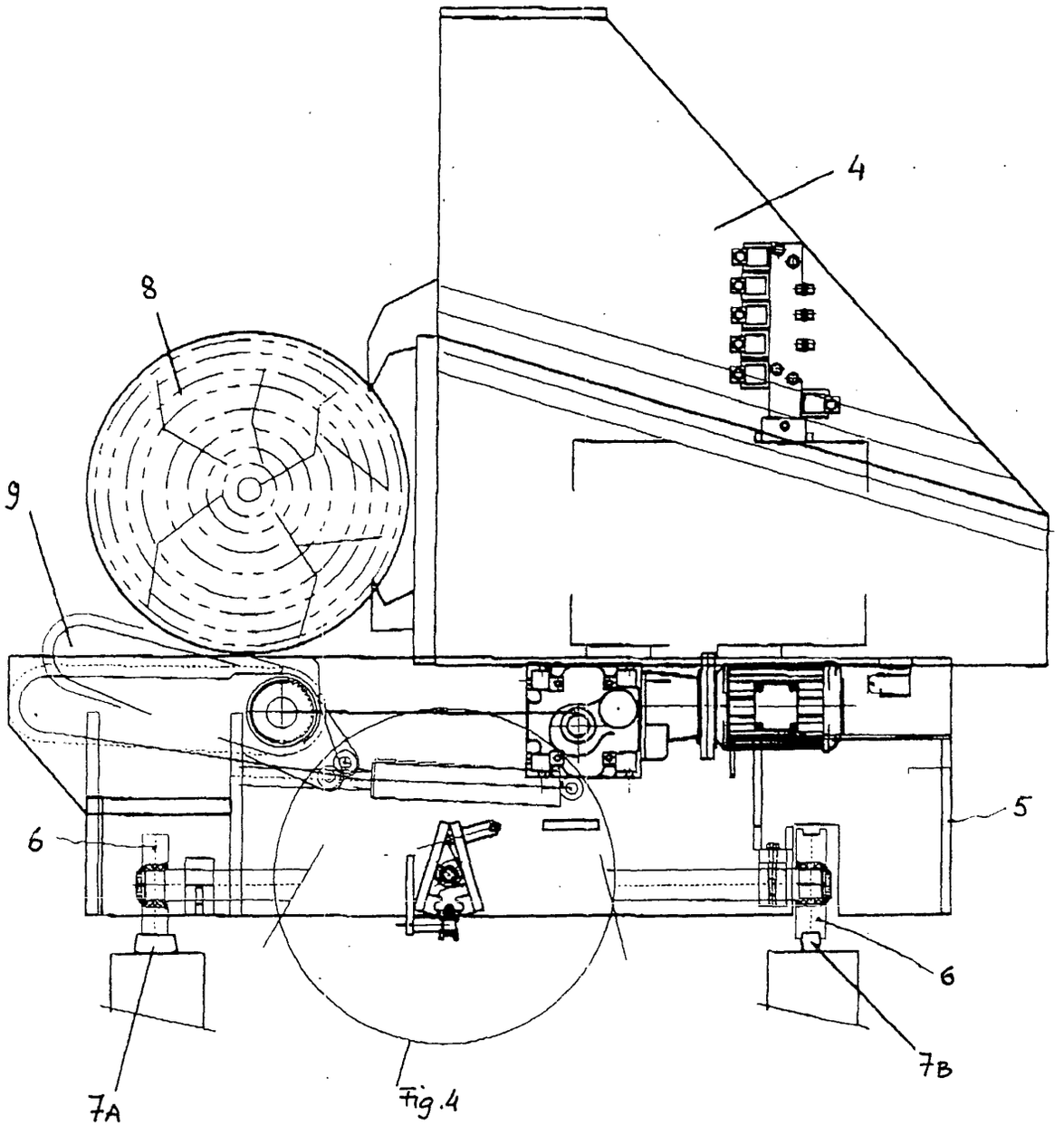

Fig. 3

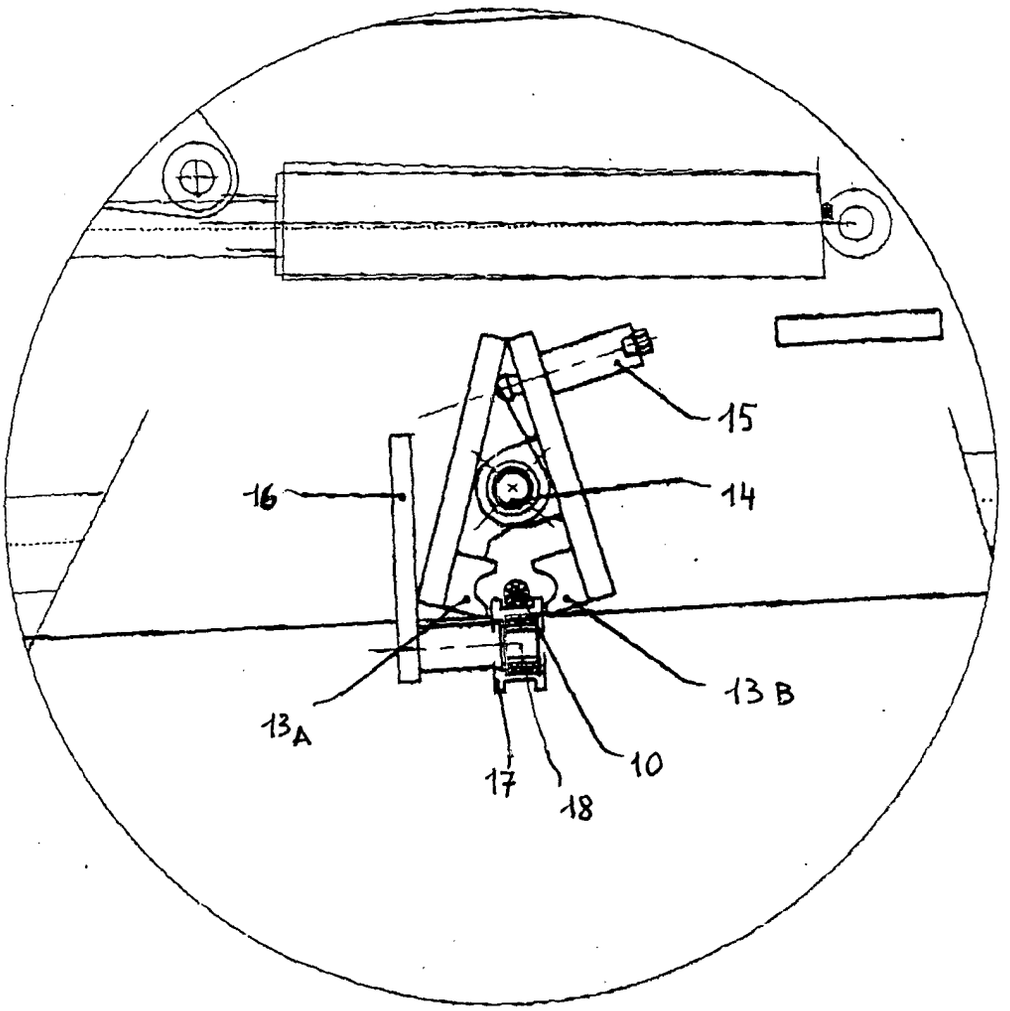

Fig. 4