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(54) **Method and arrangement for processing a log**

(57) The invention relates to an improved method for processing a log, wherein the log is fed (101) onto a processing line (201) and advanced through the following process steps of: measuring (102) a log (T) three-dimensionally to find out its geometrical shape; storing (103) measurement data of the log (T), said measurement data being a basis for conducting the log treatment; checking a position of the log (T) and rolling (104) the log over for bringing a possible skewness (L) to face upwards; and aligning the log (T) and feeding it into a processing as-

sembly (206; 2061, 2062) with the skewness (L) upward for carrying out processing of the log. The method further comprises supporting the log (T) from below at the site of skewness, while treating the log in the processing assembly (206; 2061, 2062), based on the measurement data, particularly curvature data of the log, stored in step b, such that a downward directed force effect applied to the log by the processing assembly (206; 2061, 2062) is compensated for entirely or partially at the site of said skewness. The invention relates also to an arrangement applying the method.

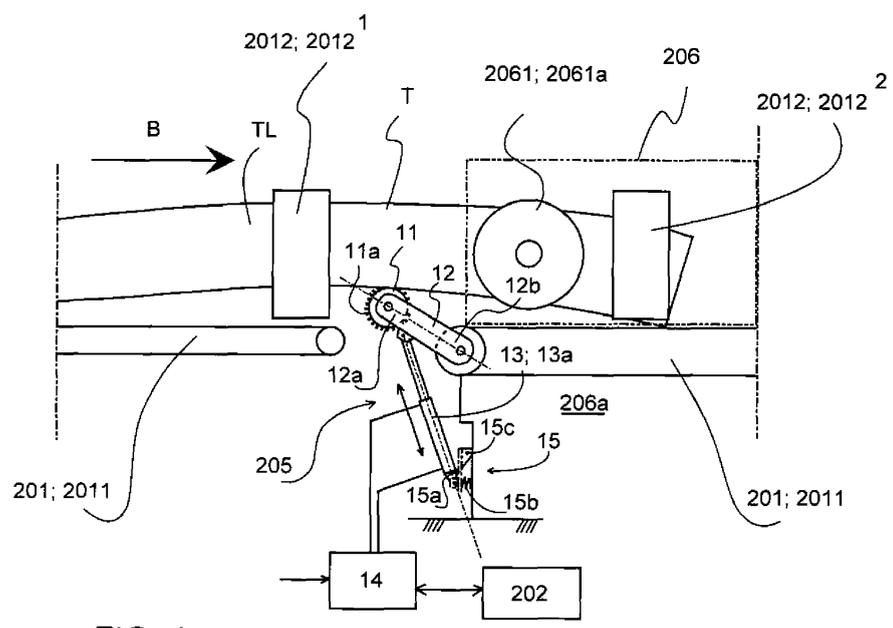


FIG. 4

EP 2 404 721 A1

Description

[0001] The invention relates to an improved method for processing a log as set forth in the preamble of claim 1.

[0002] The invention relates also to an improved arrangement for processing a log as set forth in the preamble of claim 3.

[0003] The conventional log processing sawmill line operates as follows. The first step comprises measuring a debarked log three-dimensionally, e.g. with an optical 3D scanner, to find out precisely its geometrical shape. At this point, data is collected regarding e.g. the diameter, conicity, ellipticity, and skewness of the log. The log measurement data is stored in a control unit or the like and utilized in processing the log and dividing it into pieces of lumber. If necessary, this is followed by rolling the log with an appropriate rotating device to an optimal position for a saw machine or the like woodworking tool of a sawmill line. The first woodworking tool is generally a chipping canter, the delivery to which is prepared for by aligning the log with appropriate set of side rollers, and by which the log is trimmed in its two opposite sides and at the same time the removed side surface material of the log is chipped. Hence, the log becomes a balk. In the next step, the balk is turned over such that its trimmed flat surface faces downward against a conveyor. This is followed by centering the balk to a second chipping canter, in which its two opposite untreated surfaces are trimmed basically the same way as in the treatment of the preceding first chipping canter. Thus, the balk becomes a spar with four trimmed sides. The spar is at least partly wane-edged, meaning that at least some of its lengthwise corners are constituted by a surface of the original log.

[0004] The spar is measured, after which the trimming of spar side slabs and the slicing of side slabs are optimized with a control unit. The optimization comprises determining the dimensions of side slabs obtained from a spar, particularly the width of the slabs, the required elevation and direction for a profiling process. In the next step, the spar is processed with an appropriate profiling machine, whereby the wane edges are dressed in an optimized manner off the side of the spar. This is followed by using a suitable saw machine, preferably a circular saw, for sawing first side slabs off the profiled spar. In the spar advancing direction, the saw machine is preceded by a pair of servo controlled side rolls for directing the spar in a correct position to the saw machine. In the next step, the remaining segment of the spar is turned over through 90 degrees by means of a rotating device next in the sawmill line and the spar is fed again to the profiling machine, which dresses the spar edges in an optimized manner for second side slabs. After this, the rest of the spar is chopped with an appropriate saw, such as a board saw, into pieces of lumber. The board saw is preceded by a second pair of servo controlled side rolls for directing the spar in a correct position to the saw machine.

[0005] A problem with sawmill lines as described

above is being structurally long lines. In a sawmill line, various operations require a specified unit whose length is basically equal to the maximum length of a log being processed. A drawback here is that such a long sawmill line occupies plenty of space which is expensive to build.

[0006] Finnish patent FI-104316 discloses a method and apparatus for processing a tree trunk or log by shaving, which comprises measuring the tree trunk with a log measuring instrument three-dimensionally, transferring data to a control unit, and determining a processing center line for the tree trunk and processing center lines as well as widths for side slabs, after which the processing work on the tree trunk begins. First, the tree trunk has its sides trimmed with a chipping canter so as to have four trimmed sides, i.e. it has been worked into a quadrangular spar. After this, the spar has side cuts milled on its opposite sides by specifically operating milling tool heads, thus also removing possible wane edges of the spar and side slabs being sawn off the spar. Alternatively, the sawing-off of side slabs is performed prior to the edging of side cuts, the latter being implemented with milling tool heads.

[0007] A problem in solutions set forth in the above-cited patents is that, in particular, the four-sided trimming of a warped tree trunk is attempted by means of chipping heads placed close to each other. Trimming the surface of a curving tree trunk is awkward and useful wood material is also lost in the process.

[0008] Another problem in the process of sawing a warped tree trunk is that the warped log strives to straighten out in response to downward action forces applied thereto especially by a chipping canter, but also by other woodworking machines. When a warped tree trunk, which has straightened out entirely or partially, is profiled for straight slabs on its side, the result is that, after the downward action forces become non-existent, the warped tree trunk assumes its original shape and the slabs profiled on the side are laterally crooked. Sawing off the slabs provides no longer any corrective effect on lateral crookedness of the slabs, but the latter are still laterally crooked which is not desirable.

[0009] An object of the method and arrangement according to the invention is to eliminate some of the problems relating e.g. to prior known sawmill lines and/or chipping canter lines. Another object of the invention is to provide a new method and arrangement, which ultimately enable improving the yield of sawn timber or sawn pieces of lumber and at the same time physically reducing the length of a sawmill line or the like log processing line. The method according to the invention is also intended to provide a method and an arrangement operating the same, which enable producing straight side slabs regardless of force effects applied to a warped log by a chipping canter and other working machines.

[0010] A method of the invention is characterized by what is presented in claim 1. An arrangement of the invention is characterized by what is presented in claim 3.

[0011] Preferred embodiments for a method and ar-

rangement of the invention are presented in the dependent claims.

[0012] The improved method according to the invention for processing a log comprises feeding the log onto a processing line and advancing it through the following process steps of:

a) measuring the log three-dimensionally, thereby finding out its geometrical shape;

b) storing log measurement data, the log treatment being conducted on the basis of said measurement data;

c) checking the log position and rolling the log over to bring a possible skewness to face upward;

d) aligning the log and feeding it to a processing assembly with the skewness upward for carrying out processing of the log.

[0013] According to the invention, the method further comprises

(e) supporting the log from below at the site of skewness while treating the log in the processing arrangement on the basis of measurement data stored in step b, particularly the log curvature data regarding the site of skewness, in order to totally or partially compensate at the site of said skewness for a downward directed force effect applied to the log by the processing assembly.

[0014] In a preferred embodiment of the invention, the log processing arrangement is used to conduct at least a first log processing step, wherein the log is trimmed for two vertical flanks on opposite sides thereof and thereby the log is turned into a first balk, and preferably also a second log processing step, wherein grooves are milled in top and bottom parts of the first balk's each vertical side, said grooves being used for defining at least first and second side slabs on the trimmed sides of the balk, and said processing steps being followed in the log conveying direction by a step of removing the side slabs from the first balk performed by a saw machine. According to the invention, the sequential first and second process steps, as well as the removal step of side slabs, and aligning the log and supporting the log from below as part of these process steps, are conducted along the processing line in such a way that a part of the log is in one process step while another part thereof is in the immediately preceding process step. Hence, at least two successive process steps are provided within a range whose length does not exceed that of the log, the maximum length being preferably 6 m.

[0015] The arrangement according to the invention for processing a log comprises a processing line, in which the log is advanced forward on one or more conveyors

and treated in treatment units included in the processing line principally by means of treatment programs stored in an appropriate data processing unit, said treatment units including:

a) a log measuring instrument, which is to be used for measuring the log three-dimensionally and which measuring results are to be stored in a memory unit for optimizing the log treatment in the data processing unit;

b) a log rotating device, by means of which the log is to be rolled over for bringing a possible skewness to face upward;

c) a log processing arrangement; and

d) a plurality of side roller sets (2012), by means of which a log (T) is to be conveyed, aligned, and at the same time propped from the sides, particularly in such a way that a skewness (L) faces upward as the log is fed into the processing arrangement and treated.

[0016] According to the invention, the arrangement further comprises:

e) a log supporting device, which is disposed in the immediate connection with a log processing assembly, said supporting device comprising a control unit for directing the supporting device to trace the log's bottom surface contour and at the same time to support the log from its underside at the site of skewness for totally or partially compensating at the site of skewness for a downward directed force effect applied to the log by the processing assembly.

[0017] In addition, the supporting device further comprises an arrangement, wherein the processing assembly comes without upper press rolls. This provides a further reduction of the downward directed force effect applied to a log by the processing assembly at the site of skewness.

[0018] It is an advantage of the invention that a log, which has been positioned with a skewness or the like section curved relative to the longitudinal axis facing upward, and which in this position is fed into a processing assembly, retains, by means of a log supporting device, its position in a vertical plane, nor is able to change its shape, particularly to straighten out from its curvature, in response to a downward directed force effect applied by milling tools of the processing assembly, such as chipping disks, and/or milling heads of the profiling machine. By virtue of this, the process steps provide a precise result and, particularly, the sawn timber obtained from a log is straight and dimensionally accurate.

[0019] The log supporting device is set in connection with a log processing arrangement to lie in the log con-

veying direction either immediately upstream or downstream of the processing assembly within the latter's working range. This arrangement serves to ensure that the log is supported from below while being processed.

[0020] It should be noted that there is one or more supporting devices in connection with the processing assembly. Thus, one log supporting device is most preferably provided upstream of the log processing assembly in the log conveying direction. In an embodiment alternative or supplementary to the preceding one, a second log supporting device can be provided downstream of the log processing assembly in the log conveying direction. In case the log processing assembly comprises several successive processing tools, such as a chipping canter and a profiling machine, all these, in one preferred embodiment, are preceded by one log supporting device, said tools having a second log supporting device between themselves and, in one preferred embodiment, being followed by a third log supporting device.

[0021] In a preferred embodiment of the invention, the log supporting device comprises an arm, a propping element mounted on a first end thereof, and a power unit, preferably a pressure fluid cylinder or the like, for operating the arm and the propping element, said propping element being adapted to act on the bottom surface of a log as the latter is being fed into the processing assembly. The beneficial result is a supporting device which is simple in design and reliable in operation.

[0022] In a second preferred embodiment of the invention, the log supporting device has its arm affixed at one of its ends pivotally in the direction of a processing line to a mount, such as to a frame of the processing line. The beneficial result is that the weight burden of a log is not in its entirety concentrated on the power unit, but applied to the mount as well.

[0023] In a third preferred embodiment of the invention, the log supporting device has its propping element in the form of a peripherally circular piece, such as a disk or a roller, which is mounted on the arm in a freely rotating manner. The beneficial result is that, in this case, the propping element does not slide along the bottom surface of a log, but traces the surface in a rotary motion. Thus, the log surface remains intact.

[0024] In a fourth preferred embodiment of the invention, the log supporting device has its control unit adapted to control the power unit on the basis of log measurement data stored in a data processing unit. The beneficial result is that the contour of a log's bottom surface lengthwise of the log is known from the measurement data, and, using this as a guideline, the power unit and thereby the supporting device, especially the propping element, are controlled to trace the log's bottom surface contour while the log is being advanced and fed into the processing assembly.

[0025] In a fifth preferred embodiment of the invention, the propping element is flexibly attached with a suitable elastic member to a mount, such as to a frame of the processing line. The beneficial result of this embodiment

is that prominently protrusive portions, such as knot portions or the like, possibly present in a log, do not have a significant effect on a position of the supporting device's propping element with respect to the log, because the elastic member works much like a shock absorber and yields, i.e. becomes at least partially compressed, when a protrusive portion happens to find itself in coincidence with the propping element.

[0026] In a sixth and most preferred embodiment of the invention, the log processing assembly includes at least a chipping canter and preferably (but not necessarily) also a profiling machine, and additionally a saw machine as well. According to the invention, the successive log treatment units, i.e. said chipping canter, profiling machine and saw machine, and the log side roller sets and at least one log supporting device associated with the treatment units, are disposed on the processing line close to each other, such that at least two successive log treatment units are disposed within a range which is not more than equal to the log in length.

[0027] An advantage of the invention is that the supporting device maintains the log in vertical plane in a predetermined and unchanging position, which makes a difference in closely disposed successive log treatment units, and thereby the processing results and/or sawing operations can be provided punctually and precisely at correct positions. The end result is that the side slabs are dimensionally accurate and straight, and so is the balk proceeding to further treatment.

[0028] Another advantage of the invention is its capability of implementing the processing line in the form of a short and efficiently operating line. This saves manufacturing and installation costs and, moreover, it is more economical to cover a short line than a long one.

[0029] A particular advantage of the invention is also that some of the essential and important process steps and treatment units are most preferably disposed close to each other, especially the successive process steps/treatment units, within a range whose length does not surpass that of the log, being 6 m at a maximum.

[0030] The invention and further benefits thereof will be described in more detail with reference to the accompanying drawing, in which

45 fig. 1 shows a method of the invention for processing a log in a flow chart;

fig. 2 shows schematically an arrangement of the invention for processing a log; and

50 figs. 3a - 3e show a log, and a balk processed therefrom, in cross-sections in various log processing steps;

55 fig. 4 shows schematically an arrangement of the invention in a side view, and particularly one preferred log supporting device.

[0031] In the figures, like reference numerals are used for like elements.

[0032] The method according to the invention for processing a log is illustrated sequentially in a flow chart in fig. 1. The respective arrangement is illustrated in fig. 2. The method comprises feeding 101 a log onto a processing line 201 and advancing the same through process steps to follow.

[0033] A first step a comprises measuring 102 a log T three-dimensionally with a log measuring instrument, such as a 3D scanner (cf. fig. 3a). Hence, the log's geometrical shape, such as conicity, ellipticity, and curvature lengthwise of the log, i.e. skewness, and at the same time - if necessary - its position on a processing line and on a conveyor, are thereby found out.

[0034] A second step b comprises storing 103 measurement data of the log T collected in the measuring step 102. The treatment of a log in various process steps is optimized by means of an appropriate data processing unit 202, which has suitable programs previously stored therein for executing the optimization. As a ground rule, the term optimization refers to the yield of useful pieces of lumber in a volume and/or value as large as possible from the log.

[0035] A third step c comprises checking the position of a log on a conveyor and rolling 104 the log over with a rotating device, such that a possible skewness L (i.e. a curved section of the log) faces upward (fig. 3b). It should be noted that the logs may contain sections warped in various directions in a plane perpendicular to the longitudinal direction, whereby, as a ground rule, what is turned upwards is that curved section - skewness - whose curvature between the ends of a log is the most prominent and most dominating. In this context, the definition "skewness upward" refers to the condition in which the log's curved section - skewness - faces more or less vertically upward, particularly when considering also the optimization of log treatment.

[0036] A fourth step d comprises aligning the log T and feeding it into a processing assembly 105. From a data processing unit are obtained instructions regarding an optimal log treating position, on the basis of which the log is placed (in addition to setting the skewness upward in the third step) laterally in an appropriate position while conveying it forward into the processing assembly. In this embodiment, a processing assembly 206 includes at least a chipping canter 2061.

[0037] While feeding the log T into a processing assembly and treating it in the processing assembly in step 107, the log is supported in a fifth step from below 106, especially the log T is supported in a controlled manner from its underside in such a way that the log's bottom surface contour, and particularly the log's skewness and hence curvature, is traced by a suitable lower propping element. What is thus taken into consideration is a shape of the log, which is deviant from a longitudinal straight line between the log's ends, and the support action is based on a previously conducted measurement of the

log and recorded measurement data of the log. The lower outline of a log, which has been rolled over to bring the skewness upward, serves as a guideline for supporting the log, and thereby the log is retained substantially stationary in vertical sense and perpendicularly to the motion direction while being in this embodiment conveyed forward and fed into the processing assembly. The log T is supported from below generally within a working range of the processing assembly.

[0038] In one preferred optional embodiment, the log T is supported in step e from below 106 while the log emerges out of a processing assembly 206; 2061. In another preferred embodiment, the log T is supported in step e from below 106 both in the process of feeding the log into a processing assembly in a conveying direction B from upstream of the processing assembly and in the process of the log coming out of a processing assembly, i.e. from downstream of the processing assembly in the conveying direction.

[0039] In a sixth step 107, the first two vertical and most preferably substantially straight sides, i.e. a first side and a second side s1, s2, are trimmed 107 on the log T on its opposite sides with a chipping canter 2061, thus turning the log into a first balk P1 (fig. 3c).

[0040] The purpose of a log supporting action from below is to compensate for a force effect applied downwards the log by a processing assembly, such as a chipping canter. Without support from below, the processing assembly presses a log which has been set with a curved or skewness section upwards, its curvature flaring out and its position changing unpredictably, whereby the processing result may also differ significantly from what is desired.

[0041] In one embodiment of the invention, the processing assembly 206 comprises not only the chipping canter 2061 operating as a first working tool but also a profiling machine 2062 operating as a second working tool. The next or a seventh step 108 comprises using the profiling machine's appropriate milling heads for milling 108 first and second grooves u11, u21; u12, u22 in top and bottom parts of each vertical side s1, s2 of the first balk P1 (fig. 3d). Each groove u11, u21; u12, u22 has one of its groove flanks us1, us2; us3, us4 adjacent to the vertical side s1, s2 of the balk P1. Most preferably, the groove u11, u21; u12, u22 has its groove flank us1, us2; us3, us4 at a right angle relative to the side s1, s2 of the balk P1. The grooves u11, u21; u12, u22 serve to define on the trimmed side s1, s2 of the balk P1 in an appropriate direction at least first and second straight side slabs L1, L2. This is performed in an optimized manner according to the log measurement data and the data processing unit's program. An eighth step 109 comprises removing the side slabs L1, L2, most preferably by sawing, from the vertical sides s1, s2 of the first balk P1 (fig. 3e) by using the saw machine operating as a third working tool. After this, in a ninth step 110, a remaining segment of the first balk P1, i.e. a second balk P2 and the removed side slabs L1, L2, are separated from each other. The

side slabs L1, L2 are dropped onto a suitable crosswise conveyor 208b and carried to a further treatment of the side slabs. The second balk P2 is conveyed on a lengthwise conveyor 208a to a further treatment 111 along the processing line 201.

[0042] In one embodiment of the invention, the seventh step 108 comprises using the profiling machine 2062 for also milling third and fourth grooves in top and bottom parts of each vertical side s1, s2 of the first balk P1 alongside the first and second grooves u11, u21; u12, u22. The third and fourth grooves are milled with appropriate milling heads of the profiling machine 2062 most preferably on the side of the balk P1 which is still untreated. The third and fourth grooves serve to define third and fourth substantially straight side slabs on the trimmed sides s1, s2 of the balk P1. This is conducted in an optimized manner according to the log measurement data and the data processing unit's program. This is followed by the eighth step 109, in which all side slabs are removed by sawing from the vertical sides of the first balk P1 with a suitable saw machine. The remaining segment of the first balk P1, i.e. the second balk P2 and all removed side slabs, are separated from each other in the ninth step 110 and conveyed to further processing steps.

[0043] In a preferred embodiment of the invention, the successive process steps are conducted along the processing line 201 in such a way that a part of the log T is in one process step while at the same time another part thereof is in the preceding process step. Hence, the log T has its leading end in one process step, such as in the seventh step 108, in which the grooves u11, u21; u12, u22 are being milled on the balk P1, while the log T has its middle section (or at least its trailing end) in the preceding process step, such as in the sixth step 107, in which the log is being trimmed along its vertical sides. At the same time are conducted an alignment of the log and supporting the log from below. Alternatively, the log lies simultaneously in three successive process steps. In this case, the log T has its leading end for example in the eighth step 109, in which the side slabs L1, L2 are being removed by sawing from the vertical sides s1, s2 of the first balk P1, the log T has its middle section in the seventh step 108, in which the grooves u11, u21; u12, u22 are being milled on the balk P1, and the log T has its trailing end in the sixth step 107, in which the log's vertical sides are being trimmed. At the same time are conducted an alignment of the log and supporting the log from below. What is essential in this embodiment of the invention is that at least two successive log processing steps, a possible alignment of the log and support of the log from below, are fitted within a range A, the length of which does not exceed that of the log, being preferably between 5 and 7 m, most preferably 6 m.

[0044] An arrangement of the invention for processing and sawing a log is specifically illustrated in fig. 2. The position and/or cross-section of the log T and the balk P1, after the procedures conducted with various treatment units, is also apparent from figs. 3a-3h.

[0045] The arrangement according to the invention for processing a log comprises a processing line 201, wherein a log T is advanced (in the direction indicated by an arrow B) on one or more conveyors 2011, aligned (adjusted and kept in a certain position regarding lateral direction) with a plurality of side roller sets 2012; 2012¹, 2012², 2012³, and a log supporting device 205, particularly a lower supporting device, by which the log T is supported from below by tracing its skewness as the log is being worked on. The log T is treated at treatment units, included in the processing line 201, principally in accordance with treatment programs stored in an appropriate data processing unit 202, such as a computer, with a primary target of optimizing the log treatment in order to maximize the yield of pieces of lumber obtained from the log. The treatment units of this arrangement comprise at least units as follows: a log measuring instrument 203, a log rotating device 204, a processing assembly 206 including at least a first processing machine or chipping canter 2061. In a preferred embodiment of the invention, the arrangement further comprises at least a second processing tool or first profiling machine 2062, included in the processing assembly 206 as a treatment unit, a third processing tool or saw machine assembly 207, and a separating unit 208. The treatment units are arranged along the processing line successively, most preferably in the presented sequence.

[0046] The log measuring instrument 203, such as an optical 3D scanner, is a device conducting a measurement of the log T three-dimensionally (cf. fig. 3a). The log measuring instrument is used e.g. for measuring cross-sections of the log in a lengthwise direction of the log at conveniently small intervals. This enables finding out the geometrical shape of a log, such as conicity, ellipticity, and skewness or curvature. Revealed at the same time are location and position of the log T on top of the conveyor 2011. Measurement data of the log T is stored in a suitable memory unit 2021, which is most preferably associated with the data processing unit 202.

[0047] The log rotating device 204 is a device, by means of which a log is to be rolled over for bringing a possible skewness L, i.e. a curved section, to point upward (fig. 3b). This is the position, in which the log T will be treated in the next treatment unit.

[0048] The log T is aligned and supported in lateral direction for the processing assembly 206 (and generally for processing tools as necessary) with a plurality of side roller sets 2012. A set of side rollers 2012 comprises two side rollers 2012a, 2012b, which are arranged on opposite sides of the log in the direction crosswise to the longitudinal axis of the log, mounted on appropriate swinging arms, and usually fitted with rotating devices. The log T has its position adjusted and is maintained in a certain position in lateral direction by means of the side roller sets 2012, which are arranged in connection with treatment units, such as the processing assembly 206 and the saw machine assembly 207, in the immediate vicinity thereof.

[0049] The log supporting device 205, particularly a lower supporting device, comprises a propping element 11 mounted on an elongated arm 12. The supporting device 205 further comprises a power unit 13, such as a pressure fluid cylinder, for operating the arm 12 and the propping element 11, and a control unit 14 for controlling the power unit 13. The propping element 11 is adapted to act on the log T, particularly on a bottom surface of the log, while the latter is being conveyed with its skewness upward by means of the conveyor 2011 and the side roller sets 2012 into the processing assembly 206.

[0050] The supporting device 205 has its arm 12 mounted at its second end 12b pivotally in a conveying direction B on a frame 206a of the processing line, such as the processing assembly 206. The propping element 11 is mounted on a first end 12a of the arm 12. The propping element 11 is preferably a peripherally circular piece, such as a disk or a roller, which is attached to the first end of the arm 12 at a center axis perpendicular to the conveying direction B. The propping element 11 is most preferably mounted on the arm 12 in a freely rotating manner, hence tracing in free rotation the log's advancing motion (direction B) to the processing assembly. The propping element 11 is provided over its periphery with roughening, such as teeth 11 a or the like studs.

[0051] The power unit 13 of the supporting device 205 is most preferably a pressure fluid cylinder 13a or, alternatively, e.g. a spindle motor. The power unit 13 is disposed between the arm 12 and the assembly's frame 206a, or the like fixed mount, to which the arm's second end 12b is pivotally attached. By means of the power unit 13, the arm 12 is capable of being pivoted relative to the attachment point of the second end 12b to enable operating the propping element 11 in vertical direction across an appropriate range of motion.

[0052] When the power unit 13; 13a is a pressure fluid cylinder, such as a hydraulic cylinder, the control unit 14 includes one or more valves, which enable regulating the supply of pressure fluid, such as hydraulic oil, into the pressure fluid cylinder for adjusting its length and, at the same time, a position of the propping element 11.

[0053] The control unit 14 of the supporting device 205 is a suitable data processing unit, such as a microcomputer, which is provided with a memory unit. The data processing unit has stored therein a vertical range of motion for the arm 12 and thereby for the propping element 11, across which the supporting device can be operated for supporting the log T from below. The profile of the log T, especially the shape of its bottom surface in that position of the log, in which the skewness or the like curved contour has been turned upwards by a rotating device 204, is given to the control unit 14 of the supporting device 205 from a control unit 202 of the entire arrangement, in whose memory unit 2021 the data regarding the log T has been stored from the log measuring instrument 203. On the basis of this log profile data and location data for the log conveyor 2011, by utilizing an appropriate computer program, from the control unit 14 of the supporting

device 205 is provided an instruction to the power unit 13 to swing the arm 12 in such a way that the propping element 11 is raised, held stationary in vertical sense, or lowered, and thereby the log's bottom surface contour is traced while conveying the log into the processing assembly and to a processing position.

[0054] In one preferred embodiment of the supporting device 205, its control unit 14 is integrated, as far as its essential parts are concerned, with the control unit 202 of the entire arrangement.

[0055] The supporting device 205 comprises, in one preferred embodiment thereof, an elastic member 15, by way of which the power unit 13 is attached to a frame of the assembly or to a similar fixed mount 206a. The elastic member 15 comprises a support element 15a and an elastic element 15b. The support element 15a is bearing-mounted at one side on the mount 206a with a suitable hinge element or the like. Between the support element 15a and the mount 206a is disposed the elastic element 15b, such as a spring or the like, which is most preferably provided with a guard, such as a flexible protective cover. The elastic member 15 functions as a shock absorber for the propping element 11 whenever a portion, which is present in the bottom surface of the log T and protrudes prominently from its normal arcuate plane, particularly a knot portion, happens to place itself in coincidence with the propping element 11 in the process of supporting the log by its bottom surface. In this case, the elastic member 15, particularly its elastic element 15b, gives way and compresses at least partially as the knot portion places itself in coincidence with the propping element 11, nor is any displacement in the position of the log T allowed to take place.

[0056] The log processing assembly 206 comprises at least a first working tool or chipping canter 2061, which 2061 is preferably provided with two chipping disks 2061 a, 2061 b and/or the like chipping tools. The first chipping canter 206 is used for making first two vertical, substantially straight sides, i.e. a first side and a second side s1, s2, on the log T at its opposite sides, thus turning the log into a first balk P1 (fig. 3c).

[0057] In addition, the log processing assembly 206 comprises in this embodiment of the invention a second working machine or profiling machine 2062. This profiling machine 2062 comprises most preferably at least four milling heads, such as routers. The profiling machine's 2062 milling heads are used for milling first and second grooves u11, u21; u12, u22 lengthwise of the first balk P1 in top and bottom parts of each vertical side s1, s2 of the balk (fig. 3d). Each groove u11, u21; u12, u22 has one of its groove flanks us1, us2, us3, us4 arranged to lie adjacent to a vertical side of the balk P1 and in such a way that said flank is at a right angle relative to this side. The first and second grooves are used for defining at least first and second substantially straight side slabs L1, L2 on the trimmed sides s1, s2 of the balk P1. The location and dimensions of the side slab L1, L2 are determined most preferably in an optimized manner in ac-

cordance with data obtained from the log measuring instrument 203 and a treatment program stored in the data processing unit 202.

[0058] In this embodiment of the invention, the log processing assembly comprises also a third milling machine or saw machine 207. It comprises suitable blade units 207a, 207b, by means of which the side slabs L1, L2 are cut by sawing off the vertical sides s1, s2 of the first balk P1 (fig. 3e).

[0059] The separating unit 208 comprises e.g. an open-side conveyor 208a, such as a conveyor chain, which is co-directional with the processing line 201. Hence, the side slabs L1, L2 are adapted to fall by gravity on top of a crosswise conveyor 208b set for side slabs underneath the conveyor 208a while at the same time advancing the second balk P2 to further treatment on the conveyor 208a and the processing line 201.

[0060] In a preferred embodiment of the invention, at least some of the successive treatment units of the arrangement, particularly the chipping canter 2061 and the profiling machine 2062 of the processing assembly 206 as well as the saw machine 207, and at least one lag supporting device 205 related thereto, are arranged on the processing line 201 close to each other in such a way that at least two successive log treatment units are positioned within a range A which is not more than equal to the log in length, at a maximum 6 m. Thus, a part of the log T is on the processing line 201 subjected to a treatment by one treatment unit while a part of it is subjected to a treatment by the preceding treatment unit. In this case, the log T has its leading end in one treatment unit, such as subjected to a treatment by the profiling machine 2062 with the grooves u11, u21; u21, u22 being milled on the balk P1, while the log T has its middle section (or at least its trailing end) in the preceding treatment unit, such as subjected to a treatment by the chipping canter 205 with the vertical sides s1, s2 of the log T being trimmed. Alternatively, the log T lies simultaneously in three successive treatment units. Hence, the log T has its leading end for example in the saw machine 207, in which the side slabs L1, L2 are being removed by sawing from the vertical sides of the first balk P1, the log T has its middle section in the profiling machine 2062, in which the grooves u11, u21; u21, u22 are being milled on the balk P1, and the log T has its trailing end in the chipping canter 205, in which the log's vertical sides are being trimmed. It should be noted that the log supporting device 205 is mounted immediately upstream of the processing assembly 206 in the log conveying direction B, whereby supporting the log from below has an effect on the treatment of the log T at least in the chipping canter 2061 of the processing assembly 206, but most preferably also in the profiling machine 2062 and even in the saw machine 207.

[0061] In an optional embodiment of the invention, there are several log supporting devices 205 and, in addition to the above-mentioned supporting device, those are disposed e.g. between the chipping canter 2061 and

the profiling machine 2062 and/or, in the log conveying direction B, downstream of the profiling machine 2062 before the saw machine 207.

[0062] It should be noted that the above-described arrangement of the invention is presented schematically and just those process steps and treatment units which are essential from the standpoint of the invention have been described in a more detailed manner. Equipment such as per se known side roller sets 2012, needed for conveying and possibly aligning the log T and the balk P1 processed therefrom, has not been given a detailed description in this context.

[0063] The invention is not limited to concern just the above-described exemplary embodiment, but a multitude of modifications are possible within the framework of an inventive concept as defined in the claims.

Claims

1. An improved method for processing a log, wherein the log is fed (101) onto a processing line (201) and advanced through the following treatment steps of:
 - a) measuring (102) a log (T) three-dimensionally to find out its geometrical shape;
 - b) storing (103) measurement data of the log (T), said measurement data being a basis for conducting the log treatment;
 - c) checking a position of the log (T) and rolling (104) the log over for bringing a possible skewness (L) to face upwards; and
 - d) aligning the log (T) and feeding it into a processing assembly (206; 2061, 2062) with the skewness (L) upward for carrying out processing of the log;

characterized in that the method further comprises

 - e) supporting the log (T) from below at the site of skewness, while treating the log in the processing assembly (206; 2061, 2062), based on the measurement data, particularly curvature data of the log, stored in step b, such that a downward directed force effect applied to the log by the processing assembly (206; 2061, 2062) is compensated for entirely or partially at the site of said skewness.
2. A method as set forth in claim 1, wherein the log processing assembly (206) is used for conducting at least a first log processing step, in which two vertical sides (s1, s2) are trimmed (107) on the log (T) at its opposite sides and thereby the log is turned into a first balk (P1), and preferably also a second log processing step, in which grooves (u11, u21; u12, u22) are milled (107) in top and bottom parts of each vertical side (s1, s2) of the first balk (P1), said grooves being used for defining on the balk's

trimmed sides at least a first and a second side slab (L1, L2), and said processing steps being followed, in the log conveying direction, by a removal step of the side slabs from the first balk conducted by a saw machine (207), **characterized in that** the sequential first and second processing steps, as well as the removal steps of side slabs, and aligning the log and supporting the log from below related to these processing steps, are conducted on the processing line in such a way that a part of the log (T) lies in one process step while a part of it lies in the preceding process step.

3. An arrangement for processing a log, said arrangement comprising a processing line (201) in which a log (T) is advanced on one or more conveyors (2011) and treated in treatment units included in the processing line principally by means of treatment programs stored in a suitable data processing unit (202), said treatment units including:

a) a log measuring instrument (203), by which the log (T) is to be measured three-dimensionally and which measuring results are to be stored in a memory unit (2021) for optimizing the log treatment in the data processing unit (202);

b) a log rotating device (204), by means of which the log is to be rolled for bringing a possible skewness (L) upward;

c) a log processing assembly (206; 2061);

d) a plurality of side roller sets (2012), by means of which the log (T) is to be conveyed, aligned and, at the same time, supported from the sides particularly in such a way that the skewness (L) points upward, while the log is being fed into the processing assembly and treated;

characterized in that the arrangement further comprises:

e) a log supporting device (205), which is disposed in the immediate connection with the log processing assembly (206; 2061), said supporting device (205) comprising a control unit (14; 202) for instructing the supporting device to trace a bottom surface contour of the log (T) and, at the same time, to support the log (T) from its underside, at the site of skewness, for compensating entirely or partially for a downward directed force effect applied to the log by the processing assembly (206; 2061) at the site of said skewness.

4. An arrangement as set forth in claim 3, **characterized in that** the processing assembly lacks upper press rolls.

5. An arrangement as set forth in claim 3, **characterized in that** the log supporting device (205) comprises an arm (12), a propping element (11) mounted

on a first end thereof, and a power unit (13; 13a) for operating the arm and the propping element, said propping element (11) being adapted to act on a bottom surface of the log (T) as the latter is being fed into the processing assembly (206).

6. An arrangement as set forth in claim 4, **characterized in that** the arm is mounted, pivotally in the direction of the processing line (201), at its second end (12b) on a mount, such as on a frame (206a) of the processing line (201).

7. An arrangement as set forth in claim 5 or 6, **characterized in that** the propping element (11) of the log supporting device (205) is a peripherally circular piece, such as a disk or a roller, which is mounted on the arm (12) in a freely rotating manner.

8. An arrangement as set forth in any of preceding claims 5-7, **characterized in that** the control unit (14) of the log supporting device (205) is adapted to control the power unit (13; 13a) on the basis of measurement data of the log (T) stored in the data processing unit (202).

9. An arrangement as set forth in any of preceding claims 3-8, **characterized in that** the supporting device (205) is mounted flexibly with a suitable elastic member (15) on a mount, such as on the frame (206a) of the processing line (201).

10. An arrangement as set forth in any of preceding claims 3-8, wherein the log processing assembly includes at least a chipping canter (2061) and preferably also a profiling machine (2062), as well as, additionally, a saw machine (207), **characterized in that** the sequential log treatment units (206; 2061, 2062; 207), and the log side roller sets (2012) related to the treatment units, and at least one log supporting device (205), are disposed on the processing line close to each other, such that at least two successive log treatment units (206; 2061, 2062; 207) are disposed within a range (A) which is not more than equal to the log (T) in length.

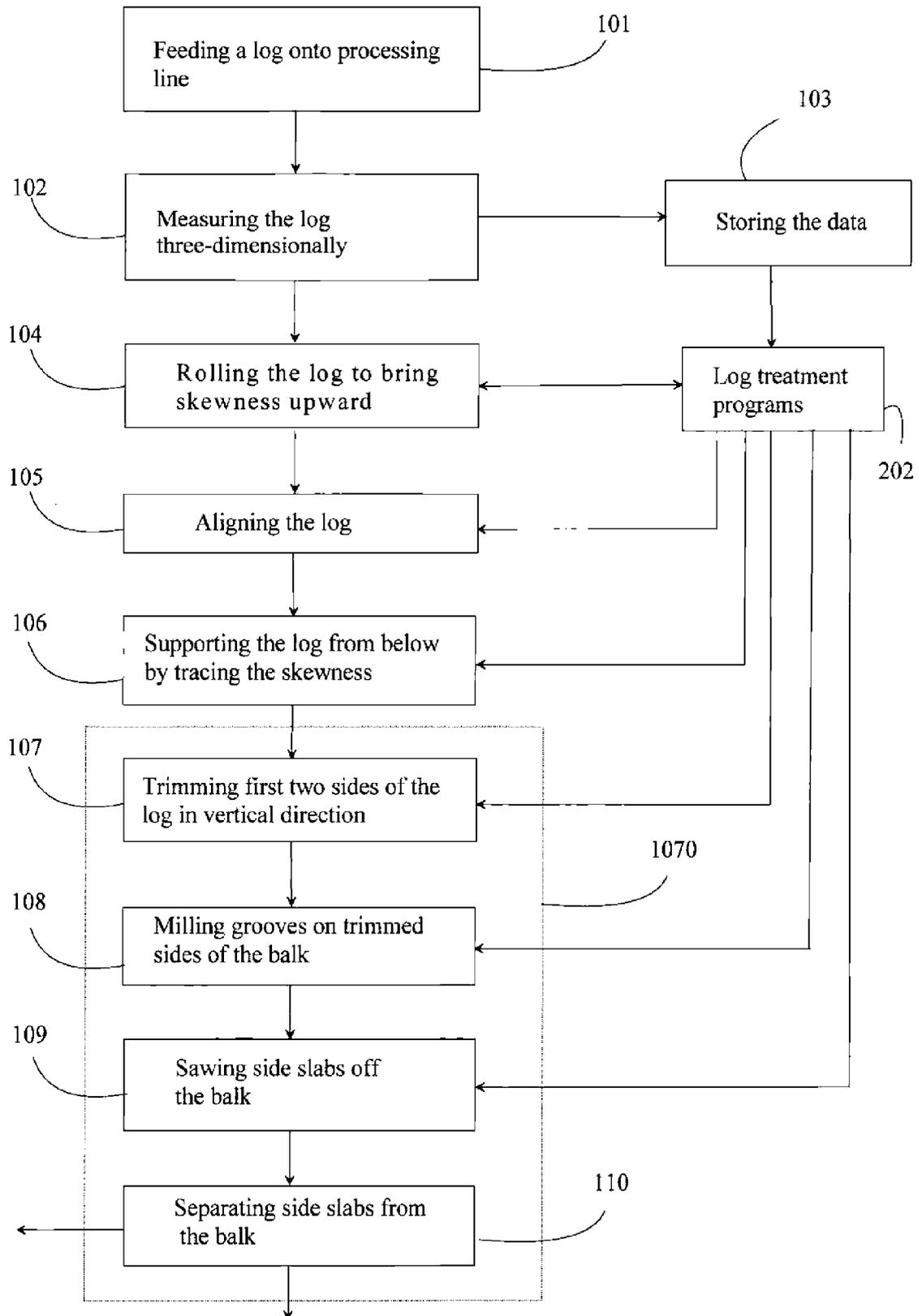


Fig. 1

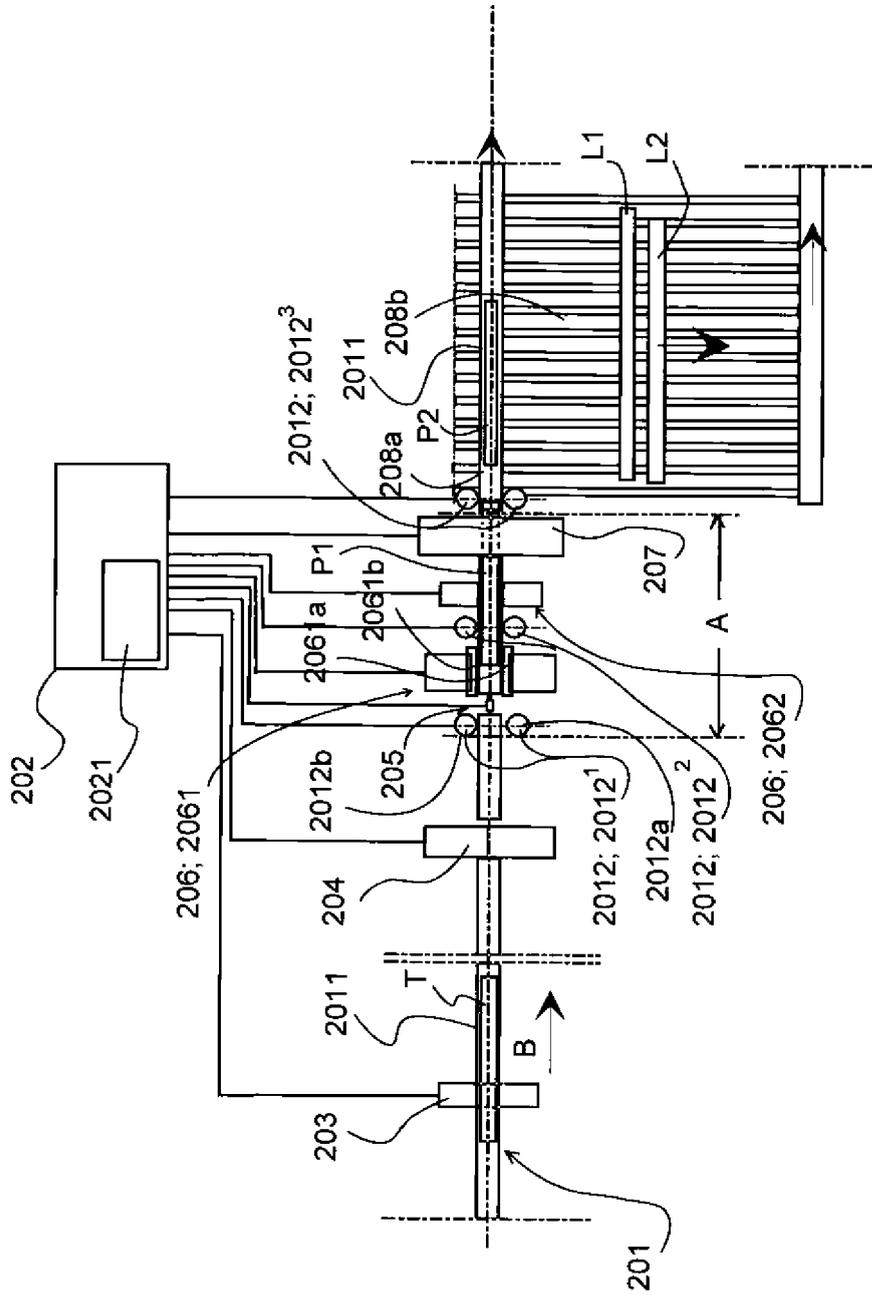


FIG. 2

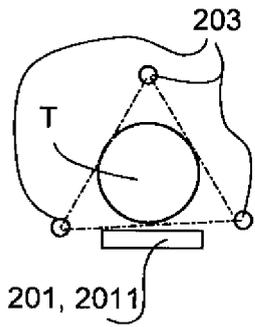


FIG. 3a

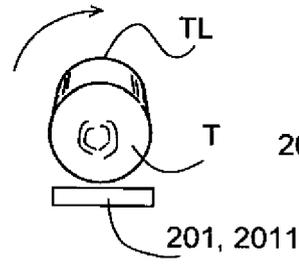


FIG. 3b

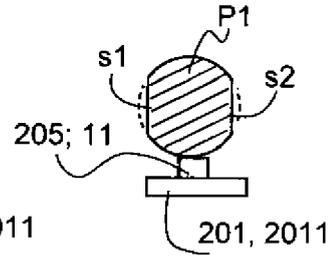


FIG. 3c

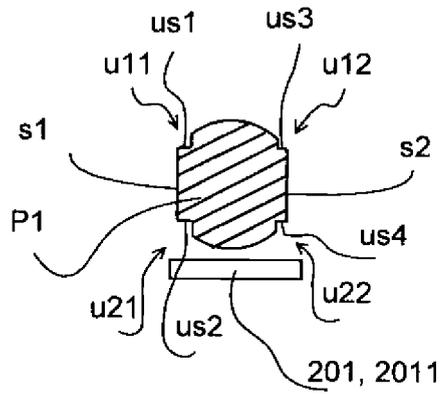


FIG. 3d

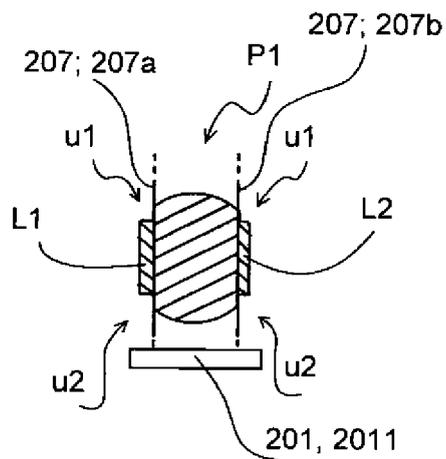


FIG. 3e

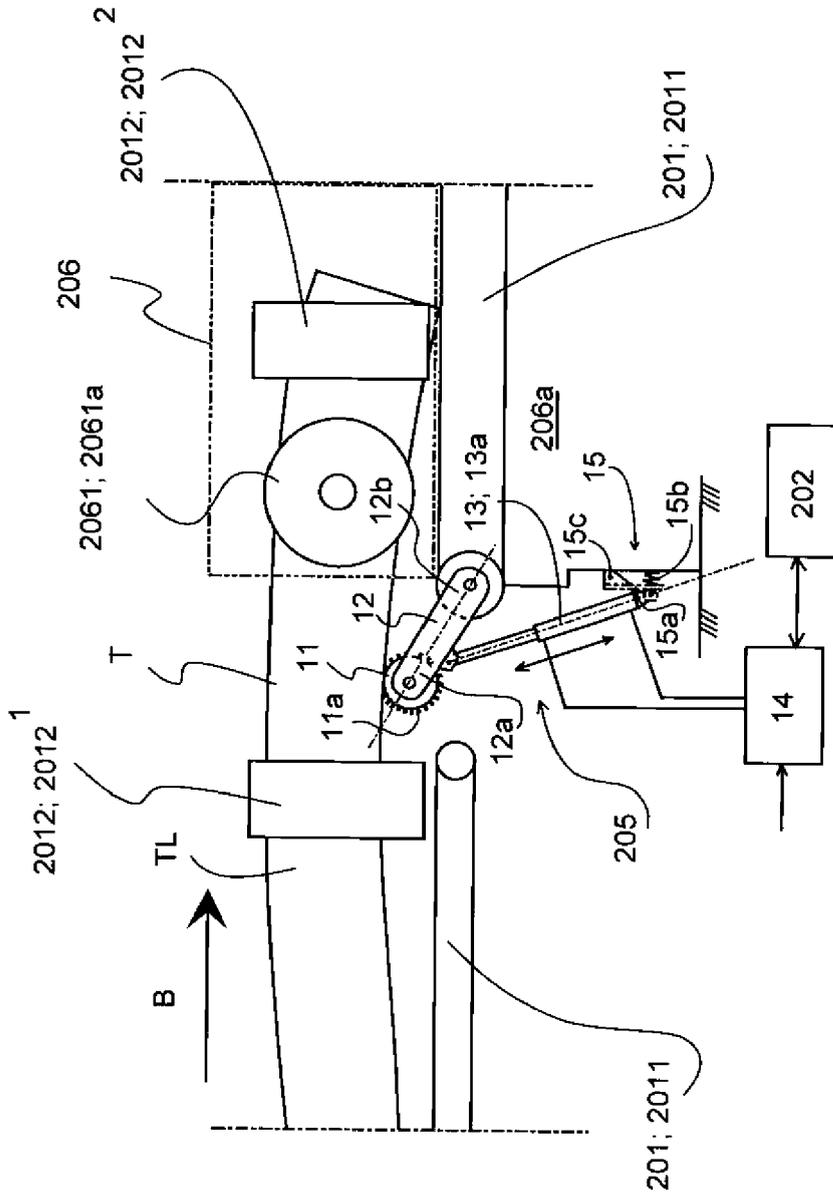


FIG. 4



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