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(54) **ARRANGEMENT FOR BROKE REMOVAL IN PULP DRYER, AND PULP DRYER**

(57) The invention relates to an arrangement for broke removal in a pulp dryer. The pulp dryer (100) includes a hood (101) defined by side walls (109) and end walls (103). Turn rolls (102) are adapted inside the hood in connection with the end walls (103) of the hood in order to lead the pulp web (W) to be dried through the pulp dryer. A service platform (200) is adapted in connection with the pulp dryer, which service platform (200) is adapted to be movable in connection with at least one end wall with openings (105) of the pulp dryer (100) in order to gain access to the turn rolls. The arrangement (10) includes one or more pressing elements (11) for pressing the pulp web against the turn roll, an operating mechanism (12) for at least one pressing element, an actuator arrangement (13) outside the hood adapted to impact the operating mechanism in order to press at least one pressing element against the turn roll, and a bracket unit (14) for joining the operating mechanism to the support frame structures (107) of the pulp dryer. The arrangement is adapted or adaptable into connection with one or more turn rolls. In the arrangement, the actuator arrangement is adapted on the side of at least one side wall of the pulp dryer, and it includes at least one actuator (13.1), which is adapted to press at least two pressing elements against the turn roll, and the operating mechanism adapted to connect to at least one actuator is adapted at least partially to the side of at least one side wall of the pulp dryer. The invention also relates to a pulp

dryer.

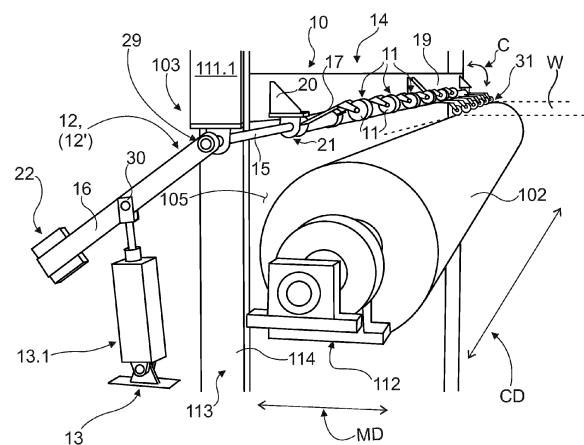


Fig. 2

Description

[0001] The invention relates to an arrangement for broke removal in a pulp dryer, where the pulp dryer includes a hood defined by side walls and end walls, inside which hood turn rolls are adapted in connection with the opposite end walls with openings of the hood in order to form several superimposed drying levels and to lead the pulp web to be dried through the pulp dryer, and where a service platform is adapted in connection with the pulp dryer, which service platform is adapted to be movable in connection with at least one end wall with openings of the pulp dryer in order to gain access to the turn rolls, and where the arrangement includes:

- one or more pressing elements for pressing the pulp web against a turn roll,
- an operating mechanism for at least one pressing element,
- an actuator arrangement outside the hood adapted to impact the operating mechanism in order to press at least one pressing element against a turn roll,
- a bracket unit for joining the operating mechanism to the support frame structures of the pulp dryer,

and which arrangement is adapted or adaptable into connection with one of more turn rolls. The invention also relates to a pulp dryer.

[0002] Web-like materials, such as paper or pulp, are typically dried either without contact by blowing hot air towards the material or in contact with heated surfaces, primarily cylinders.

[0003] The drying of a pulp web represents one example of non-contact drying. In a pulp dryer, the pulp web to be dried hovers on a drying level above blow boxes situated underneath. The blow boxes blow hot process air from their upper edges towards the pulp web to dry it. There are revolving turn rolls at the ends of the drying levels. When the pulp web travels via the turn rolls, the pulp web changes its direction of travel in the machine direction, in other words shifts from one drying level to another, hence moving back and forth inside the pulp dryer. The pulp web presses against the turn rolls exclusively due to the tension of the pulp web. The driven pair of rolls at the outlet side end of the pulp dryer, in other words the draw press, helps the movement of the pulp web through the pulp dryer.

[0004] Revolving turn rolls arranged between drying levels revolve freely in normal operation. However, they have drive equipment that is used, as an example, during tail threading through the pulp dryer. One requirement for normal operation to continue throughout the entire pulp dryer is that the pulp web is uniform from the feed of the pulp dryer to the outlet. This requirement is not fulfilled when the pulp web breaks. As a result of this, at least part of the pulp web remains in the pulp dryer.

[0005] Since the pulp dryers used currently are often very large, up to hundreds of metres of web-like material

may remain inside a drying cabinet after a web break. Only that part of the pulp web that is between the break point and the draw press of the pulp dryer can be pulled out by means of the pair of rolls at the outlet end. The other part of the broken pulp web that remains inside the pulp dryer can cause an extensive, long-term and laborious cleaning operation, partly in a warm and moist environment.

[0006] In accordance with prior art, service platforms that move up and down are located in at least one end of the pulp dryer, which ends also house the turn rolls that change the direction of travel of the pulp web. Correspondingly, at least one of those ends of the hood of the pulp dryer that is equipped with a service platform is equipped with openings that can be closed with openable hatches. The openings are so arranged that they provide access to the turn rolls. In this case, a cleaning operation of the pulp dryer is performed through the end hatches from the environment of the turn rolls, from service platforms. The cleaning operation is very challenging. Attempts to get a hold of the leading edge or trailing edge of the pulp web by mechanical means in connection with a break usually only break the pulp web further from other points and often in quite small pieces.

[0007] A break in a web that enters the pulp dryer or a web breaking at the top part of a drying cabinet can also cause problems when the draw press pulls it further through the drying cabinet. In this case, the pulp web is packed close to the turn rolls located at the top part of the hood of the pulp dryer. In addition, the moving part of the pulp web that is closest to the break point, in other words the tail, can move freely in the transverse direction of the machine after the break. In this case, pieces and shreds of pulp come off the tail, at worst along the entire length of the dryer.

[0008] The object of the present invention is to accomplish an arrangement for broke removal in a pulp dryer to facilitate and expedite broke removal in a pulp dryer. Another object of the invention is to also accomplish a pulp dryer where broke removal is quick and easy, in which case the pulp dryer has improved productivity. The characteristic features of the arrangement according to the invention are presented in claim 1, and the characteristic features of the pulp dryer according to the invention are presented in claim 15.

[0009] According to the invention, at least two pressing elements that are loaded against a turn roll and that form nips together with the turn roll are used via an operating mechanism, the actuator arrangement of which is adapted on the side of the side wall of the pulp dryer. In this case, a service platform can be arranged very close to the end wall of the pulp dryer, which end wall has an opening. As a result of this, the service platform can be implemented, according to one embodiment, even without a railing or corresponding edge structure on the side of the pulp dryer. This proximity of the service platform to the pulp dryer also contributes to improved accessibility to the turn rolls from the service platform through

the openings at the end of the pulp dryer, and hence facilitates the cleaning of the pulp dryer. Moreover, an actuator arrangement that loads a nip via the operating mechanism can also be located at a place with advantageous temperature conditions by using the solution according to the invention.

[0010] According to one embodiment, the operating mechanism can include a pivot arm connected to a transversal pivot axle of the pulp dryer. The pivot arm is impacted by at least one actuator. In this case, the pressing elements, in turn, are connected to the pivot axle. In this case, several pressing elements can be operated by just one actuator.

[0011] According to one embodiment, the pressing elements are adapted on the pivot axle by means of compression joint. One way to implement this is to arrange a loading arm between the pressing element and the pivot axle, to which loading arm the pressing element is fastened in a rotatable manner. In this case, the location, position and even number of the pressing elements on the pivot axle can be adjusted and selected freely. The other additional advantages to be achieved with the invention are disclosed in the description of the invention, and the characteristics are disclosed in the claims.

[0012] The invention, which is not restricted to the various embodiments presented below, is described in more detail by making reference to the enclosed drawings, in which:

- Figure 1 shows on a level of principle one example of the arrangement according to the invention inside a pulp dryer viewed from a side as a cross section of the pulp dryer,
- Figure 2 shows the arrangement shown in Figure 1 in more detail, viewed diagonally from a side in connection with one turn roll of the pulp dryer,
- Figure 3 shows one example of the arrangement according to the invention inside a pulp dryer shown on a level of principle in Figure 1, viewed from a side when the support frame structures of the end of the pulp dryer are exposed,
- Figure 4 shows one example of a bracket unit of the pressing element included in the arrangement on a loading arm, and
- Figure 5 shows another example of the implementation of the arrangement according to the invention in terms of the pressing elements and loading arm, viewed diagonally.

[0013] Figure 1 shows on a level of principle one example of arrangement 10 according to the invention for broke removal in pulp dryer 100 when pulp dryer 100 is viewed from a side, and at the same time also an example of pulp dryer 100 itself according to the invention. Figure 1 shows the cross section of pulp dryer 100 in machine direction MD, from its one end 103'. Therefore, Figure 1 does not show, for example, support frame structures

107 of pulp dryer 100, which support frame structures 107 are shown in Figure 3. In other words, Figure 1 shows arrangement 10 as a diagram only partially in terms of those parts that are located inside pulp dryer 100 in connection with its end 103' and in connection with turn rolls 102 placed there.

[0014] Pulp dryer 100, to which the invention also relates in addition to arrangement 10, includes hood 101 in a known manner. Hood 101 forms an enclosed space in which the drying of pulp web W, in other words evaporation of water, takes place. Hood 101 is defined in machine direction MD of pulp dryer 100 by its side walls 109, in cross direction CD by its end walls 103 (only one of the two is shown in Figures 1 and 2) and from above by its roof 108. On the inside of hood 101, in other words between side walls 109, there is the equipment included in pulp dryer 100 intended for drying pulp web W, such as turn rolls 102 and blow boxes (not illustrated).

[0015] Turn rolls 102 are adapted inside pulp dryer 100, and more specifically at opposite ends 103' of its hood 101. Turn rolls 102 are adapted to take pulp web W in a production situation inside hood 101 through pulp dryer 100 in order to dry the pulp web. Pulp web W travelling through pulp dryer 100 is dried in a manner known in itself in pulp dryer 100 on a track that is formed by superimposed drying and cooling layers as well as turn rolls 102 arranged at ends 103' and that runs back and forth between ends 103'. Turn rolls 102 hence form several superimposed drying levels 106 inside hood 101. In this case, pulp web W changes its machine direction MD between drying levels 106 when it travels over turn rolls 102, which in normal operation are freely rotating but which are driveable during tail threading, for example.

[0016] There are drying boxes on drying levels 106 between turn rolls 102. Hot air is blown from the drying boxes in a manner known in itself towards pulp web W that travels past the drying boxes (from above and beneath). In a production situation, pulp web W presses against turn rolls 102 exclusively by the force of the tension of pulp web W. In this case, pulp web W is pulled through pulp dryer 100 to its outlet side, from where pulp web W exits pulp dryer 100 by means of an arranged driveable pair of rolls, in other words draw press or similar (not illustrated), which pair of rolls tensions pulp web W.

[0017] Turn rolls 102 are adapted in connection with opposite end walls 103 of hood 101, which end walls 103 have openings 105. In this way, openings 105 that can be closed in an openable manner are adapted at ends 103' of hood 101, in other words at end walls 103 on the side of turn rolls 102, in order to gain access to turn rolls 102. Openings 105 are equipped with hatches 104 so that the openings can also be closed. Ends 103' have openable/closeable hatches 104 or similar, of which only the topmost hatch is shown in its open position in Figures 1 and 3. Hatch 104 can be, for example, a lift hatch, folding hatch, reeling hatch or hinged stationary hatch, and the material can be aluminium, for example. During production, these are used for closing openings 105, which

allow access and view into pulp dryer 100 and through which it is possible to reach into pulp dryer 100 to carry out measures for example in the area of turn rolls 102. There can be openings 105 at least at one end wall 103 of hood 101. Opening 105 gives access to at least one turn roll 102.

[0018] Moreover, service platform 200 is also adapted in connection with pulp dryer 100 in order to perform measures, such as cleaning, on pulp dryer 100. Service platform 200 is adapted to be, for example, movable close to hood 101 in order to gain access to turn rolls 102. In this case, service platform 200 is in connection with at least one end wall 103 with openings 105 of hood 101 and hence also close to turn rolls 102 adapted at ends 103'. By means of service platform 200 that is adapted to be movable, the operators can be lifted in a manner known in itself to a suitable height to perform the internal cleaning of hood 101 through openings 105.

[0019] Service platform 200 is an elongated device in cross direction CD of pulp dryer 100, movable up and down, and can be used for standing on. On the other hand, the service platform can also be stationary. In this case, there can be several service platforms per one end wall 103 with openings 105. Service platform 200 has longer sides 201, 203 in the direction of end wall 103 with openings 105 of pulp dryer 100, and between them narrower end sides 202, 204. The sides can be implemented as railings, for example. Service platform 200 is a liftable platform, in other words it also has floor 208. On the side of end sides 202, 204 of service platform 200, there is a support structure that has vertical guideways for moving the service platform vertically by means of actuators (not illustrated). By means of the actuators, service platform 200 can be driven, in other words it can be lifted and lowered suitably in height direction H of pulp dryer 100 to the location of each opening 105 in order to gain access to turn rolls 102 through openings 105. It is hence movable along end wall 103 of hood 101 at the location of turn rolls 102. Here, vertical direction H of pulp dryer 100 is defined by the direction defined by turn rolls 102 located one upon the other.

[0020] Figure 2 shows arrangement 10 shown only partially in Figure 1 in a little more detail, viewed diagonally from a side in connection with one turn roll 102 of pulp dryer 100. Arrangement 10 according to the invention for broke removal in pulp dryer 100 is located on pulp dryer 100 in connection with its end 103'. Arrangement 10 according to the invention is used on pulp dryer 100, for example, after a break in pulp web W or corresponding event or in connection with a tail threading situation (during it or after a shutdown, breakage or failed tail threading). The primary purpose of use is to clean pulp dryer 100 on its inside from material on the inside, in other words from pulp web and parts of pulp web. The basic parts of arrangement 10 include pressing elements 11, actuator arrangement 13 for pressing elements 11 and operating mechanism 12 between actuator arrangement 13 and at least two pressing elements 11 for at least

two pressing elements 11 in order to change the place of at least two pressing elements 11 relative to turn roll 12 by means of actuator arrangement 13 that impacts via operating mechanism 12. The arrangement can also be characterised so that actuator arrangement 13 is adapted in order to press at least one, or now, according to the invention, at least two pressing elements 11 against turn roll 102 by means of operating mechanism 12. Moreover, operating mechanism 12 is connected to support frame structures 107 of pulp dryer 100 by means of bracket unit 14 included in arrangement 10.

[0021] Pressing elements 11, which can be one or more per one turn roll 102 in arrangement 10, are adaptable in connection with turn roll 102 of pulp dryer 100, and more specifically, to be loadable against them. Pressing elements 11 can be, for example, a pressing roll, pressing disc, pressing roller or other corresponding rotating element. The rotating element can also be a partial sector, if a continuous pressing surface with the scope of the entire circumference is mounted on an axle in the same connection. The pressing surface of the pressing element or roller can be straight or barrel-shaped. The material of pressing element 11 can be, for example, plastic or metal, such as aluminium. Pressing elements 11 are arranged inside pulp dryer 100 for pressing pulp web W against turn roll 102. In this way, it can be said that pressing elements 11 are functionally in connection with turn roll 102 and arrangeable into contact against it. Pressing elements 11, when loaded against turn roll 102, feed the broke of pulp web W forward. In this way, pressing elements 11 together with turn roll 102 form broke discharge nip 31 inside hood 101 of pulp dryer 100.

[0022] Arrangement 10 according to the invention is intended for leading broke from pulp dryer 100 equipped with one or more service platforms 200 to broke handling 210. One or more arrangements 10 according to the invention are arranged or arrangeable in connection with at least one end 103' of pulp dryer 100. According to one embodiment, arrangement 10 can be in connection with at least the uppermost drying levels 106 of pulp dryer 100, such as in connection with the 2nd to 8th uppermost drying levels 106. The following are in connection with end 103', starting from the inside of hood 101 of pulp dryer 100 and listed in machine direction MD: turn rolls 102 adapted to be rotatable; end wall 103 of hood 101, which end wall 103 is equipped with openings 105; and service platform 200 arranged either to be stationary or movable in height direction H of pulp dryer 100. Arrangement 10 is located on both sides relative to pulp dryer 100, in other words inside hood 101 and also on its outside.

[0023] When pulp web W breaks, the end part of pulp web W, in other words the part that is closer to the outlet of pulp dryer 100, is pushed automatically out of hood 101. The early part of pulp web W, in other words the part that is closer to the inlet of pulp dryer 100, remains inside pulp dryer 100 and hence also inside hood 101. Since the outlet is usually located at the lowest level, the

top part of pulp dryer 100 must be cleaned of the remaining pulp web. This takes place by using arrangement 10 according to the invention.

[0024] At least one actuator 13.1 included in actuator arrangement 13 is used for lifting pivot arm 16 upwards, and pivot axle 15 in cross direction CD of pulp dryer 100, which pivot axle 15 is connected to pivot arm 16, is used for pressing, now via loading arm 17, pressing element 11 against turn roll 102. After this, pulp web W is fed forward by using the drive system of turn rolls 102 at a low speed, while at the same time guiding it from the operators' service platform 200 under manual assistance out of hood 101 through opening 105. After being pushed out of opening 105, pulp web W may be guided to broke handling 210 either by human power or automatically, depending on the implementation, location and related equipment of broke handling 210 with which the feeding and/or guiding after opening 105 is carried out. In the embodiment according to Figures 1 and 3, the draw nip of broke extraction device 209 on movable service platform 200 arranges the draw to broke handling 210. In some cases, pulp web W is guided to broke handling 210 without broke extraction device 209 located on movable service platform 200. In this case, pulp web W is hence fed "freely" over railing 203 of service platform 200 into a pulper.

[0025] By using pressing element 11, it is possible to achieve a sufficient contact force between turn roll 102 and pulp web W so that pulp web W can be pulled forward. In other words, they together form draw nip 31 in this case. Draw nip 31, which can be formed in connection with each turn roll 102, which is equipped with arrangement 10 according to the invention, functions as its own independent unit separately of the others. When broke removal is needed on a certain drying level 106, an operator runs service platform 200 adjacent to corresponding opening 105 and then activates arrangement 10. It hence takes place in connection with each turn roll 102 most typically as a separate independent event.

[0026] Actuator arrangement 13 included in arrangement 10 is adapted on the side of at least one side wall 109 of pulp dryer 100. Side wall 109 can also be referred to as a wall in machine direction MD. When actuator arrangement 13 is on the side of at least one side wall 109 of pulp dryer 100, actuator arrangement 13 is not in connection with end 103' of pulp dryer 100 and hence not in the range of the travel path of service platform 200, either, which range of travel path is on the side of end 103' of pulp dryer 100. In this way, arrangement 10 is also located on both sides of side wall 109, in other words inside hood 101 and also on its outside. Actuator arrangement 13 included in arrangement 10 is in the case of the embodiment presented also outside hood 101.

[0027] On the other hand, the location of actuator arrangement 13 can also be defined so that it is located in cross direction CD of pulp dryer 100 on the side of ends 202, 204 of service platform 200, in other words on the side of narrower sides 202, 204, relative to elongated

service platform 200.

[0028] As a result of the invention, service platform 200 can be arranged very close to end wall 103 of pulp dryer 100. This facilitates access to turn rolls 102 via openings 105 and hence the carrying out of maintenance measures on pulp dryer 100. According to one embodiment, the distance of service platform 200 from hood 101 of pulp dryer 100 can be 50 - 150 mm. A consequence of this is also that according to one embodiment, service platform 200 can even be without a railing in its longitudinal direction on the side of pulp dryer 100. When the railing is not in the way of working, it is even easier to reach turn rolls 102.

[0029] Actuator arrangement 13 includes at least one actuator 13.1 on at least one side of service platform 200 in cross direction CD of pulp dryer 100 and hence also on the side of side wall 109 of pulp dryer 100. Actuator arrangement 13, and more specifically at least one actuator 13.1 included in it, is adapted to press at least two pressing elements 11 against turn roll 102. There can be, for example, 2 to 30, advantageously 3 to 20, pressing elements 11 per one actuator 13.1. Moreover, there can be two or more loading arms 17 per one actuator 13.1 to press pressing elements 11 against turn roll 102.

[0030] Operating mechanism 12 adapted to connect to at least one actuator 13.1 of arrangement 10 is adapted at least partially on the side of at least one side wall 109 of pulp dryer 100. Arrangement 10 is hence located on both sides of side wall 109 in this respect, too. In this case, it can be partially inside hood 101 and also outside it.

[0031] Figure 3 shows pulp dryer 100 shown in Figure 1 viewed from the side and opened from the connection of its side wall 109. Support frame structures 107 of pulp dryer 100 include support structure 110 adapted to the side of side walls 109 of pulp dryer 100. Support structure 110 is arranged for turn rolls 102, among others. Support structure 110 is located on the side of side wall 109 of pulp dryer 100. One or more actuators 13.1 of arrangement 10 are adapted to same support structure 110, to which turn rolls 102 are also supported by their bearing housings 112. In this way, it is possible to utilise existing structures without a need for new ones.

[0032] According to one embodiment, support structure 110, to which actuator arrangement 13 is supported, is ladder-type frame 111, also part of support frame structure 107 of hood 101, in other words of pulp dryer 100. It includes vertical parts 111.1, 111.2 and between them horizontal parts 111.3. In other words, in this case they form a vertically overlapping H-profile. In this case, one or more actuators 13.1 of arrangement 10 can be adapted to horizontal part 111.3 of ladder-type frame 111 by their cylinder parts, for example. Ladder-type frame 111 formed on the roll tower formed by turn rolls 102 can be a duplicated structure in cross direction CD of pulp dryer 100. In this case, there are also two horizontal bars 111.3 one after the other at a distance from each other in cross direction CD. In narrower pulp dryers 100, one actuator

13.1 is sufficient only on the side of one side wall 109 of pulp dryer 100, but in wider pulp dryers 100, actuators 13.1 can be on both edges of pulp dryer 100, in other words on the sides of its both side walls 109. When actuator arrangement 13 is on the side of side walls 109, actuator arrangement 13 can also be said to be next to openings 105, hatches or similar lift doors. Actuator 13.1 is then in a cool and also drier place.

[0033] In the embodiment presented, operating mechanism 12 includes at least one pivot axle 15 in cross direction CD of pulp dryer 100. Pivot arm 16 is adapted between actuator 13.1 and pivot axle 15. In this case, actuator 13.1 turns pivot axle 15, and pressing elements 11 are arranged in a rigid manner relative to pivot axle 15, whereby pressing elements 11 turn with it. When pressing elements 11 have turned sufficiently with pivot axle 15, they meet turn roll 102, whereby draw nip 31, which compresses broke between them, is formed against turn roll 102.

[0034] According to one embodiment, pressing elements 11 are adapted on loading arm 17, one example of which is shown in Figure 4. This can enable individual and even three-dimensional adjustment of pressing element 11, which adjustment even takes place steplessly or in one or more directions. Loading arm 17 can be fastened to pivot axle 15 in a detachable manner for setting the place of pressing elements 11 steplessly in cross direction CD of pulp dryer 100. In this way, it is possible to easily set the mutual distance of pressing elements 11 to the desired distance and/or also change it easily if the need arises. More generally, loading arm 17 enables easy adjustability of pressing elements 11 relative to turn roll 102.

[0035] Each pressing element 11 can have its own loading arm 17. In this case, in addition to changing their place, it is also possible to add them easily to turn roll 102 or remove them easily from turn roll 102. In this way, in addition to adjustment, loading arm 17 also makes arrangement 10 easily modifiable.

[0036] According to one embodiment, pressing elements 11 are adapted on loading arm 17, which is fastenable in a detachable manner to pivot axle 15 in order to set the place of pressing elements 11 in circumferential direction C, in other words height direction, of pivot axle 15. In this way, it is possible to easily set the distance of pressing elements 11 from turn roll 102 to the desired distance and/or also change it easily if the need arises. The circumferential C position relative to turn roll 102 can also be used for influencing the pressing force.

[0037] Loading arm 17 arranged for pressing element 11 includes first fastening arrangement 23 adapted at first end 17.1 of loading arm 17 for fastening loading arm 17 to pivot axle 15. According to one embodiment, it can be carried out, for example, by means of compression joint 32, which is implemented by means of fastening element 18. Fastening element 18 can have a round cross section, for example. The embodiment presented of this in the Figures is mounting socket 18'. This is just

one way of arranging circumferential C adjustment of loading arm 17 on pivot axle 15, and this adjustment is also stepless.

[0038] Mounting socket 18' according to the presented embodiment can be divided, for example, into two parts, such as two halves. They can be attached to each other by means of screw fastening, forming a circumferential circle that has an opening and that is closable in an openable manner, in order to take pivot axle 15 through mounting socket 18'. For potential adjustment, the screws are just loosened a little, then the necessary shifting movements are made (CD and/or C), after which the screws are tightened. Socket mounting is also one way of easily adding pressing elements 11 to turn roll 102 or removing pressing elements 11 from turn roll 102. In order to lock the adjustment, it is possible, for example, to drill holes through mounting socket 18' and pivot axle 15 for a cotter bolt.

[0039] First fastening arrangement 23 can equally as well also be, for example, a friction joint, fastening element joint and form-locked joint by means of, for example, an adapter. Fastening arrangement 23 can also be a combination of those referred to above. According to one embodiment, pivot axle 15 can also be sharp-cornered. In this case, circumferential C adjustment of loading arm 17 takes place in steps.

[0040] Axle unit 24 for pressing element 11 is adapted at one end 17.2 of loading arm 17 of the embodiment presented. Axle unit 24 now includes fork 25. Fork 25 is used for fastening pressing element 11 to loading arm 17 in a rotatable manner. Axle 27 goes through pressing element 11 in its axial direction, and axle 27 is fastened by its ends to flanges 26 of fork 25. Fork 25 is a narrow fastening structure. Moreover, with it the force can be directed to pressing element 11 from above.

[0041] Loading arm 17 can also include stepless second fastening arrangement 28 for changing the place of pressing element 11 in longitudinal direction L of loading arm 17. This enables the use of loading arm 17 of the same length regardless of the distance of turn rolls 102 from openings 105 and from the bracketing point of arrangement 10 at end wall 103.

[0042] In the embodiment presented, stepless second fastening arrangement 28 includes one or more elongated openings 33. Openings 33 are on loading arm 17 in its longitudinal direction L. Fork 25, more generally axle unit 24, included in pressing element 11 is fastened to openings 33 by means of one or more screw fastenings 34. More generally, fastening elements 34' can be used as the term instead of screw fastening 34.

[0043] Bracket unit 14 includes mounting beam 19 and brackets 20 adapted to it. Mounting beam 19 is in cross direction CD of pulp dryer 100. Mounting beam 19 of bracket unit 15 is adapted to the upper edge of opening 105. In this case, pressing elements 11 can also be brought to the location of openings 105 and above turn rolls 102. In the embodiment presented, mounting beam 19 is on support structure 113 of end wall 103, which

support structure 113 is illustrated with broken line in Figure 3, and more specifically on its vertical beam 114.

[0044] Brackets 20 adapted to mounting beam 19 are equipped with bearings 21 for pivot axle 15. Moreover, at the end of the pivot axle there can be articulated suspension 29 for pivot axle 15, by which it is also connected to perpendicularly arranged pivot arm 16. Pressing elements 11 can therefore be said to be suspended in an articulated manner from the supports, now being vertical beam 111.1 of ladder-type frame 111 and cross beam 19 adapted on support structure 113 of the end wall on the inside of end wall 102 of hood 101 above openings 105. In this case, arrangement 10 according to the invention only needs one small lead-through from the outside of hood 101 of pulp dryer 100 to the inside per two or more draw nips 31.

[0045] According to one embodiment, at least one actuator 13.1 of actuator arrangement 13 is single-acting. Actuator 13.1 can be pneumatic, for example, because compressed air is typically well available in the operating environment, but equally as well it can also be hydraulic. Both driving forces can be implemented as cylinders, for example. The actuator can also be electrically operated, such as a movement screw equipped with a drive.

[0046] In the embodiment presented, pivot arm 16 now also includes counterweight 22. Counterweight 22 is on pivot arm 16 on the opposite side of articulation point 30 of actuator 13.1 relative to articulation point 29 of pivot arm 16. Counterweight 22 can also be located between ladder-type profile 111 and thus on the side of side wall 109 of pulp dryer 100. Counterweight 22 is used for keeping one or more pressing elements 11 located on pivot arm 16 apart from turn rolls 102, for example, in the production situation of pulp dryer 100. In this case, even single-acting actuator 13.1 is sufficient, because counterweight 22 that keeps draw nip 31 open takes care of the returning. Moreover, counterweight 22 can also handle the situation if the pressure of actuator 13.1 disappears in the middle of the formation of draw nip 31.

[0047] Figure 5 shows another embodiment of arrangement 10 in particular in terms of pressing elements 11.1, 11.2 and loading arm 17. Two pressing elements 11.1, 11.2 are adapted on one loading arm 17 here. Pressing elements 11.1, 11.2 are now consecutively in longitudinal direction L of loading arm 17. This is one way of lengthening the effective nip that is formed by pressing elements 11.1, 11.2 together with turn roll 102.

[0048] This arrangement accomplishes a longer contact surface, in other words segmental coverage with turn roll 102 in machine direction MD as compared to, for example, just one pressing element 11 located above turn roll 102, for example.

[0049] Pulp dryer 100, which the invention also concerns alongside arrangement 10, includes in a known manner turn rolls 102 adapted at its ends 103' in order to lead the pulp web through pulp dryer 100 in order to dry the pulp web. Movable service platforms 200 shown in Figure 1 are adapted in pulp dryer 100, for example,

at both ends 103' of pulp dryer 100 in order to perform measures on pulp dryer 100. More specifically, service platforms 200 are arranged near turn rolls 102 adapted at ends 103' of pulp dryer 100. The Figures only show pulp dryer 100 partially, from its one end 103' and opened to different degrees. The pulp web travelling through pulp dryer 100 is dried in a manner known in itself in pulp dryer 100 on a track that is formed by superimposed web feeding points and turn rolls 102 arranged at ends 103' and that runs back and forth between ends 103'. Ends 103' have openable/closable hatches 104 or similar, such as a folding lift hatch (Figure 1). During production, these are used for closing the openings, which allow access into pulp dryer 100 and through which it is possible to get into pulp dryer 100 to carry out measures in the area of turn rolls 102, for example.

[0050] Arrangement 10 according to the invention for broke removal from pulp dryer 100 is located on pulp dryer 100 in connection with its end 103' and is intended for leading broke W from pulp dryer 100 equipped with one or more service platforms 200 to broke handling 201. One or more arrangements 10 are arrangeable in connection with at least one end 103' of pulp dryer 100, which have, starting from pulp dryer 100, turn rolls 102 adapted to be rotatable and service platform 200 that is arranged to be either stationary or to be movable in height direction H of pulp dryer 100.

[0051] Arrangement 10 according to the invention can advantageously be adapted together with known broke removal nips 209 of service platform 200. They can be located on the side of the side that is away from hood 101 of service platform 200, in other words on the side of back wall 203, at the location of floor 208 of liftable service platform 200 and/or between liftable service platform 200 and hood 101. In this case, arrangement 10 according to the invention together with its pressing elements 11 is used for feeding web W forward in a simple and reliable manner over a necessary distance in order to guide it further to broke removal nip 209. However, in the cases of narrow pulp dryers, for example, arrangement 10 can be adapted as such, in other words without broke removal nip 209 outside pulp dryer 100.

[0052] Arrangement 10 according to the invention is suited to both new pulp dryers 100 and existing pulp dryers by means of a retrofit. In this way, arrangement 10 according to the invention for discharging broke W from pulp dryer 100 can be understood to be pre-arranged in an existing pulp dryer 100 or as an arrangement arrangeable in pulp dryer 100 in retrospect.

[0053] It is to be understood that the above description and the related figures are only intended to illustrate the present invention. The invention is hence not only restricted to the above-presented embodiments or to the embodiments defined in the claims, but several different variations and adaptations of the invention will also be obvious to a person having ordinary skill in the art, which variations and adaptations are possible within the inventive idea defined by the enclosed claims.

[0054] The invention relates to an arrangement for broke removal in a pulp dryer. The pulp dryer (100) includes a hood (101) defined by side walls (109) and end walls (103). Turn rolls (102) are adapted inside the hood in connection with the end walls (103) of the hood in order to lead the pulp web (W) to be dried through the pulp dryer. A service platform (200) is adapted in connection with the pulp dryer, which service platform (200) is adapted to be movable in connection with at least one end wall with openings (105) of the pulp dryer (100) in order to gain access to the turn rolls. The arrangement (10) includes one or more pressing elements (11) for pressing the pulp web against the turn roll, an operating mechanism (12) for at least one pressing element, an actuator arrangement (13) outside the hood adapted to impact the operating mechanism in order to press at least one pressing element against the turn roll, and a bracket unit (14) for joining the operating mechanism to the support frame structures (107) of the pulp dryer. The arrangement is adapted or adaptable in connection with one or more turn rolls. In the arrangement, the actuator arrangement is adapted on the side of at least one side wall of the pulp dryer, and it includes at least one actuator (13.1), which is adapted to press at least two pressing elements against the turn roll, and the operating mechanism adapted to connect to at least one actuator is adapted at least partially to the side of at least one side wall of the pulp dryer. The invention also relates to a pulp dryer.

Claims

1. An arrangement for broke removal in a pulp dryer, where the pulp dryer (100) includes a hood (101) defined by side walls (109) and end walls (103), inside which hood (101) turn rolls (102) are adapted in connection with the opposite end walls (103) with openings (105) of the hood (101) in order to form several superimposed drying levels (106) and to lead the pulp web (W) to be dried through the pulp dryer (100), and where a service platform (200) is adapted in connection with the pulp dryer (100), which service platform (200) is adapted to be movable in connection with at least one end wall (103) with openings (105) of the pulp dryer (100) in order to gain access to the turn rolls (102), and where the arrangement (10) includes:

- one or more pressing elements (11) for pressing the pulp web (W) against a turn roll (102),
- an operating mechanism (12) for at least one pressing element (11),
- an actuator arrangement (13) outside the hood (101) adapted to impact the operating mechanism (12) in order to press at least one pressing element (11) against the turn roll (102),
- a bracket unit (14) for joining the operating

mechanism (12) to the support frame structures (107) of the pulp dryer (100),

and which arrangement (10) is adapted or adaptable into connection with one of more turn rolls (102), **characterised in that:**

- the actuator arrangement (13) is adapted on the side of at least one side wall (109) of the pulp dryer (100) and it includes at least one actuator (13.1), which is adapted to press at least two pressing elements (11) against the turn roll (102),
- the operating mechanism (12) adapted to connect to at least one actuator (13.1) is adapted at least partially on the side of at least one side wall (109) of the pulp dryer (100) .

2. The arrangement according to claim 1, **characterised in that** the support frame structures (107) of the pulp dryer (100) include a support structure (110) adapted on the side of the side walls (109) of the pulp dryer (100), arranged on turn rolls (102), and one or more of the actuators (13.1) of the arrangement (10) are adapted to said support structure (110).

3. The arrangement according to claim 1 or 2, **characterised in that** the operating mechanism (12) includes:

- a pivot axle (15) in the cross direction (CD) of the pulp dryer (100),
- at least one pivot arm (16) adapted between at least one actuator (13.1) and the pivot axle (15).

4. The arrangement according to claim 3, **characterised in that** the pressing elements (11) are adapted on a loading arm (17), which can be fastened to the pivot axle (15) in a detachable manner by means of a first fastening arrangement (23), for setting the place of the pressing elements (11) steplessly in the cross direction (CD) of the pulp dryer (100).

5. The arrangement according to claim 3 or 4, **characterised in that** the pressing elements (11) are adapted on the loading arm (17), which can be fastened to the pivot axle (15) in a detachable manner by means of the first fastening arrangement (23), for setting the place of the pressing elements (11) steplessly in the circumferential direction (C) of the pivot axle (15).

6. The arrangement according to claim 4 or 5, **characterised in that** the loading arm (17) arranged on the pressing element (11) includes the following arranged on the loading arm (17):

- a fastening element (18) adapted at a first end (17.1) for fastening the loading arm (17) to the pivot axle (15),
 - an axle unit (24) adapted at a second end (17.2) for fastening the pressing element (11) to the loading arm (17) in a rotatable manner. 5
7. The arrangement according to any one of the claims 1 - 6, **characterised in that** the bracket unit (14) includes: 10
- a mounting beam (19) in the cross direction (CD) of the pulp dryer (100),
 - brackets (20) adapted to the mounting beam (19), equipped with bearings (21) for the pivot axle (15). 15
8. The arrangement according to any one of the claims 1 - 7, **characterised in that** the distance of the service platform (200) from the hood (101) of the pulp dryer (100) is 50 - 150 mm. 20
9. The arrangement according to any one of the claims 1 - 8, **characterised in that** the service platform (200) is without a railing on the side of the pulp dryer (100). 25
10. The arrangement according to any one of the claims 1 - 9, **characterised in that:** 30
- at least one actuator (13.1) of the actuator arrangement (13) is single-acting,
 - the pivot arm (16) includes a counter weight (22) for keeping the pressing elements (11) apart from the turn rolls (102) in the production situation of the pulp dryer (100). 35
11. The arrangement according to any one of the claims 4 - 10, **characterised in that** one or more pressing elements (11, 11.1, 11.2) are adapted per one loading arm (17). 40
12. The arrangement according to any one of the claims 4 - 11, **characterised in that** the loading arm (17) includes a second fastening arrangement (28) for changing the place of one or more pressing elements (11, 11.1, 11.2) steplessly in the longitudinal direction (L) of the loading arm (17). 45
13. The arrangement according to any one of the claims 1 - 12, **characterised in that** the operating mechanism (12) adapted to connect to at least one actuator (13.1) is adapted at least partially outside the hood (101) of the pulp dryer (100). 50
14. The arrangement according to claim 12 or 13, **characterised in that** in order to change the place of one or more pressing elements (11, 11.1, 11.2) of the 55
- second fastening arrangement (28) steplessly in the longitudinal direction (L) of the loading arm (17), one or more elongated openings (33) are adapted on the loading arm (17) in its longitudinal direction (L), to which opening (33) the pressing element (11) is adaptable by means of fastening elements (34') to be movable.
15. A pulp dryer, which includes:
- a hood (101) defined by side walls (109) and end walls (103), inside which hood (101) turn rolls (102) are adapted in connection with the opposite end walls (103) with openings (105) of the hood (101) in order to form several superimposed drying levels (106) and to lead the pulp web (W) to be dried through the pulp dryer (100),
 - at least one service platform (200) adapted in connection with the hood (101) of the pulp dryer (100), which service platform (200) is adapted to be movable in connection with at least one end wall (103) with openings (105) of the pulp dryer (100) in order to gain access to the turn rolls (102),
 - an arrangement (10) for broke removal in a pulp dryer (100), which includes:
 - one or more pressing elements (11) for pressing the pulp web (W) against a turn roll (102),
 - an operating mechanism (12) for at least one pressing element (11),
 - an actuator arrangement (13) outside the hood (101) adapted to impact the operating mechanism (12) in order to press at least one pressing element (11) against the turn roll (102),
 - a bracket unit (14) for joining the operating mechanism (12) to the support frame structures (107) of the pulp dryer (100),
- characterised in that** the pulp dryer (100) includes at least one arrangement (10) according to one or more of the claims 1 - 14 for broke removal in a pulp dryer (100).

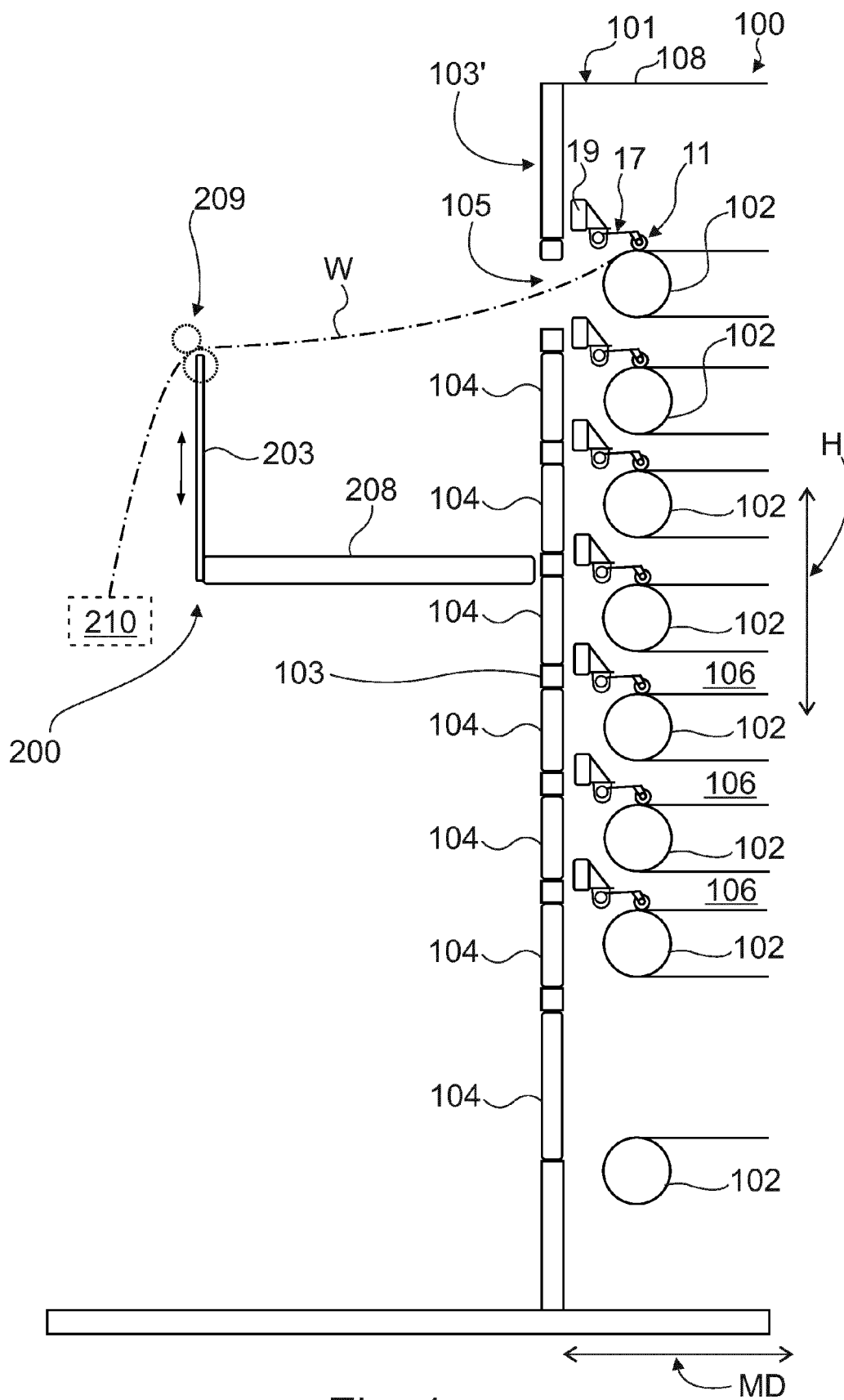


Fig. 1

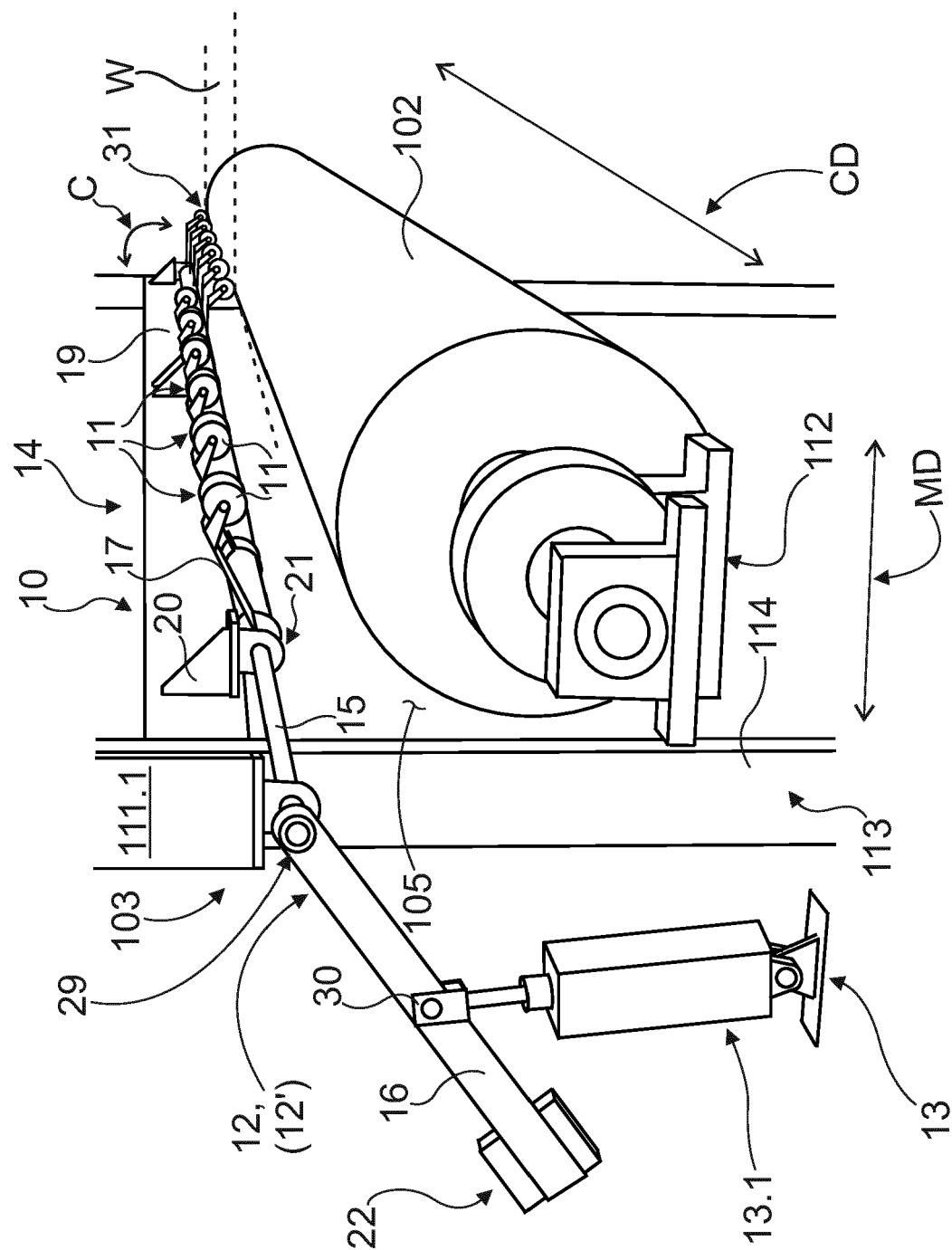


Fig. 2

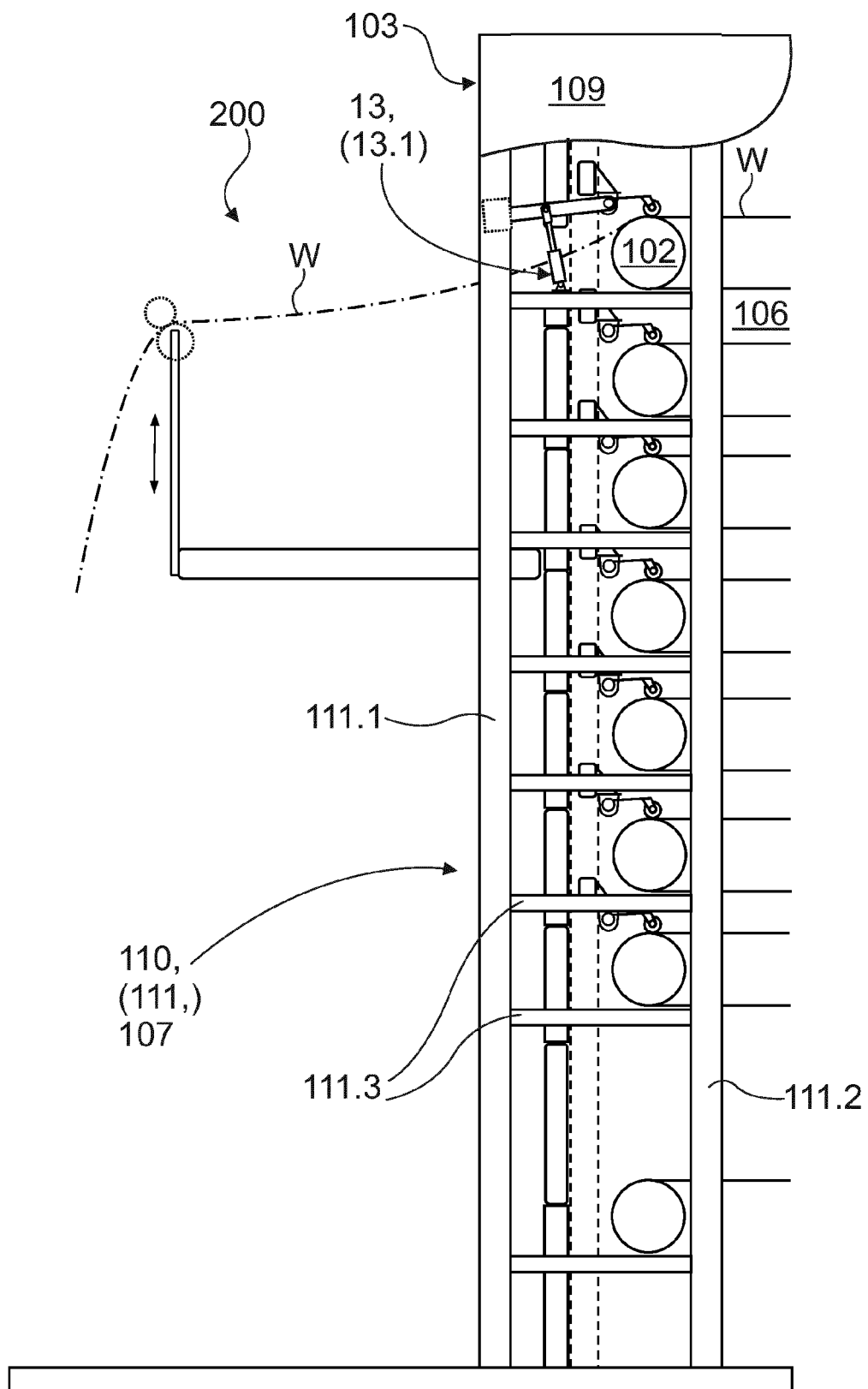


Fig. 3

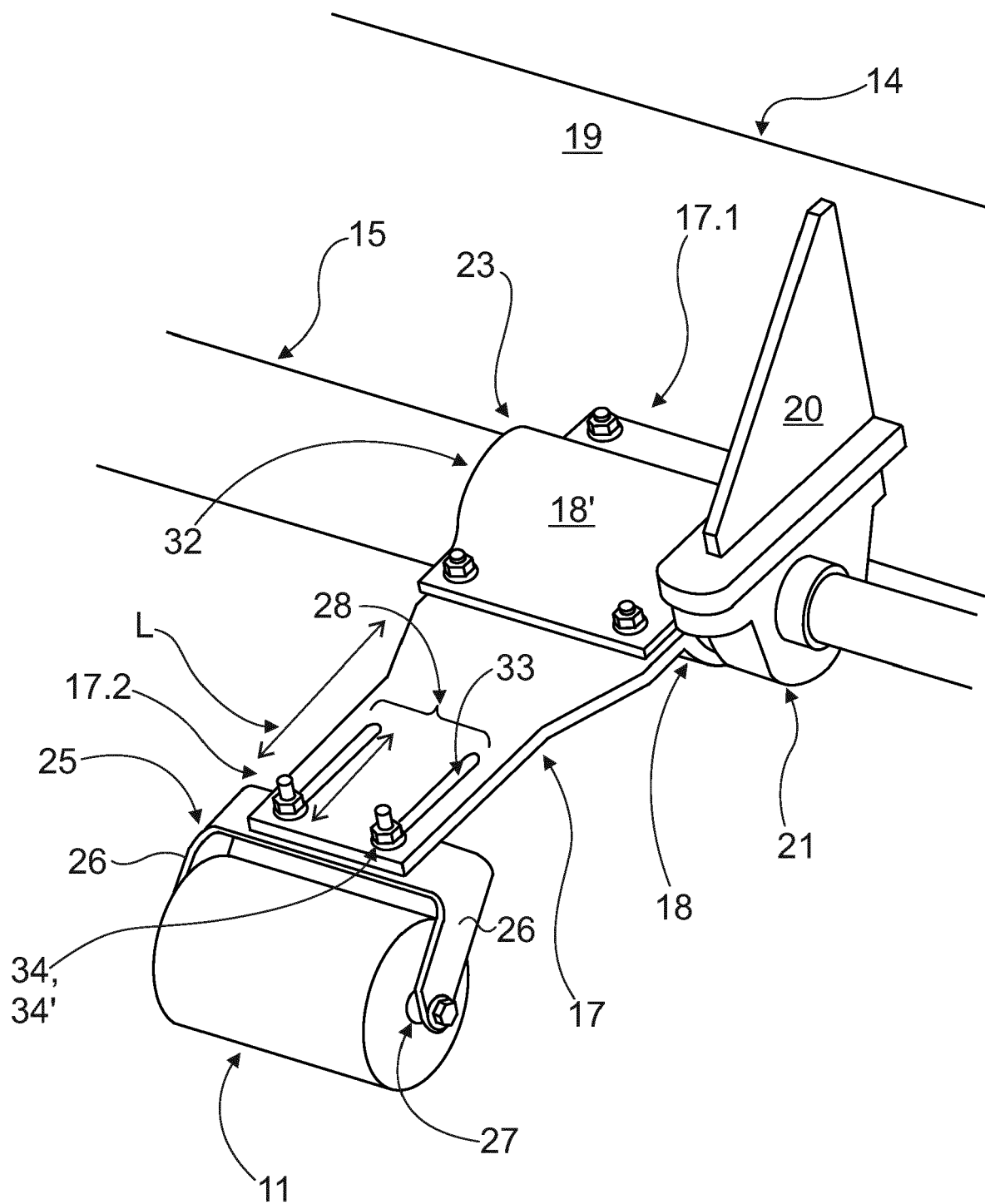


Fig. 4

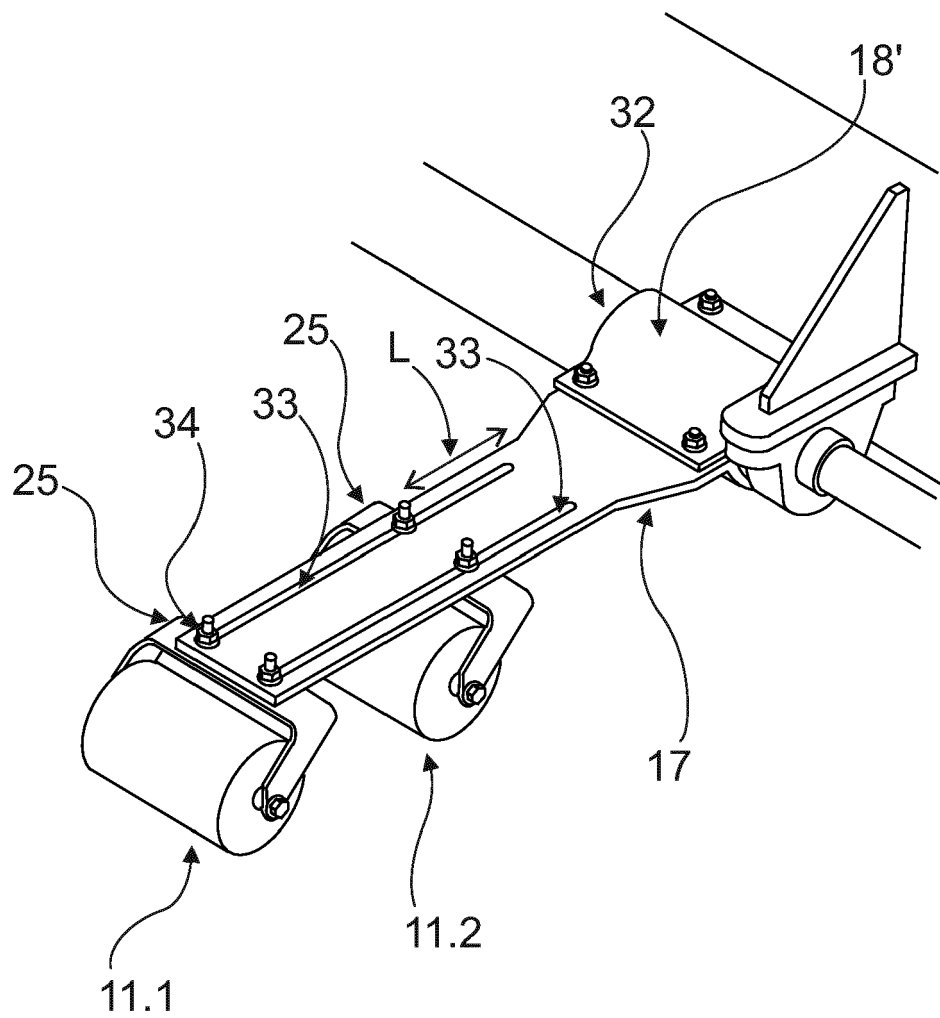


Fig. 5



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Application Number

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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 26 March 2024	Examiner Arndt, Markus
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