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(54) METHOD AND APPARATUS FOR PACKING PAPER REELS

EINE VORRICHTUNG UND EIN VERFAHREN ZUR VERPACKUNG VON MATERIALBAHNROLLEN
MÉTHODE D'EMBALLAGE DE ROULEAUX, PLUS PARTICULIÈREMENT DE BOBINES DE PAPIER

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Description

[0001] This invention comprises a method and an apparatus for packing web-material reels. Web-material reels are typically paper, board, pulp reels or plastic paper laminate reels or plastic reels. They can also be of some other web-like material, such as paper cloth. In the following, they all are referred to as a paper reel.

[0002] Paper reels are typically packed by rotating the paper reel and by guiding around it a so-called jacket wrapping the edges of which are folded against the reel ends. In connection with wrapping the jacket wrapping or before it, so-called inner headers are placed at the ends of the paper reel, on top of which the edges of the jacket wrapping are folded. These operations are commonly called the wrapping step.

[0003] The paper reel being packed is either a single reel or it can consist of two or more narrow paper reels which are packed to a common jacket wrapping. The packing of several paper reels is referred to as multi-reel packing. Even though a paper reel consisted of several narrower paper reels, it is called a paper reel in the context of this invention.

[0004] The jacket wrapping is typically of so-called paper laminate in which there is between two paper layers a plastic layer. The paper layers form a mechanical so-called handling protection and the plastic layer forms a moisture barrier. The jacket wrapping can also consist of only paper or of only plastic sheet. The jacket wrapping can also consist of separate paper and plastic sheet layers.

[0005] After the wrapping step, at the ends of the paper reel are fastened typically plastic-coated outer headers by means of hot press planes, whereby the headers adhere at the ends by thermal grip, closing the packing. The outer headers are placed and aligned on end press planes in accordance with the reel end and kept fast by suction grip before fastening at the ends of the paper reel. These operations are referred to as the end press step.

[0006] The inner headers are placed in connection with the wrapping step and the outer headers are placed in connection with the end press step onto the reel and the end press planes either manually or automatically typically using an industrial robot.

[0007] After the wrapping or end press step, the paper reel is usually fastened with one or more shipping labels. It is also possible to enter marks on the paper reel by writing directly on the jacket surface e.g. a belt barcode with an ink-jet printer. These operations are referred to as the marking step.

[0008] The packing of paper reels constitutes a considerable cost factor in production and the investment costs of packing are also considerably high. For these reasons, the packing of paper reels is desired to do as economically and effectively as possible, for which, all packing measures are aimed at doing totally automatically.

[0009] Recently, the packing of paper reels is often wished to automatise also for work safety, because moving paper reels and packing apparatuses form a safety risk when working in their vicinity. Paper reels weigh up to 10,000 kg.

[0010] In large, modern paper mills, the reel-packing systems operate totally automatically. In such high-capacity systems, the wrapping step and the end press step are performed at different work stations for an adequately short operation cycle. The marking step is also performed at one or more work stations depending on each marking measure.

[0011] Before the actual packing measures, the paper reel is identified, weighed, measured and positioned in order for the reel be positioned correctly in various packing steps. The positioning most commonly occurs centrally in the longitudinal axial direction. At the end of a printing paper reel is typically made a marking with the ink-jet printer to later trace the manufacturing batch.

[0012] These operations together constitute the information operations of reel packing and they are usually performed centrally at an information station which can be integrated with the positioning station. The information operations determine the operating parameters and selections of reel-packing operations, such as used wrapping widths and number of layers, the picking and placing of inner and outer headers. The shipping labels and ink-jet markings are also printed according to the identifier and weight data and the paper reel is registered as produced.

[0013] The above measures performed in connection with packing paper reels are referred to as the packing measures.

[0014] In known packing systems, the transfer of the paper reel between different work stations occurs either by transferring on a conveyor in the axial direction of the reel, by rolling in the radial direction or by using both transfer motions. The conveyor is typically a so-called step conveyor or a chain slat conveyor. Because high-capacity systems include several work stations, it is also easy to locate in their connection automatic header handling devices, such as industrial robots and header stations as well as labelling and marking apparatuses. Due to decentralised operations, high-capacity systems require a large space and their operation is typically monitored by one operator whose task is also to restock packing materials.

[0015] As high-capacity, automatic reel-packing systems are very expensive of their building and device investments, they are profitable to acquire and use in paper mills producing typically more than 100 reels per hour. Such high-production mills are, inter alia, printing, writing or office paper mills having several paper machines.

[0016] One such typical high-capacity reel-packing system is described in patent specification FI95228.

[0017] There exist many paper mills the production of which is smaller, typically 60 paper reels per hour or less. Such mills typically include only one paper machine and

they manufacture e.g. laminate paper, packing paper, board or their converts, having a smaller production volume. These smaller mills also rationalise their production and their work safety requirements increase, due to which, the handling of paper reels have to be automated also at these mills.

[0018] In the reel-packing systems of lower-capacity paper mills, the wrapping and end press steps are typically located at the same station, for which, the paper reel being packed transfers to the station and away from the station by rolling in the radial direction. Alternatively, the paper reel is transferred to the station and/or away from the station on a conveyor.

[0019] Such reel-packing systems are described, inter alia, in patent specification SE503181.

[0020] When both the wrapping and end press step of the paper reel are performed at the packing station, due to the space required by the reel transfer operations and the end press planes, it is difficult to locate into connection with such packing systems an automatic simple header system. Hence, doubled header systems are required, such as in patent specification US5333321.

[0021] Patent specification FI117168B describes another known packing system in which the paper reel is transferred with a conveyor and a rotating device between the wrapping and end press steps. In this system, the wrapping step and the end press step occur in different positions, whereby it requires a large space. Furthermore, intermediate placers are required for handling the inner headers.

[0022] DE 10 2007 040050 A1 discloses an apparatus for packing web material roll with wrapping material incorporating a head positioning station and a wrapping station, whereby the web material roll is transferred with a conveyor from head positioning station to wrapping station. In this publication the wrapping station including rotating rolls is stationary.

[0023] A disadvantage of known packing systems is also that, in them, it is hard to locate labelling devices into connection with the packing station without impeding other operations. The marking step is performed in a later handling step and position, whereby separate labelling station and devices are required, which is an expensive investment.

[0024] A common requirement for a reel-packing system to be installed in an existing small- or medium-sized paper mill is that it can be located in existing spaces without considerable building investments. If possible, the reel-packing operations should be arranged such that an operator working at some other production machine, e.g. a slitter-winder, can control the operation of reel packing. The reel-packing system should also be cost-effective to acquire and use. Considering these requirements, the reel-packing system of a small- or medium-sized paper mill should be compact of its structure and operate as automatically as possible.

[0025] The same requirements are set for the packing systems of particularly large so-called jumbo reels pro-

duced in large paper mills, where the jumbo reels are handled separately from the production of other so-called normal-sized paper reels.

[0026] The method and apparatus according to the invention include the properties which fulfil the above requirements and which avoid the disadvantages and limitations occurring in known low-capacity reel-packing systems.

[0027] The method according to the invention is characterised by what is stated in the characterising part of claim 1.

[0028] The method according to the invention is further characterised by what is stated in claims 2-24.

[0029] The apparatus according to the invention is characterised by what is stated in the characterising part of claim 25.

[0030] The apparatus according to the invention is further characterised by what is stated in claims 25-28.

[0031] The method and apparatus according to the invention will be described in more detail with reference to Figs. 1-8.

[0032] According to Figs. 1a and 1b, the apparatus according to this invention is a packing station 1 run linearly 6 at which a paper reel 5 is axially transferred between various packing steps and handling positions. The packing station 1 comprises at least a set of reel rotating rolls 2 with its drive and lateral run apparatus 3. The packing station 1 advantageously comprises end press planes 4 with their actuators for fastening headers onto the paper reel 5 after the wrapping step.

[0033] The set of reel rotating rolls 2 and the end press planes 4 optimally integrated in it are run together, whereby the paper reel 5 is laterally transferred in the longitudinal axial direction between various packing steps and handling positions. Both end press planes move separately in relation to the set of reel rotating rolls 2 and the paper reel 5 on it at the end press step.

[0034] In the work position, the end press planes 4 are vertical, but they can be rotatable to a horizontal or inclined position to facilitate the manual placing of the headers.

[0035] Next, some advantageous embodiments of the reel-packing system and apparatus according to the invention will be described with reference to the figures.

[0036] Figs. 1a-1f show an advantageous embodiment of a method and apparatus according to the invention and its operation by steps.

[0037] A paper reel 5 is transferred into a packing station 1 at an input point (A) (Fig. 1a) and the paper reel is transferred by an axial run motion 6 of the packing station to a wrapping position (B). At the wrapping position (B), a jacket wrapping is wrapped around the jacket in a way known as such. In connection with wrapping the jacket wrapping, so-called inner headers 7 are placed at the ends of the paper reel 5 (Fig. 1b) on top of which the edges of the wrapper are folded.

[0038] The inner headers 7 can also be fastened onto the paper reel 5 before the packing operations e.g. by

tape on the reel edge or by hooks at the reel centre already on the slitter-winder or conveyors.

[0039] When the packing station also comprises end press planes 4, outer headers 10 are placed on the press planes advantageously during the wrapping step or after it when the paper reel is at the wrapping position (B) (Fig. 1c). Thus, a one and same operator 8 can place both inner and outer headers (7, 10) in each packing step. The operator 8 is advantageously a so-called industrial robot or some other automatic header handling device, but it is also possible to place the headers manually.

[0040] The press fastening of the outer headers 10 to the paper reel 5 is advantageously performed during the axial run motion after the wrapping step (Fig. 1d), whereby the end press step does not increase the total time spent for reel packing. Then, the method according to the invention provides efficient reel-packing operation.

[0041] The paper reel is transferred by the axial run motion of the packing station 1 (Fig. 1e) to a labelling and marking position (C) where the reel is fastened with a shipping label (11) typically by rotating the reel and by feeding the shipping label between it and the rotating rolls. At the same time, it is possible to make some other marking (12), e.g. a belt barcode, with an ink-jet printer (13).

[0042] After the marking step, the paper reel is transferred to an output position (D) where the paper reel is transferred away from the packing station (Fig. 1f). The transfer of the paper reel to the packing station and away from the packing station occurs in a way known as such e.g. by rolling the reel 5 utilising pushers and receivers beside the path and the conveyers of the packing station 1.

[0043] If the paper reel is not fastened with a label nor other markings are performed, the reel is transferred from the wrapping position (B) directly to the output position (D).

[0044] When the jacket wrapping is formed of several parallel, partially overlapping wrapper webs, the paper reel is positioned at the wrapping position (B) axially at different points (14) in relation to wrapper stations/wrapper feed system (9) in the wrapping step (Fig. 5). Then, all sizes, up to 5-m wide paper reels can be wrapped to the jacket wrapping using only a few wrapper widths. The positioning of the paper reel at different points for wrapping into parallel wrapper webs is advantageously performed employing the same actuator and run mechanism (3) as to perform the linear run motion of the packing station between different packing measures.

[0045] The method and apparatus according to the invention can perform a simultaneous lateral transfer of the paper reel with rotating the wrapper around the reel employing the same actuator and run mechanisms (3) as in the linear run motion of the packing station between different packing operations. The method and apparatus according to the invention can thus implement the so-called spiral wrapping.

[0046] The method and apparatus according to the in-

vention can be applied to wrapping paper reels also with some other kind of material than paper wrapper. The wrapper material can be e.g. plastic web which is wrapped around the reel as the so-called radial wrapping by rotating the paper reel. The run motion of the packing station in the direction of the paper reel can be combined with this radial wrapping, whereby the feed devices of plastic sheet can be in place for implementing spiral wrapping.

[0047] The wrapping of the paper reel can also be performed with plastic web as the so-called axial wrapping in which the plastic web is wrapped around the paper reel via the ends simultaneously rotating the reel slowly.

[0048] The wrapping of the paper reel can also be performed by combining the above wrapping ways.

[0049] In connection with plastic wrapping, headers are typically placed onto the paper reel like in paper wrapping. The headers maintain in place by means of the plastic wrapping folded around the edge of the reel.

[0050] The structure of the method and apparatus according to the invention is optimal, because different packing measures are performed the paper reel being at the packing station all the time. The transfer of the paper reel to different packing and handling positions is performed with the linear run motions of the packing station which are provided with the run mechanism and actuator (3). The actuator typically comprises a gear-head motor with its control device which drives the run motion of the packing station via a belt, a chain, a wire cable or some other equivalent transmission element. The packing station moves on linear guides which are typically linear bearings, wheel-rail combinations or equivalent control mechanisms of linear motion. The actuator can be fixedly installed outside the packing station or it can be fastened to the packing station and move along with it. The actuator can also be integrated in the linear guide. For implementing the linear run motion of the packing station, there are several different alternatives of which only a few were mentioned here.

[0051] The run mechanism and the actuator advantageously operate with the so-called parking drive control by means of which the linear run motion of the packing station and its alignment to various measure positions occurs accurately utilising control data obtained from different packing operations.

[0052] It is thus characteristic of the method and apparatus according to the invention that there is no need for a separate conveyor or other devices for transferring the paper reel between different packing and handling steps.

[0053] Before the paper reel is brought to packing, it is weighed and positioned before the transfer to the packing station advantageously according to the end (E). Then, the reel width (L) is also measured, based on which parameters the position of the packing station (1) is determined when being input (A) (Fig. 1a). It is simple to implement the identification of the paper reel from the barcode or some other identification at the end and the

possible ink-jet marking at the end when the reel is positioned according to the end (E).

[0054] In connection with the method according to the invention, the information and positioning operations can be implemented in a way known as such advantageously in connection with a conveyor bringing paper reels, whereby no separate information and positioning station is required.

[0055] Similarly, it is possible to determine the output position of the packing station (D) according to the reel width (L) for positioning the paper reel according to the end (F) (Fig. 1f), whereby it is possible to fasten to the reel ends an end label with a simple device after having been transferred away from the packing station.

[0056] The method and apparatus according to the invention can also be employed such that the transfer position of the paper reels to the packing station varies (A1...AN). An example of such an embodiment is an application in which the paper reels are transferred to the packing station immediately after slitting (WINDER) directly from a location in the axial direction of the paper reels in a reel set (A1...AN). That is, the reels are not transferred axially before the transfer to the packing station (Fig. 6).

[0057] In this embodiment, it is advantageous to integrate the method and apparatus according to the invention to operate with a slitter-winder. The packing and marking steps of paper reels advantageously employ control and production data used and created in connection with slitting, such as reel width, diameter, position in the reel set, customer details, paper quantity, etc. directly without controlling them again before packing. Then, there is no need to make barcodes or other markings on the paper reels to identify them in connection with packing. The packing apparatus of paper reels according to the invention and the slitter-winder can then form a centralised slitting-packing unit of paper reels compact of its space use which is centrally operated by one operator.

[0058] Furthermore, the method and apparatus according to the invention can be utilised such that the reel set is transferred aside from the slitter-winder or to a totally separate packing position. Also in this embodiment, the paper reels are transferred to the packing station from a location of reels directly equivalent to the slitting in the reel set (A1... AN). This embodiment is employed when the transfer of the reels to the packing station is not performed directly from the exit points of slitting. This embodiment also utilises advantageously control and production data used and created in connection with slitting, which follow the reel set, at the packing and marking steps. Then, there is no need to make barcodes or other markings on the paper reels to identify them in connection with packing.

[0059] It is also advantageous to employ this embodiment when paper reels from several slitter-winders are transferred to centrally occurring packing. The reel sets are conveyed from the slitter-winders to the packing position e.g. by a transport carriage, fixed conveyors, free-

travelling so-called forklifts, automatic guided vehicles or some other equivalent way of conveying known as such (Fig. 6).

[0060] It is particularly advantageous to use the embodiment of the method and apparatus according to the invention described above (Fig. 6) when the paper reels are narrow and several reels are packed into the same jacket wrapping, i.e., a so-called multi-reel package is formed. Then, reels separated from the reel set to be packed together are transferred to the packing station, after which they are wrapped to a common jacket wrapping like the single paper reel. The paper reels packed together can be advantageously supported by means of the end press planes to avoid falling during the run motion and be pressed together before the wrapping step, whereby it is ensured that the reels are tightly together within the jacket wrapping. Hence, durable multi-reel packing is provided. Then, the handling of narrow paper reels is safe and secure without having to bind them together before packing and the packing measures can be performed rationally like for a single paper reel. Core-board reels and other paper reels intended for converting are typical such narrow reels the handling of which is problematic with known reel-packing methods and devices.

[0061] It is also possible to support and press single discoid reels to be packed on the end press planes in connection with the run motion. Then, it is also ensured that the longitudinal axis of the paper reel is parallel to the set of wrapping rolls, whereby the wrapping succeeds. Such single narrow reels to be packed are e.g. liquid packaging board reels.

[0062] The method and apparatus according to the invention can also be employed such that the transfer position of the paper reels from the packing station varies (D1...DN). Then, it is possible e.g. to sort paper reels to different storage positions according to customers or compensation storages can be formed (Fig. 7) e.g. according to transport operation cycles.

[0063] In the method according to the invention, the various packing operations of the paper reel and the apparatus according to the invention enable the optimal location of the placing operations of headers and header stations close to the wrapping position (B) or close to the input point (A). Then, it is possible for one industrial robot or other operator (8) to handle the inner and outer headers coming to both ends of the reel. The operation cycle of the robot or other operator is adapted to the cycle of different packing steps to obtain an efficient overall operation of reel packing. There is then no need for doubled header stations or separate intermediate transfer manipulators.

[0064] The key operation of the method and apparatus according to the invention is the linear run motion of the packing station. By employing and controlling this run motion, it is possible to implement all information and positioning measures related to the packing of paper reels, the wrapping step, the end press step, the placing

of headers as well as labelling and marking measures in a rational way. By using the method and apparatus according to the invention, it is possible to eliminate several operations and work stations which are required in known reel-packing systems.

[0065] The apparatus according to the invention can competitively provide the fully-automatic reel-packing systems of small- and medium-sized paper mills suitable for all reel sizes and various spaces which fulfil the modern efficiency and safety requirements.

[0066] The method and apparatus according to the invention can be applied to various device lay-outs.

[0067] In the embodiment shown in Figs. 1a-1f, the input position (A) and the output position (D) of the paper reel are on the same side in relation to the wrapping position (B). Then, the transfer of a packed paper reel away from the packing station and the transfer of a new reel to the packing station occur with short run motions and the operation of the packing system is swift.

[0068] Fig. 2 shows a second embodiment of the method and apparatus according to the invention in which the input position (A) and the output position (D) are on different sides in relation to the wrapping position B.

[0069] Fig. 3 shows a third embodiment of the method and apparatus according to the invention in which either the input position (A) or the output position (D) is at the point of the wrapping position (B) and on the opposite side of the header system. The output position (D) or equivalently the input position (A) are at the side of the wrapping position.

[0070] Fig. 4 shows an embodiment of the method and apparatus according to the invention in which the input position (A), the output position (D) and the wrapping position (B) are all at the same point. The marking and labelling position (C) is at the side of the wrapping position. The structure of this embodiment is very compact and applicable when the number of paper reels being packed is small, at the most some dozens of reels per hour, and when the usable space is small.

[0071] In the embodiment according to Figs. 3 and 4, the wrapping stations and the wrapper feed system (9) are located up, from where the wrapper is controlled down and wrapped around the paper reel. This device arrangement enables the radial transfer of the paper reel at the point of the wrapping position.

[0072] In the embodiment of the method and apparatus according to the invention shown in Fig. 8, the placing of headers is performed from the opposite side of the reel input position (A) before running the packing station to the wrapping position (B). In this embodiment, all logistics operations of packing materials occur from the same direction. This embodiment is employed when the packing operations are located beside the conveyor or wall or the header operations cannot be located at the point of the wrapping position for some other reason. It is also possible to perform manual header placing in this embodiment safely separately from the other packing measures which can occur e.g. within a safety enclosure.

[0073] It is common for all of the embodiments of the method and apparatus according to the invention that the packing station and the paper reel on it are transferred between different packing measure positions by running linearly. The distance between the different packing measure positions and the input and output operations is such that the operations can be located along the path of the packing station. The space requirement of different packing measures and devices prerequisites that, in practice, their distance from each other is greater than the longitudinal axial width of the paper reel.

[0074] The above properties of the method and apparatus according to the invention differ substantially from the known reel-packing methods in which the paper reel is transferred on a conveyor in the longitudinal axial direction or/and by rolling in the radial direction between different stationary packing stations.

[0075] The suitable embodiment for each case is selected according to the requirements set by inner logistics and other issues at the paper mill.

[0076] In connection with the method and apparatus according to the invention, it is advantageous to use only a few, typically two or three wrapper widths, because the capacity requirement at small paper mills is not very great. The reel-packing apparatus according to the invention is thus compact of its structure and then easy to locate in various environments, whereby it is competitive of its investment costs.

[0077] The invention is by no means limited to a certain number of wrapper stations and widths nor certain device arrangements, but these can be optimally selected according to production requirements.

[0078] The method and apparatus according to the invention can also be applied when modernising existing packing systems to fulfil the modern efficiency and safety requirements. For instance, the packing station, the header system and the labelling apparatus as well as the input and output operations of the paper reel can be located into connection with an existing wrapper feed system.

[0079] Furthermore, the method and apparatus according to the invention can be applied e.g. such that the apparatus comprises the wrapping step with its header system and the possible marking step and the input and output operations of the paper reel in a way described above. Then, the outer headers are fastened in a later packing step. This arrangement can be used when the method according to the invention is integrated in an existing reel-packing system which already includes a modern end press operation.

[0080] Modernising existing reel-packing apparatuses saves investment costs compared to the acquisition of a whole new packing system.

[0081] The method and apparatus according to the invention can be applied diversely, whereby it can creatively provide a cost-effective and efficient paper-reel packing system in small-and medium-sized paper production units which is not possible nor profitable to im-

plement with existing, known methods and devices.

[0082] The method and apparatus according to the invention is not limited to the above embodiments nor applications, but the method and the apparatus can be varied within the scope defined by the claims.

[0083] The method and apparatus according to the invention can also be applied such that no wrapping nor end press step is performed but only the labelling and/or marking steps.

Claims

1. A method for packing paper reels, in which a paper reel (5) is transferred to a packing station (1) input position (A) and a required packing measure or required packing measures is/are performed for the paper reel after which the paper reel is transferred away from the packing station (1) at output position (D), **characterised by** running the packing station linearly, wherein the packing station comprises at least a set of reel rotating rolls, transferring the paper reel (5) carried on the set of reel rotating rolls (2) in the longitudinal axial direction to a packing measure position or packing measure positions, which is/are located along the path of the packing station, wherein the packing measures comprise at least the wrapping of the paper reel (5) in a jacket wrapping which is performed in a wrapping position (B).
2. A method according to claims 1 **characterised by** the packing measures further comprising the fastening of outer headers (10) at the ends of the paper reel (5).
3. A method according to claim 2 **characterised by** at least one operator (8) placing inner headers (7) at a wrapping step and/or outer headers (10) at an end press step.
4. A method according to claim 2 **characterised by** placing the outer headers (10) by an industrial robot or equivalent automatic operator (8) onto end press planes (4) being in a press line (P).
5. A method according to claim 2 **characterised by** the fastening of the outer headers (10) occurring at least partially during a linear run motion of the packing station taking place after the wrapping step.
6. A method according to any one of previous claims **characterised by** placing the inner headers and/or outer headers at the ends of the paper reel and/or onto the end press planes at the point of the transfer position of the paper reel to the packing station (A) before transferring the paper reel to the wrapping position (B).
7. A method according to any one of previous claims **characterised by** the packing measures also comprising reel labelling (11) and/or marking measures (12, 13) which are performed in a labelling and marking position (C).
8. A method according to any one of previous claims **characterised by** the transfer position of the paper reel to the packing station (A) and the transfer position away from the packing station (D) being on the same side with the wrapping position (B) in the longitudinal axial direction of the paper reel.
9. A method according to any one of previous claims **characterised by** the transfer position of the paper reel to the packing station (A) and the transfer position away from the packing station (D) being on different sides of the wrapping position (B) in the longitudinal axial direction of the paper reel.
10. A method according to any one of previous claims **characterised by** the transfer position of the paper reel to the packing station (A) being at the point of the wrapping position (B) and the transfer position away from the packing station (D) being at the side of the wrapping position (B) in the longitudinal axial direction of the paper reel.
11. A method according to any one of previous claims **characterised by** the transfer position of the paper reel to the packing station (A) being at the side of the wrapping position (B) in the longitudinal axial direction of the paper reel and the transfer position away from the packing station (D) being at the point of the wrapping position (B).
12. A method according to any one of previous claims **characterised by** the transfer position of the paper reel to the packing station (A), the transfer position away from the packing station (D) being at the point of the wrapping position (B) and the labelling and marking position (C) being at the side of the wrapping position in the longitudinal axial direction of the paper reel.
13. A method according to any one of previous claims **characterised by** the paper reel being positioned in relation to the wrapper stations and a wrapping feed system (9) in the longitudinal axial direction of the paper reel at different points such that a jacket wrapping is stepwise formed of two or more parallel, partially overlapping wrapper webs.
14. A method according to any one of previous claims **characterised by** transferring the paper reel in the longitudinal axial direction simultaneously with wrapping the wrapper material around the reel such that a spiral jacket wrapping is formed.

15. A method according to claim 1 **characterised by** positioning the packing station for transferring the paper reel to the packing station according to the position in the longitudinal axial direction of the reel, whereby the position in the longitudinal axial direction of the paper reel at the packing station is determined.
16. A method according to claim 15 **characterised by** the position in the longitudinal axial direction of the paper reel at the packing station being at its centre.
17. A method according to claim 15 **characterised by** the paper reel being positioned before transferring to the packing station in the longitudinal axial direction according to either of the ends.
18. A method according to any one of previous claims **characterised by** transferring each paper reel to the packing station directly from the position in the longitudinal axial direction (A1...AN) which is equivalent to the position of the paper reel in a reel set after having exited the slitter-winder, having been transferred aside or after some other kind of conveyance of the reel set.
19. A method according to any one of previous claims **characterised by** using in the control of the packing measures of the paper reel control and production data used and created in connection with slitting, such as e.g. reel width, diameter, position in the reel set, customer details, paper quantity, etc.
20. A method according to any one of previous claims **characterised by** the position of the paper reel in the longitudinal axial direction for transferring away from the packing station being positioned according to either of the ends.
21. A method according to any one of previous claims **characterised by** the output position of paper reels in the longitudinal axial direction (D1...DN) varying and being determined according to production, size or other parameters.
22. A method according to claim 1 **characterised by** the packing measure position or packing measure positions being located sideways in relation to the transfer position to the packing station and/or away from the packing station and the transfer direction along the path of the packing station, at a longer distance than the longitudinal axial width of the paper reels.
23. A method according to any one of previous claims **characterised by** supporting and/or pressing on the end press planes (4) one or more (narrow) paper reels at the packing station (before the run motion of the packing station, during the run motion to the wrapping position (6) and/or after it) before the wrapping step.
24. An apparatus for packing paper reels comprising a packing station (1) with its drive and lateral run apparatus (3), by means of which the packing station together with a paper reel (5) which is transferred into the packing station at an input position (A) are transferred in the longitudinal axial direction to a packing measure position/positions, which is/are located along the path of the packing station, **characterised in that** the packing station (1) comprises at least a set of reel rotating rolls with its actuator (2) for rotating the paper reel to perform different packing measures wherein the packing measures comprise at least the wrapping of the paper reel (5) in a jacket wrapping which is performed in a wrapping position (B).
25. An apparatus for packing paper reels according to claim 24 **characterised in that** it further comprises end press planes (4) such that both end press planes and the set of rotating rolls move together linearly in relation to different packing and handling positions (A, B, C, D) and that both end press plane move separately in relation to the set of rotating rolls and the paper reel (5) on it for fastening headers at the ends of the paper reel.
26. An apparatus according to claim 24 **characterised in that** the packing measure position is or packing measure positions are located sideways in relation to the transfer position to the packing station and/or away from the packing station and the transfer direction along the path of the packing station, at a longer distance than the longitudinal axial width of the paper reels.

40 Patentansprüche

1. Verfahren zum Verpacken von Papierrollen, in dem eine Papierrolle (5) in eine Eingabeposition (A) einer Verpackungsstation (1) verlagert wird und eine erforderliche Verpackungsmaßnahme oder erforderliche Verpackungsmaßnahmen für die Papierrolle durchgeführt wird/werden, nach der/denen die Papierrolle in einer Ausgabeposition (D) von der Verpackungsstation (1) weg verlagert wird,
gekennzeichnet durch
 lineares Betreiben der Verpackungsstation, wobei die Verpackungsstation zumindest einen Satz an rotierenden Rollenwalzen aufweist,
 Verlagern der auf dem Satz an rotierenden Rollenwalzen (2) getragenen Papierrolle (5) in längsaxialer Richtung in eine Verpackungsmaßnahmenposition oder Verpackungsmaßnahmenpositionen, die sich entlang des Pfads der Verpackungsstation befindet

- bzw. befinden, wobei die Verpackungsmaßnahmen zumindest das Umwickeln der Papierrolle (5) in eine Schutzzumwicklung umfasst, was in einer Umwickelposition (B) durchgeführt wird.
2. Verfahren nach Anspruch 1, **gekennzeichnet dadurch, dass** die Verpackungsmaßnahmen ferner das Befestigen von äußeren Endschilde (10) an den Enden der Papierrolle (5) umfassen.
 3. Verfahren nach Anspruch 2, **gekennzeichnet durch** zumindest einen Bediener (8), welcher innere Endschilde (7) in einem Umwickelschritt und/oder äußere Endschilde (10) in einem End-Press-Schritt anordnet.
 4. Verfahren nach Anspruch 2, **gekennzeichnet durch** Anordnen der äußeren Endschilde (10) **durch** einen Industrieroboter oder einen äquivalenten automatischen Bediener (8) auf End-Pressbahnen (4), die in einer Presslinie (P) sind.
 5. Verfahren nach Anspruch 2, **gekennzeichnet durch** das Befestigen der zumindest teilweise während einer linearen Laufbewegung der Verpackungsstation nach dem Umwickelschritt auftretenden äußeren Endschilde (10).
 6. Verfahren nach einem der vorhergehenden Ansprüche, **gekennzeichnet durch** Anordnen der inneren Endschilde und/oder der äußeren Endschilde an den Enden der Papierrolle und/oder auf den End-Pressbahnen an dem Punkt der Verlagerungsposition der Papierrolle in die Verpackungsstation (A) vor dem Verlagern der Papierrolle in die Umwickelposition (B).
 7. Verfahren nach einem der vorhergehenden Ansprüche, **gekennzeichnet dadurch, dass** die Verpackungsmaßnahmen ferner eine Rollenkennzeichnung (11) und/oder Markierungsmaßnahmen (12, 13) umfassen, welche in einer Kennzeichnungs- und Markierungsposition (C) durchgeführt werden.
 8. Verfahren nach einem der vorhergehenden Ansprüche, **gekennzeichnet dadurch, dass** sich die Verlagerungsposition der Papierrolle in die Verpackungsstation (A) und die Verlagerungsposition weg von der Verpackungsstation (D) auf derselben Seite wie die Umwickelposition (B) in der längsaxialen Richtung der Papierrolle befinden.
 9. Verfahren nach einem der vorhergehenden Ansprüche, **gekennzeichnet dadurch, dass** sich die Verlagerungsposition der Papierrolle in die Verpackungsstation (A) und die Verlagerungsposition weg von der Verpackungsstation (D) auf unterschiedlichen Seiten von der Umwickelposition (B) in der längsaxialen Richtung der Papierrolle befinden.
 10. Verfahren nach einem der vorhergehenden Ansprüche, **gekennzeichnet dadurch, dass** sich die Verlagerungsposition der Papierrolle in die Verpackungsstation (A) an dem Punkt der Umwickelposition (B) befindet und dass sich die Verlagerungsposition weg von der Verpackungsstation (D) auf der Seite der Umwickelposition (B) in der längsaxialen Richtung der Papierrolle befindet.
 11. Verfahren nach einem der vorhergehenden Ansprüche, **gekennzeichnet dadurch, dass** sich die Verlagerungsposition der Papierrolle in die Verpackungsstation (A) auf der Seite der Umwickelposition (B) in der längsaxialen Richtung der Papierrolle befindet und dass sich die Verlagerungsposition weg von der Verpackungsstation (D) an dem Punkt der Umwickelposition (B) befindet.
 12. Verfahren nach einem der vorhergehenden Ansprüche, **gekennzeichnet dadurch, dass** sich die Verlagerungsposition der Papierrolle in die Verpackungsstation (A) und die Verlagerungsposition weg von der Verpackungsstation (D) an dem Punkt der Umwickelposition (B) befinden und sich die Kennzeichnungs- und Markierungsposition (C) auf der Seite der Umwicklungsposition in der längsaxialen Richtung der Papierrolle befindet.
 13. Verfahren nach einem der vorhergehenden Ansprüche, **gekennzeichnet dadurch, dass** die Papierrolle im Verhältnis zu den Umwickelstationen und einem Umwickelzufuhrsystem (9) in der längsaxialen Richtung der Papierrolle an unterschiedlichen Punkten positioniert ist, so dass eine Schutzzumwicklung schrittweise aus zwei oder mehreren, parallelen, teilweise überlappenden Umwickelnetzen gebildet wird.
 14. Verfahren nach einem der vorhergehenden Ansprüche, **gekennzeichnet dadurch, dass** das Verlagern der Papierrolle in die längsaxiale Richtung gleichzeitig mit dem Umwickeln des Umwickelmaterials um die Rolle erfolgt, so dass eine spiralförmige Schutzzumwicklung gebildet wird.
 15. Verfahren nach Anspruch 1, **gekennzeichnet durch** Positionieren der Verpackungsstation zum Verlagern der Papierrolle in die Verpackungsstation gemäß der Position in der längsaxialen Richtung der Rolle, wobei die Position in der längsaxialen Richtung der Papierrolle an der Verpackungsstation bestimmt wird.
 16. Verfahren nach Anspruch 15, **gekennzeichnet dadurch, dass** die Position in der längsaxialen Richtung der Papierrolle an der Verpackungsstation in

ihrem Zentrum ist.

17. Verfahren nach Anspruch 15, **gekennzeichnet dadurch, dass** die Papierrolle positioniert wird bevor sie in die Verpackungsstation in der längsaxialen Richtung gemäß einem ihrer Enden verlagert wird. 5
18. Verfahren nach einem der vorhergehenden Ansprüche, **gekennzeichnet durch** ein Verlagern jeder Papierrolle in die Verpackungsstation direkt von der Position in der längsaxialen Richtung (A1...AN), welche der Position der Papierrolle in einem Satz an Rollen entspricht, nachdem diese den Rollenschneider verlassen haben und zur Seite oder in irgendeiner anderen Beförderungsart für den Satz an Rollen transferiert wurden. 10
19. Verfahren nach einem der vorhergehenden Ansprüche, **gekennzeichnet durch** Verwenden bei der Steuerung der Verpackungsmaßnahmen der Papierrolle Steuerungs- und Produktionsdaten, die in Verbindung mit Schneiden, wie z.B. der Rollenbreite, des Durchmessers, der Position in dem Satz an Rollen, Kundendetails, Papiermenge, etc., verwendet und erzeugt wurden. 15
20. Verfahren nach einem der vorhergehenden Ansprüche, **gekennzeichnet dadurch, dass** die Position der Papierrolle in längsaxialer Richtung zur Verlagerung weg von der Verpackungsstation gemäß einem ihrer Enden positioniert ist. 20
21. Verfahren nach einem der vorhergehenden Ansprüche, **gekennzeichnet dadurch, dass** die Ausgabe- position von Papierrollen in längsaxialer Richtung (D1...DN) variieren und gemäß der Produktion, Größe oder anderen Parametern bestimmt wird. 25
22. Verfahren nach Anspruch 1, **gekennzeichnet dadurch, dass** die Verpackungsmaßnahmenposition oder die Verpackungsmaßnahmenpositionen seitwärts in Bezug auf die Verlagerungsposition in die Verpackungsstation und/oder weg von der Verpackungsstation und der Verlagerungsrichtung entlang des Pfads der Verpackungsstation in einer längeren Entfernung als die längsaxiale Breite der Papierrollen angeordnet sind. 30
23. Verfahren nach einem der vorhergehenden Ansprüche, **gekennzeichnet durch** ein Unterstützen und/oder Pressen an den End-Pressbahnen (4) einer oder mehrerer (schmaler) Papierrollen an der Verpackungsstation (vor der Laufbewegung der Verpackungsstation, während der Laufbewegung in die Umwicklungsposition (6) und/oder danach) vor dem Umwicklungsschritt. 35
24. Vorrichtung zum Verpacken von Papierrollen, um-

fassend eine Verpackungsstation (1) mit ihrer Antriebs- und Laterallaufvorrichtung (3), durch welche die Verpackungsstation zusammen mit einer Papierrolle (5), welche in die Verpackungsstation in eine Eingabeposition (A) verlagert wird, in der längsaxialen Richtung in eine Verpackungsmaßnahmenposition/-positionen verlagert werden, welche entlang des Pfads der Verpackungsstation angeordnet ist/sind, **gekennzeichnet dadurch, dass** die Verpackungsstation (1) zumindest einen Satz an rotierenden Rollenwalzen mit ihrem Aktuator (2) zum Rotieren der Papierrolle umfasst, um unterschiedliche Verpackungsmaßnahmen durchzuführen, wobei die Verpackungsmaßnahmen zumindest das Umwickeln der Papierrolle (5) in eine Schutzumwicklung umfassen, was in einer Umwicklungsposition (B) durchgeführt wird. 40

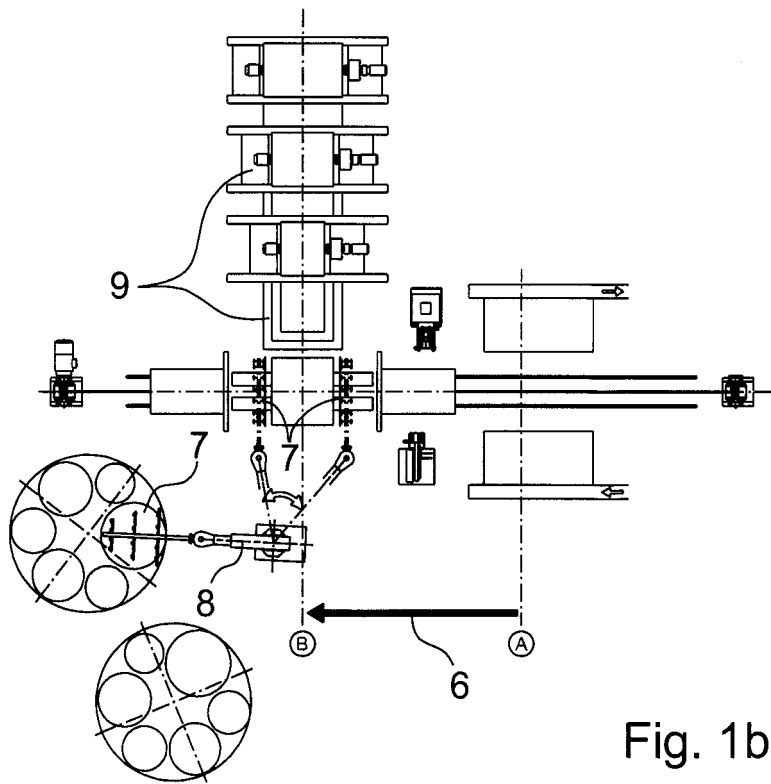
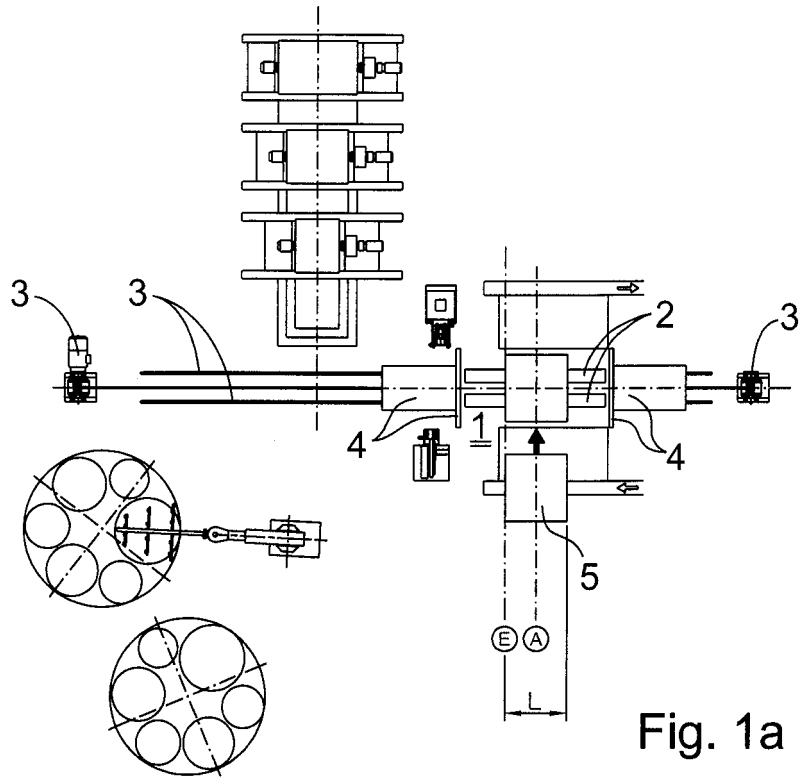
25. Vorrichtung zum Verpacken von Papierrollen nach Anspruch 24, **gekennzeichnet dadurch, dass** sie ferner End-Pressbahnen (4) umfasst, so dass sich beide End-Pressbahnen und der Satz an rotierenden Walzen zusammen linear im Verhältnis zu unterschiedlichen Verpackungs- und Handhabungspositionen (A, B, C, D) bewegen und dass beide End-Pressbahnen sich separat im Verhältnis zu dem Satz an rotierenden Walzen und der Papierrolle (5) darauf bewegen, um Endschilder an den Enden der Papierrolle zu befestigen. 45
26. Vorrichtung nach Anspruch 24, **gekennzeichnet dadurch, dass** sich die Verpackungsmaßnahmenposition oder Verpackungsmaßnahmenpositionen seitwärts im Verhältnis zu der Verlagerungsposition an der Verpackungsstation und/oder weg von der Verpackungsstation und der Verlagerungsrichtung entlang des Pfads der Verpackungsstation in einer längeren Entfernung als die längsaxiale Breite der Papierrollen befinden. 50

Revendications

1. Procédé pour l'emballage de bobines de papier dans lequel une bobine de papier (5) est transférée vers un poste d'emballage (1) au niveau d'une position d'entrée (A) et une mesure requise d'emballage ou des mesures requises d'emballage est/sont réalisée(s) pour la bobine de papier, après quoi la bobine de papier est transférée au-delà du poste d'emballage (1) au niveau d'une position de sortie (D), **caractérisé par** un fonctionnement linéaire du poste d'emballage, dans lequel le poste d'emballage comprend au moins un ensemble de rouleaux tournants pour bobine, par le transfert de la bobine de papier (5) qui est portée sur l'ensemble de rouleaux tournants pour bobine (2) dans la direction longitudinale axiale vers une position de mesure d'emballage ou

- des positions de mesure d'emballage qui est/sont située(s) le long de la piste du poste d'emballage, dans lequel les mesures d'emballage comprennent au moins l'enveloppement de la bobine de papier (5) dans un enveloppement par nappe lequel est réalisé dans une position d'enveloppement (B).
2. Procédé selon la revendication 1 **caractérisé en ce que** les mesures d'emballage comprennent en outre la solidarisation de têtiers extérieurs (10) au niveau des extrémités de la bobine de papier (5).
 3. Procédé selon la revendication 2 **caractérisé en ce que** la mise en place de têtiers intérieurs (7) s'effectue par au moins un opérateur (8) au cours d'une étape d'enveloppement et/ou de têtiers extérieurs (10) au cours d'une étape finale de pressage.
 4. Procédé selon la revendication 2 **caractérisé en ce que** la mise en place des têtiers extérieurs (10) s'effectue au moyen d'un robot industriel ou d'un opérateur automatique équivalent (8) sur des plateaux d'extrémité de pressage (4) se trouvant sur une ligne de pressage (P).
 5. Procédé selon la revendication 2 **caractérisé par** la solidarisation des têtiers extérieurs (10) se produisant au moins partiellement au cours d'un déplacement linéaire du poste d'emballage qui a lieu après l'étape d'enveloppement.
 6. Procédé selon l'une quelconque des revendications précédentes **caractérisé par** la mise en place des têtiers intérieurs et/ou extérieurs au niveau des extrémités de la bobine de papier et/ou sur les plateaux d'extrémité de pressage à l'endroit de la position de transfert de la bobine de papier vers le poste d'emballage (A) avant de transférer la bobine de papier vers la position d'enveloppement (B).
 7. Procédé selon l'une quelconque des revendications précédentes **caractérisé en ce que** les mesures d'emballage comprennent aussi un étiquetage de bobine (11) et/ou des mesures de marquage (12,13) qui sont réalisés dans une position d'étiquetage et de marquage (C).
 8. Procédé selon l'une quelconque des revendications précédentes **caractérisé en ce que** la position de transfert de la bobine de papier vers le poste d'emballage (A) et la position de transfert loin du poste d'emballage (D) sont du même côté que la position d'enveloppement (B) dans la direction longitudinale axiale de la bobine de papier.
 9. Procédé selon l'une quelconque des revendications précédentes **caractérisé en ce que** la position de transfert de la bobine de papier vers le poste d'emballage (A) et la position de transfert loin du poste d'emballage (D) sont sur des côtés différents de la position d'enveloppement (B) dans la direction longitudinale axiale de la bobine de papier.
 10. Procédé selon l'une quelconque des revendications précédentes **caractérisé en ce que** la position de transfert de la bobine de papier vers le poste d'emballage (A) est située à l'endroit de la position d'enveloppement (B) et la position de transfert loin du poste d'emballage (D) étant du côté de la position d'enveloppement (B) dans la direction longitudinale axiale de la bobine de papier.
 11. Procédé selon l'une quelconque des revendications précédentes **caractérisé en ce que** la position de transfert de la bobine de papier vers le poste d'emballage (A) est située du côté de la position d'enveloppement (B) dans la direction longitudinale axiale de la bobine de papier et la position de transfert loin du poste d'emballage (D) est située à l'endroit de la position d'enveloppement (B).
 12. Procédé selon l'une quelconque des revendications précédentes **caractérisé en ce que** la position de transfert de la bobine de papier vers le poste d'emballage (A), la position de transfert loin du poste d'emballage (D) étant à l'endroit de la position d'enveloppement (B) et la position d'étiquetage et de marquage (C) étant du côté de la position d'enveloppement dans la direction longitudinale axiale de la bobine de papier.
 13. Procédé selon l'une quelconque des revendications précédentes **caractérisé en ce que** la bobine de papier est mise en position par rapport aux postes d'enveloppement et par un système d'alimentation d'enveloppement (9) dans la direction longitudinale axiale de la bobine de papier en différents endroits de sorte qu'un enveloppement par nappe est formé séquentiellement de deux ou plusieurs bandes d'enveloppement parallèles se chevauchant partiellement..
 14. Procédé selon l'une quelconque des revendications précédentes **caractérisé en ce que** la bobine de papier est transférée dans la direction longitudinale axiale simultanément avec l'enveloppement du matériau d'enveloppement autour de la bobine de façon à former un enveloppement par nappe en spirale.
 15. Procédé selon la revendication 1 **caractérisé en ce que** le poste d'emballage est positionné pour transférer la bobine de papier vers le poste d'emballage en fonction de la position de la bobine dans la direction longitudinale axiale de façon que la position de la bobine de papier dans la direction longitudinale axiale au niveau du poste d'emballage est détermi-

- née.
16. Procédé selon la revendication 15 **caractérisé en ce que** la position de la bobine de papier dans la direction longitudinale axiale au niveau du poste d'emballage est en son centre. 5
17. Procédé selon la revendication 15 **caractérisé en ce que** la bobine de papier est positionnée avant son transfert vers le poste d'emballage dans la direction longitudinale axiale en fonction de l'une ou l'autre des extrémités. 10
18. Procédé selon l'une quelconque des revendications précédentes **caractérisé en ce que** chaque bobine de papier est transférée vers le poste d'emballage directement à partir de la position dans la direction longitudinale axiale (A1...AN) qui est équivalente à la position de la bobine de papier dans un ensemble de bobines après la sortie de la découpeuse-bobineuse, ayant été transférée sur le côté ou après un autre type de convoyage de l'ensemble de bobines. 15 20
19. Procédé selon l'une quelconque des revendications précédentes **caractérisé en ce que** l'on utilise dans la commande des mesures d'emballage de la bobine de papier des données de production et de commande utilisées et créées en relation avec le découpage, telles que par exemple, la largeur de bobine, le diamètre, la position dans l'ensemble de bobines, des éléments relatifs aux clients, la quantité de papier, etc. 25 30
20. Procédé selon l'une quelconque des revendications précédentes **caractérisé en ce que** la position de la bobine de papier dans la direction longitudinale axiale pour son transfert loin du poste d'emballage est déterminée en fonction de l'une ou l'autre des extrémités. 35 40
21. Procédé selon l'une quelconque des revendications précédentes **caractérisé en ce que** la position de sortie de bobines de papier dans la direction longitudinale axiale (D1...DN) varie et est déterminée en fonction de paramètres de production, de dimension ou autres. 45 50
22. Procédé selon la revendication 1 **caractérisé en ce que** la position de mesure d'emballage ou les positions de mesure d'emballage est/sont située(s) latéralement en fonction de la position de transfert vers le poste d'emballage et/ou loin à partir du poste d'emballage et la direction de transfert le long de la piste du poste d'emballage, à une distance supérieure à la largeur axiale longitudinale des bobines de papier. 55
23. Procédé selon l'une quelconque des revendications précédentes **caractérisé en ce que** l'on soutient et/ou l'on presse sur les plateaux d'extrémité de pressage (4) une ou plusieurs bobines de papier (étroites) au niveau du poste d'emballage (avant la mise en route du poste d'emballage, pendant son fonctionnement en déplacement vers la position d'enveloppement (6) et/ou après) avant l'étape d'enveloppement.
24. Machine pour l'emballage de bobines de papier comprenant, un poste d'emballage (1) avec son dispositif d'entraînement et de déplacement latéral (3) au moyen duquel le poste d'emballage en même temps qu'une bobine de papier (5) qui est transférée dans le poste d'emballage au niveau d'une position d'entrée (A) sont transférés dans la direction longitudinale axiale jusqu'à une position/des positions de mesure d'emballage qui est/sont située(s) le long de la piste du poste d'emballage **caractérisée en ce que** le poste d'emballage (1) comprend au moins un ensemble de rouleaux tournants pour bobines avec son actionneur (2) pour entraîner en rotation la bobine de papier afin de réaliser différentes mesures d'emballage dans lesquelles les mesures d'emballage comprennent au moins l'enveloppement de la bobine de papier (5) dans un enveloppement par nappe qui est effectué dans une position d'enveloppement (B).
25. Machine pour l'emballage de bobines de papier selon la revendication 24 **caractérisée en ce qu'**elle comprend en outre des plateaux d'extrémité de pressage (4) de façon que les deux plateaux d'extrémité de pressage et l'ensemble de rouleaux tournants se déplacent linéairement ensemble en fonction des différentes positions d'emballage et de manipulation (A, B, C, D) et **en ce que** les deux plateaux d'extrémité de pressage se déplacent séparément en fonction de l'ensemble de rouleaux tournants et de la bobine de papier (5) qu'ils supportent pour la solidification de têtiers au niveau des extrémités de la bobine de papier.
26. Machine selon la revendication 24 **caractérisée en ce que** la position de mesure d'emballage est, ou les positions de mesure d'emballage sont, située(s) latéralement par rapport à la position de transfert vers le poste d'emballage et/ou loin du poste d'emballage et de la direction de transfert le long de la piste du poste d'emballage, à une distance supérieure à la largeur axiale longitudinale des bobines de papier.



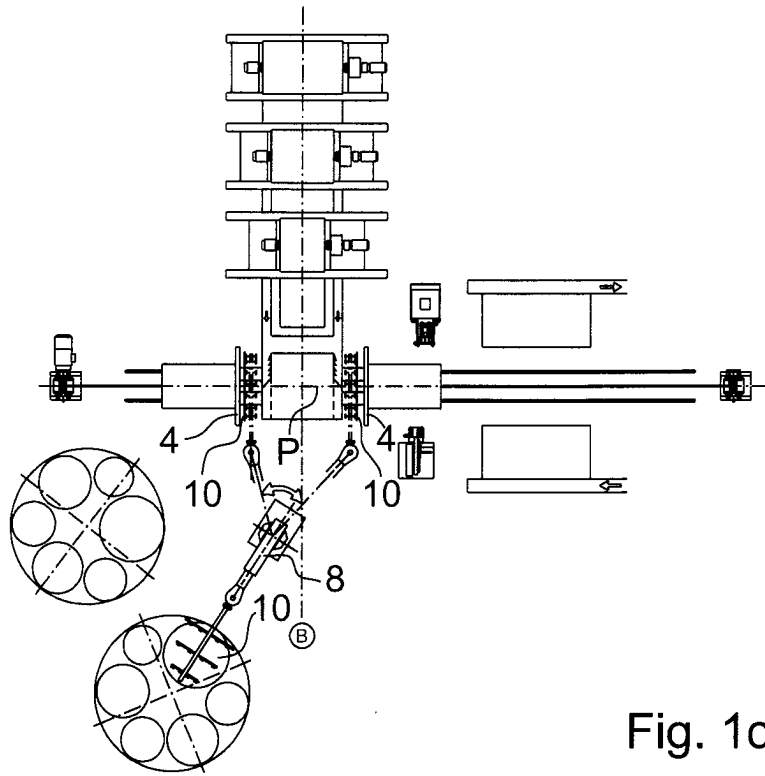


Fig. 1c

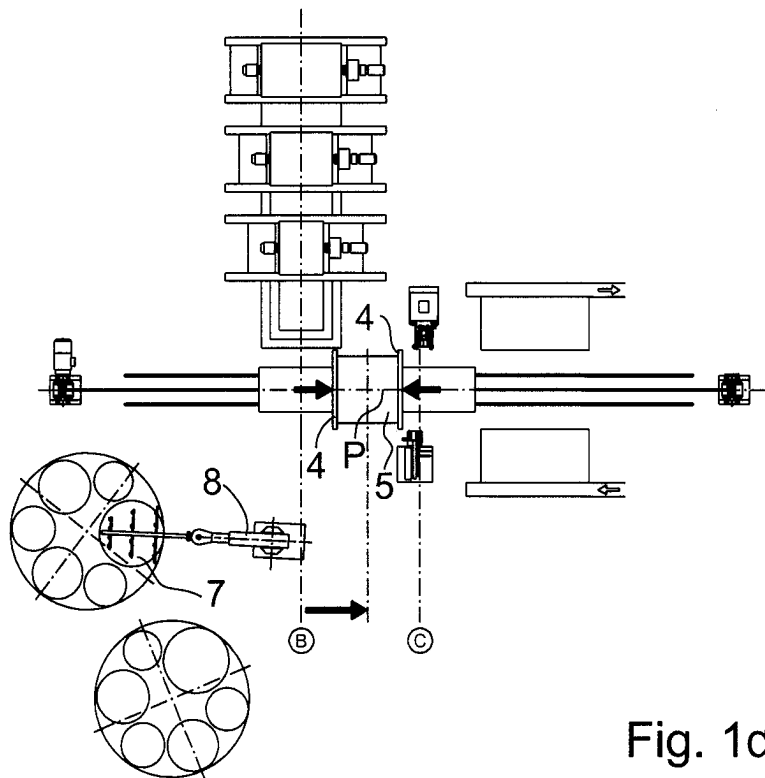


Fig. 1d

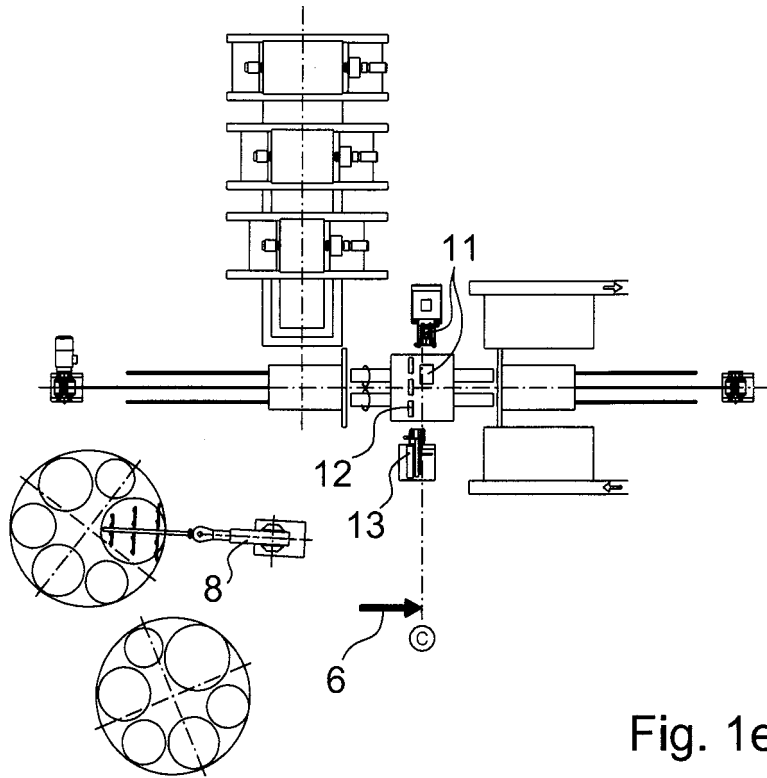


Fig. 1e

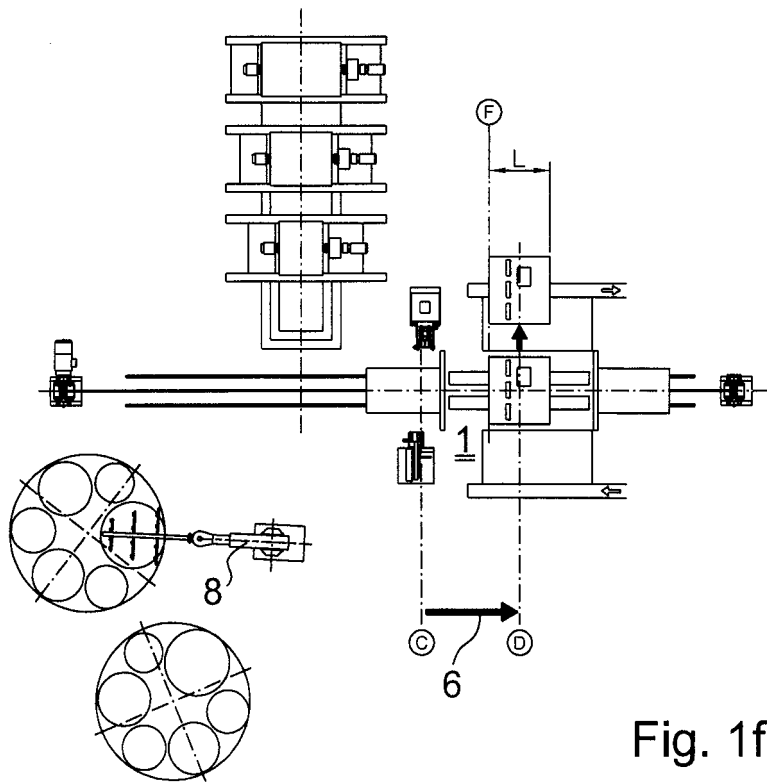


Fig. 1f

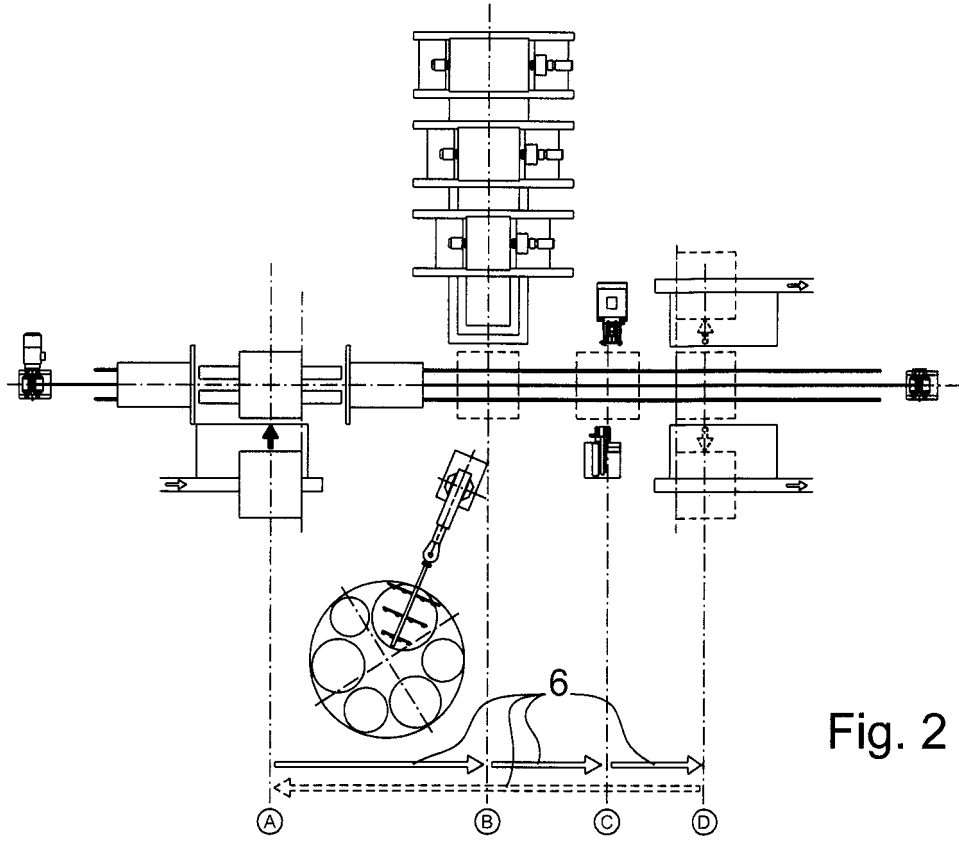


Fig. 2

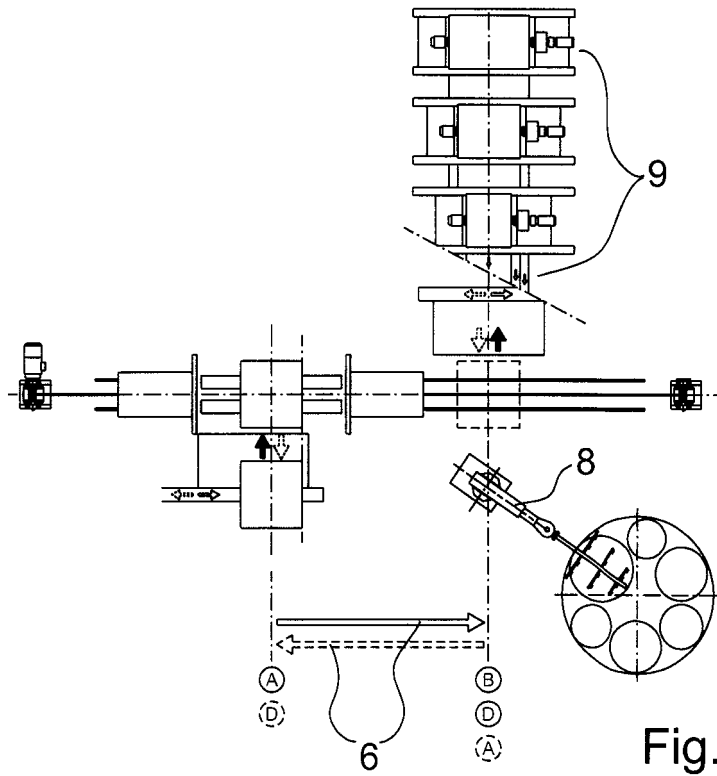


Fig. 3

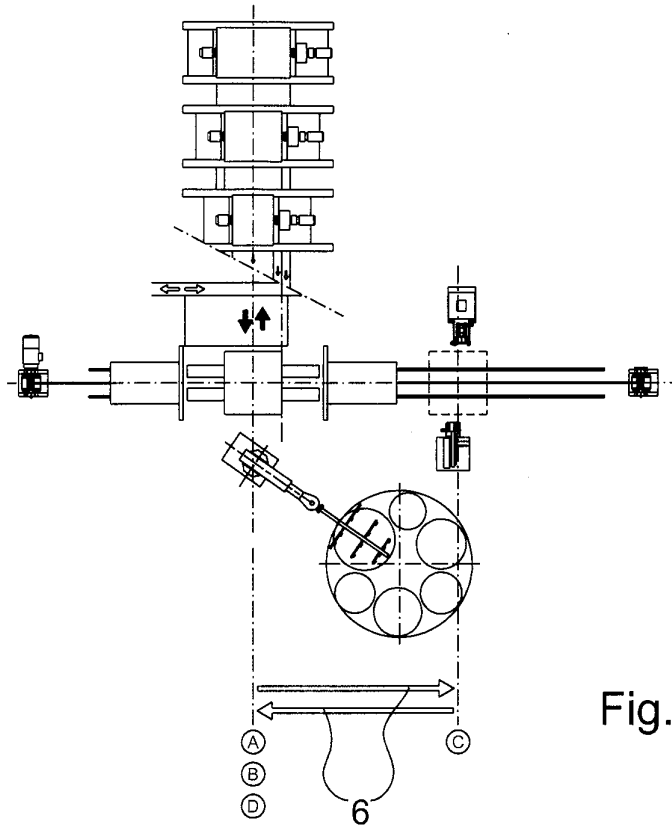


Fig. 4

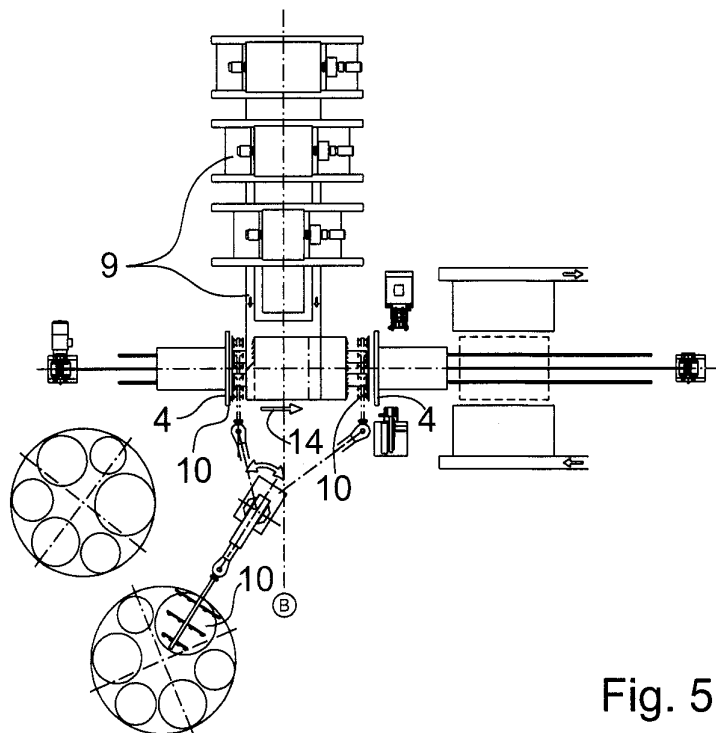


Fig. 5

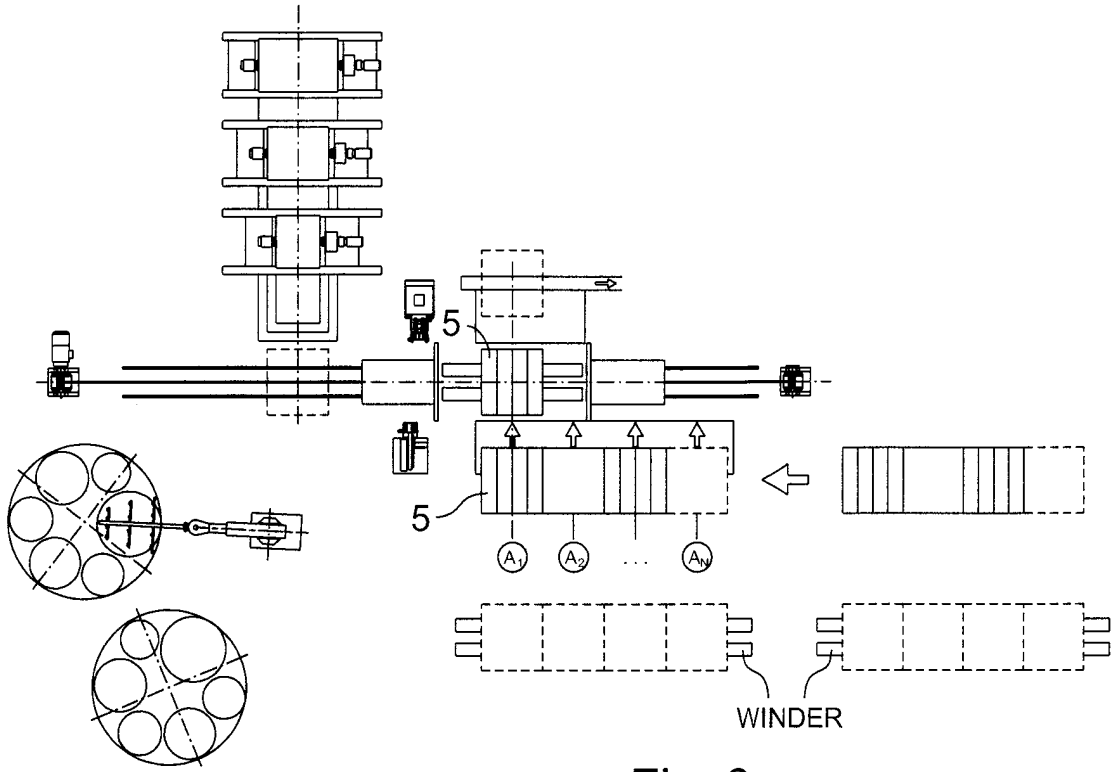


Fig. 6

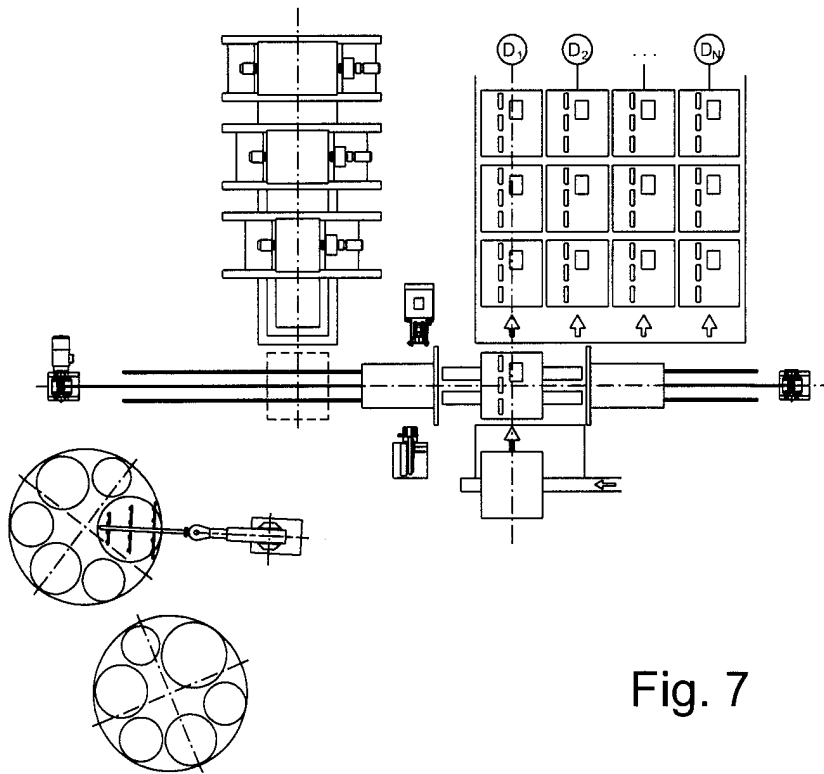


Fig. 7

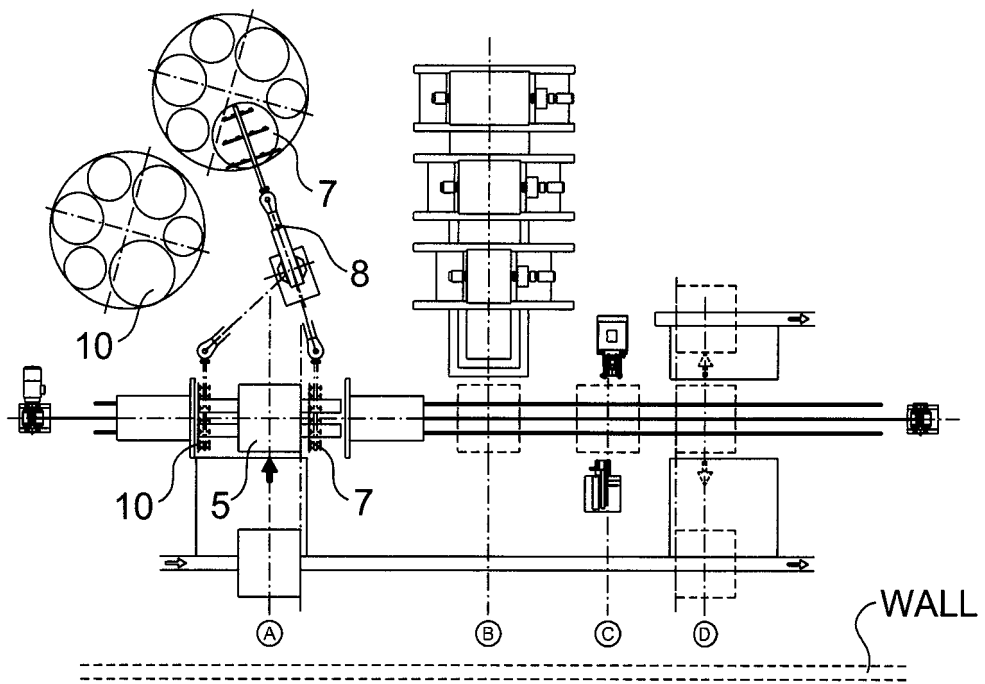


Fig. 8

REFERENCES CITED IN THE DESCRIPTION

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