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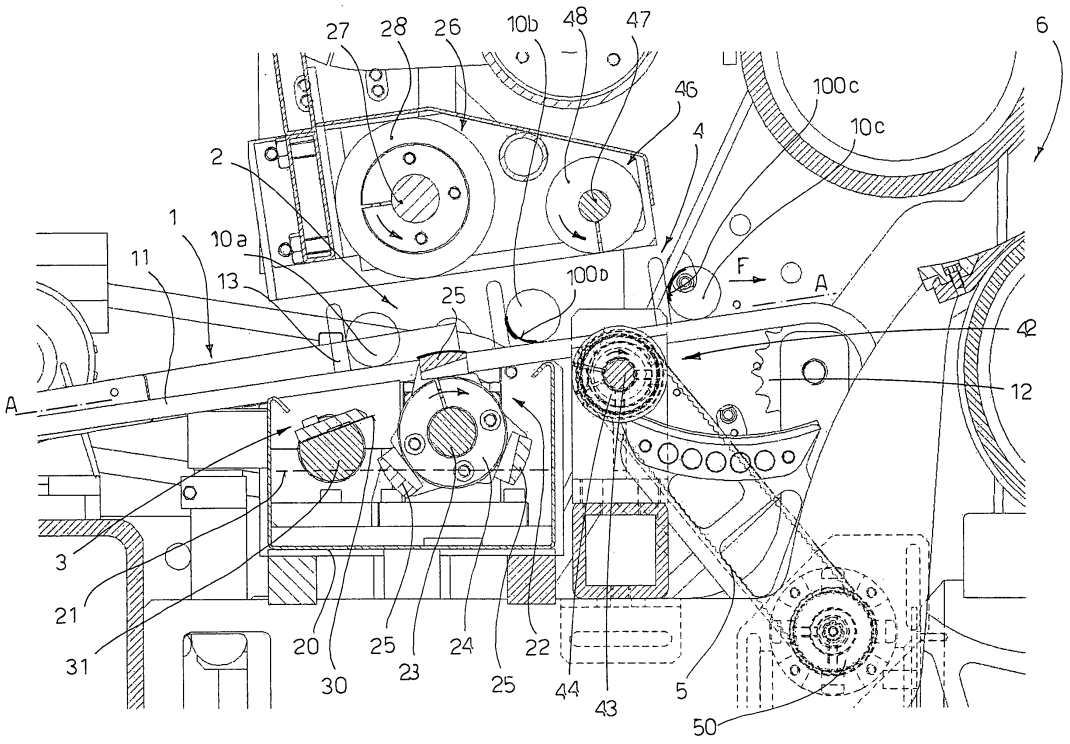
(54) Core gluing device for a rewinding machine and related method

(57) A core gluing device for a rewinding machine comprises conveying means (1) designed to convey the cores (10a, 10b, 10c) along a core conveying surface (A-A), a gluing unit (2) comprising a first gluing roller (22) which picks up the glue from a glue container (20) and a second gluing roller (26) opposed to the first gluing roller, so that each core (10a, 10b, 10c) can pass between the two gluing rollers (22, 26) for application of a trace of glue (100b, 100c) on it. The gluing rollers (22, 26) are driven at different speeds to control the width of the trace of glue to be applied to the core and positioning devices (4) are provided, arranged downstream of the gluing devices (2) and upstream of a log winding unit (6) of the rewinding machine for the correct positioning of the core (10c) with the related trace of glue (100c), before insertion between the winding rollers.



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Description

[0001] The present invention refers to a device and to a method for gluing cores of a rewinding machine.

[0002] As is known, a rewinding machine is used for the formation of reels of sheet material originating from large parent reels.

[0003] Generally the sheet material is wound on tubular cores, which are appropriately fed towards the winding unit of the rewinding machine. For this purpose, upstream of the winding unit of the rewinder there is a gluing unit which applies a strip of glue on the outer surface of the cores. In this way, when the core comes into contact with the winding rollers, the end edge of the sheet material grips the glue deposited on the core permitting winding of the sheet material on the core for formation of the reel.

[0004] The European patent EP 0.697.988 describes a gluing unit of the overflow type. The glue comes out of a slot positioned according to a directrix of the core by overflowing and is applied on the cores when they pass over the slot, conveyed by a chain provided with pushing devices. In this phase the core is kept in contact with the overflow device by means of a blade.

[0005] Said overflow gluing device has some drawbacks. It operates irregularly with high density glues, requires frequent maintenance for cleaning and does not permit adjustment of the amount of glue applied.

[0006] A gluing system commonly called wet bar is also known and used by the same applicant. Said gluing system comprises a chain core conveying unit provided with pusher pins. The glue is distributed by contact between the core and a steel bar wet by the glue.

[0007] The bar is immersed in tanks of glue. When the core reaches the bar, the latter is raised by a system of levers driven by pneumatic cylinders until it comes into contact with the core, depositing part of the glue on the core itself. During the contact with the bar, the core is projected upwards until it knocks against plates positioned above the core at a distance of 3/5 mm. During continuation of the bar movement, for a fraction of a second, the core is blocked between the plate, the chain pusher pin and the gluing bar. In this way the entire bar comes into contact longitudinally with the core.

[0008] The wet bar gluing system also has its drawbacks. Due to the up-down times of the bar and to the time it remains in the tank to pick up the glue, the speed of the glue distribution unit is limited and therefore the production capacity of the rewinding machine is limited. Furthermore the glue is applied on only one generatrix of the core.

[0009] The European patent application EP 1.249.417 owned by Gambini describes a core gluing device in which the cores are fed by a conveyor towards a pair of opposed counter-rotating rollers in which one roller picks up the glue from a tank. In this case the two rollers and the conveyor are driven in synchronism in order to obtain the same linear speed, so that the glue is applied along a generatrix of the core.

[0010] Said gluing system with synchronised rollers also has the drawback that the glue is applied only on one generatrix of the core and that the width of the glue application area cannot be varied.

[0011] It should also be considered that all the gluing systems of the prior art have problems with the correct positioning of the cores at the winding unit inlet. In fact, the layer of glue on the core must be in a precise position to allow a correct gluing of the end edge of the reel on the core, when it comes into contact with the winding rollers.

[0012] Object of the present invention is to eliminate the drawbacks of the prior art by providing a core gluing device that permits the control of the amount and of the extent of the glue applied on the cores and at the same time to ensure a correct positioning of the cores at the rewinding machine inlet.

[0013] A further object of the present invention is to provide a core gluing device that can guarantee a regular distribution of the glue on the cores regardless of the type of glue used.

[0014] A further object of the present invention is to provide a core gluing device that ensures a high glue application speed on the cores.

[0015] These objects are achieved in accordance with the invention with the device and the method presenting the characteristics listed in the attached independent claims 1 and 18.

[0016] Advantageous embodiments of the invention are illustrated in the dependent claims.

[0017] The core gluing device for rewinding machine according to the invention comprises:

- conveying devices designed to convey the cores along a core conveying surface, and
- a gluing unit comprising a first gluing roller which picks up the glue from a glue container and a second gluing roller opposed to the first gluing roller so that each core can pass between said two gluing rollers for application of a trace of glue on it.

[0018] The main characteristic of the invention is represented by the fact that positioning devices are provided arranged downstream of the gluing devices and upstream of the winding unit for the correct positioning of the core with the related trace of glue, before insertion between the rollers of the winding unit.

[0019] Conveniently the first and second gluing rollers can be driven at different speeds, to control the width of the trace of glue to be applied on the core.

[0020] The gluing device according to the invention has several advantages with respect to the prior art. Said gluing device permits:

- a higher gluing speed with consequent increase in the performance of the machine,
- a regular operation also with high density glues,
- a uniform distribution of the glue and an adjustment

of the dimension of the arc of circumference on which the glue is applied ,

- a distribution of the glue substantially throughout the whole generatrix of the core,
- an optimal positioning of the core at the inlet of the winding rollers, and
- a reduced maintenance.

[0021] Advantageously, elements are fitted on the first gluing roller, which pick up the glue contained in the glue container and apply the glue on the cores. Said elements are interchangeable and can be easily replaced according to the form of the trace of glue required for application on the cores.

[0022] Further characteristics of the invention will become clearer from the detailed description that follows referring to a non-restrictive embodiment intended purely as an example, illustrated in the attached figure, which is a schematic view, in side elevation, partially in section and partially interrupted illustrating the core gluing device according to the invention.

[0023] The gluing device according to the invention comprises a conveyor 1 designed to convey a plurality of tubular cores (10a, 10b, 10c), a glue application unit 2 designed to apply the glue on the outer surface of said cores (10a, 10b, 10c) and positioning devices 4 designed to position the cores (10a, 10b, 10c) in a suitable position for their insertion between the winding rollers of a winding unit 6 (illustrated partially) forming part of the rewinding machine.

[0024] The conveyor 1 comprises a conveying surface A-A defined by the arrangement of conveying chains 11, sloping slightly upwards, on which the cores (10a, 10b, 10c) are conveyed in a feed direction indicated by the arrow F. In the solution shown the conveyor 1 comprises one or more chains 11 driven by motorised crown gears 12 in order to feed the cores forward.

[0025] The conveyor chains 11 are fitted with a plurality of pusher devices 13 in the form of plates that protrude upwards, substantially square to the conveying surface A-A. The pusher devices 13 are equidistant from each other so that the cores (10a, 10b, 10c) can be conveyed in sequence, with axis transverse with respect to the feed direction F and positioned in the corner formed between the conveying surface A-A and the respective pusher device 13.

[0026] The gluing unit 2 comprises a tank 20, which is filled with glue up to an intermediate level 21 illustrated by broken line. The glue tank 20 is positioned below the core feed surface, i.e. below the conveying surface A-A.

[0027] A lower gluing roller 22, comprising a shaft 23 on which a plurality of disc-shaped flanges 24 spaced from each other are fitted, is provided into the tank 20. The axis of the shaft 23 of the gluing roller 22 is above the level 21 of the glue and below the core feed surface and extends over a horizontal plane in a transverse direction with respect to the core feed direction.

[0028] The disc-shaped flanges 24 are equipped in a removable way with glue distribution elements 25 which protrude externally with respect to the disc-shaped flanges 24. In this way the elements 25 can be easily replaced according to the type of glue distribution required on the cores.

[0029] Each element 25 is in the shape of a bar with the surface facing the outside substantially convex. The width of the element 25 is selected according to the width of the trace of glue required for application on the core. Each element 25 can extend over the whole length of the lower gluing roller 22 or several elements 25 can be provided aligned longitudinally in order to cover the entire length of the lower gluing roller 22.

[0030] The elements 25 can vary in shape according to the dimension of the core in working and the to glue distribution required. Furthermore the elements can be so shaped to accommodate an optimal amount of glue.

[0031] The elements can be made of different types of materials both according to the core and to the glue used. In this way more or less porous materials can be chosen, with different surface finish. Brushes can also be used as elements 25.

[0032] As shown in the figure, on the circumference of the disc-shaped flanges 24 three elements 25 are provided arranged equidistant from each other at an angle of 120°.

[0033] The shaft 23 of the lower gluing roller 22 is rotated by an independent motorization (not shown in the figure). During rotation of the lower gluing roller 22, the elements 25 move from a position below the level of the glue 21 where they pick up the glue contained in the tank 20 to a position in which they are aligned with the conveying surface A-A for application of the glue on the cores.

[0034] The lower gluing roller 22 can be rotated continuously or step-by-step with the element 25 pausing briefly in the position in which it is aligned with the conveying surface. In the case of step-by-step rotation, each step corresponds to a rotation of the lower gluing roller 22 to perfectly align an element 25 with the conveying surface A-A. In the case of three equidistant elements 25, as shown in the figure, each step corresponds to a rotation of 120° of the gluing roller 22.

[0035] A scraper unit 3 is provided into the tank 20 to scrape the excess of glue from the elements 25 before they reach the core gluing position. The scraper unit 3 comprises a doctor or a blade 30, the end edge of which scrapes the outer surface of the elements 25 during the rotation of the lower gluing roller 22. The doctor 30 is fitted on a cylindrical support, which can be appropriately rotated according to the shape and to the form of the elements 25. Furthermore the protrusion of the doctor 30 can be adjusted.

[0036] Above the conveying surface A-A a second upper gluing roller 26 is positioned, which acts as a counter roller for the first lower gluing roller 22.

[0037] The second gluing roller 26 comprises a shaft 27 whose axis is parallel to the axis of the shaft 23 of the

first gluing roller. A plurality of disc-shaped flanges 28 are mounted on the shaft 27 of the second gluing roller 26. The disc-shaped flanges 28 are fitted and fixed on the shaft 27 by means of suitable mechanical accessories.

[0038] The line connecting the centres of the first gluing roller 22 and of the of second gluing roller 26 is substantially square to the conveying surface A-A and the centre distance between said rollers can be adjusted and selected according to the diameter of the cores (10a, 10b, 10c). The distance between the outer surface of the element 25 when it is aligned with the conveying surface A-A and the peripheral edge of the disc-shaped flanges 28 of the second gluing roller 26 is selected equal to the diameter of the cores.

[0039] The second gluing roller 26 is rotated by an independent motorization (not shown) so that it is counter-rotating with respect to the first roller 22, in the cores feed direction. Obviously, however, in some applications the rollers 22 and 26 can rotate in the same direction. Therefore the conveyor 1, the first lower gluing roller 22 and the second upper gluing roller 26 are moved by three independent motorizations.

[0040] The motorization of the first gluing roller 22 is synchronised with the motorization of the conveyor 1 so that the elements 25 are aligned with the conveying surface A-A whenever a core passes near the element 25. The second gluing roller 26 is rotated at a different speed from that of the first gluing roller 22, according to the type of trace of glue required for application on the cores (10a, 10b, 10c).

[0041] In fact, the difference in speed between the first gluing roller 22 and the second gluing roller 26 entails a partial rotation of the core on the outer surface of the element 25.

[0042] The figure illustrates the core 10b coming out of the gluing unit 2. Said core 10b has a trace of glue 100b in a position generally not suitable for insertion between the winding rollers. Said position of the core is defined by the relative speed set between the gluing rollers (22, 26). Consequently the positioning devices 4 will partially rotate the core 10b so that the trace of glue 100b is in an optimal pre-set position 100c to accommodate the end edge of the sheet material for winding between the rollers of the winding unit 6.

[0043] The positioning devices 4 comprise a pair of opposed rollers, consisting of a first lower positioning roller 42 positioned below the core feed surface and a second upper positioning roller 46 positioned above the core feed surface.

[0044] The lower and upper positioning rollers (42, 46) comprise respective shafts (43, 47) on which respective disc-shaped flanges (44, 48) are fitted. The axes of the positioning rollers (42, 46) are parallel to each other. The line connecting said axes is substantially square to the core feed surface and the centre distance can be adjusted and selected according to the diameter of the cores (10a, 10b, 10c). This means that when a core passes between the positioning rollers its circumference must be tangent to the circumference of the disc-shaped flanges (43, 48) of the positioning rollers.

[0045] The lower positioning roller 42 is rotated in the same direction as the feed direction of the conveyor 1, by means of a belt or of a chain transmission 5 driven by a motor 50.

[0046] The upper positioning roller 46 is rotated in the opposite direction to that of the lower positioning roller, by means of an independent motorization. However, the positioning rollers 42 and 46 could be rotated by the same motorization to guarantee the operation of the entire device.

[0047] The lower and upper positioning rollers (42, 46) are counter-rotating at the same speed or at different speeds. Obviously in some applications the positioning rollers (42, 46) can rotate in the same direction. The rotation speeds of the positioning rollers (42, 46) are set in order to guarantee an appropriate rotation of the core, thus permitting the correct positioning of the trace of glue on the core which must come into contact with the winding rollers of the winding unit 6.

[0048] The figure illustrates the core 10c coming out of the positioning devices 4, in which the trace of glue 100c is positioned correctly to contact with end edge of the sheet material on the winding roller of the winding unit 6.

[0049] To reduce the costs, the upper gluing roller 22 and the upper positioning roller 42 can be rotated by the same motorization.

[0050] Numerous detail variations and modifications can be made to the present embodiment of the invention, within the capability of a person skilled in the art while still falling within the scope of the invention expressed by the attached claims.

Claims

1. Core gluing device for a rewinding machine, comprising:

- conveying means (1) designed to convey the cores (10a, 10b, 10c) along a core conveying surface (A-A), and
- a gluing unit (2) comprising a first gluing roller (22) which picks up the glue from a glue container (20) and a second gluing roller (26) opposed to said first gluing roller, so that each core (10a, 10b, 10c) can pass between said two gluing rollers (22, 26) to receive a trace of glue (100b, 100c),

characterised in that

positioning devices (4) are provided, arranged downstream of said gluing devices (2) and upstream of a winding unit (6) of the rewinding machine for a correct positioning of the core (10c) with the related trace of

glue (100c), before insertion between the winding rollers of the winding unit (6).

2. Device according to claim 1, **characterised in that** said first and second gluing rollers (22, 26) can be driven at different speeds in order to control the width of the trace of glue to be applied on the core.

3. Device according to claim 1 or 2, **characterised in that** said first and second gluing rollers (22, 26) are counter-rotating and rotate in the core feed direction.

4. Device according to claim 1 or 2, **characterised in that** said first and second gluing rollers (22, 26) are rotate in the same rotation direction.

5. Device according to any one of the preceding claims, **characterised in that** said first and second gluing rollers (22, 26) are rotated by independent motorizations.

6. Device according to any one of the preceding claims, **characterised in that** gluing elements (25) are fitted on said first gluing roller (22) to pick up the glue from the glue container (20) and to apply it on the cores.

7. Device according to claim 6, **characterised in that** there are three gluing elements (25) arranged equidistant at an angle of approximately 120° on the circumference of said first gluing roller (22).

8. Device according to claim 6 or 7, **characterised in that** it comprises scraper devices (3) designed to scrape the excess glue from said gluing elements (25) before they reach the core gluing position.

9. Device according to any one of the preceding claims, **characterised in that** said first gluing roller (22) and said glue container (20) are arranged below the core conveying surface (A-A), while said second gluing roller (26) is arranged above the core conveying surface (A-A).

10. Device according to claim 9, **characterised in that** the line connecting the centres of said first and second gluing rollers (22, 26) is substantially square to the conveying surface and the centre distance is adjustable according to the diameter of the cores to be glued.

11. Device according to any one of the preceding claims, **characterised in that** said first gluing roller (22) is rotated step-by-step.

12. Device according to any one of the preceding claims, **characterised in that** said positioning devices (4) comprise a first and a second positioning roller (42, 46) opposed each other.

13. Device according to claim 12, **characterised in that** said first and second positioning rollers (42, 46) are counter-rotating and rotate in the core feed the direction.

14. Device according to claim 12, **characterised in that** said first and second positioning rollers (42, 46) are made to rotate in the same rotation direction.

15. Device according to claim 13 or 14, **characterised in that** said first and second positioning rollers (42, 46) are rotated by independent motorizations.

16. Device according to claim 13 or 14, **characterised in that** said first and second positioning rollers (42, 46) are rotated by the same motorization.

17. Device according to any one of the claims from 12 to 16, **characterised in that** the upper gluing roller (22) and the upper positioning roller (42) are rotated by the same motorization.

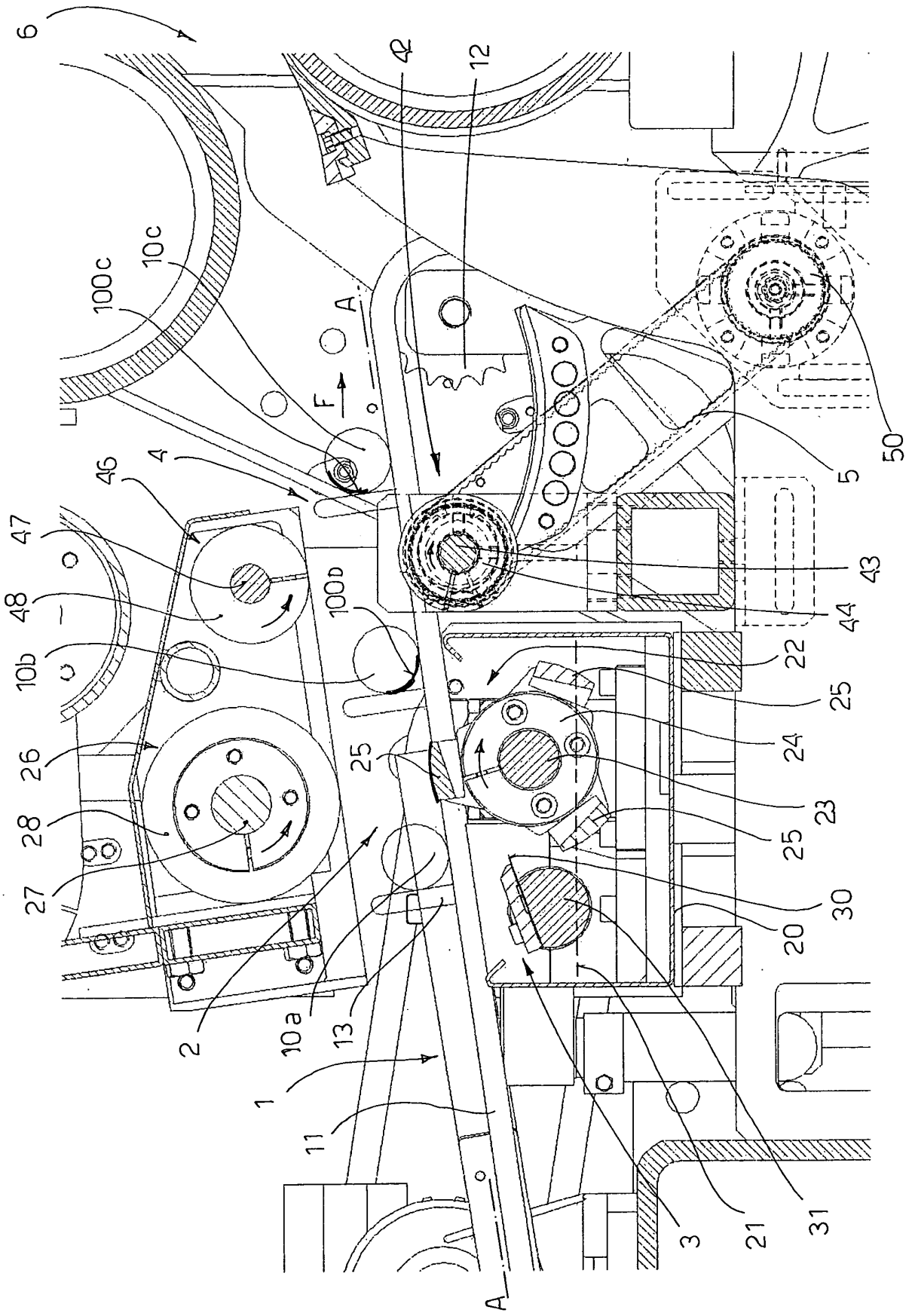
18. Method for gluing cores in a rewinding machine comprising the following steps:

- conveying of tubular cores (10a, 10b, 10c) towards a gluing unit (2) comprising a first gluing roller (22) which picks up the glue from a glue container (20) and a second gluing roller (26) opposed and parallel to said first gluing roller,
- application of a trace of glue (100b, 100c) on each core (10a, 10b, 10c) that passes between said two gluing rollers (22, 26),

characterised in that,
at the outlet of the gluing unit, the core (10c) is appropriately rotated to be correctly positioned with the related trace of glue (100c) before insertion between the winding rollers of a winding unit (6).

19. Method according to claim 18, **characterised in that**, during application of the glue on the core, said first and second gluing rollers (22, 26) are driven at different speeds in order to control the width of the trace of glue.

20. Method according to claim 18 or 19, **characterised in that** said rotation of the core at the outlet of the gluing unit is obtained by means of a pair of opposed positioning rollers (42, 46).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