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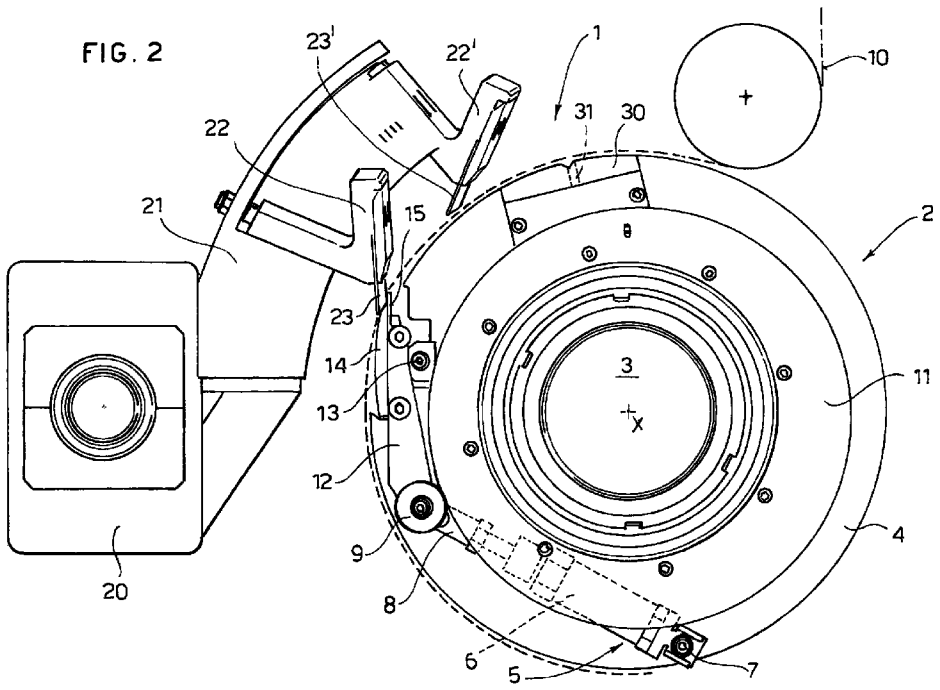
(54) Cutting device for rewinding machine

(57) A cutting device for a rewinding machine comprising an unwinding assembly to unwind a reel of sheet or web material (10) of large diameter, a winding assembly to wind the web (10) into final rolls of smaller diameter and a cutting assembly (1) comprising a cutting roller (2) on which is mounted a mobile blade (15) able to bring said web (10) into contact with cutting blades (23) fixedly mounted on the frame of the machine, in a cusp-shaped configuration.

FIG. 2



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Description

[0001] The present invention refers in general to a rewinding machine for logs of sheet material and in particular to a cutting device and a relative method for transversally cutting the web of sheet material at the end of the rewinding stage.

[0002] As is known, a rewinding machine is used to unwind large-sized rolls of sheet material, and to wind such sheet material into smaller rolls, suitable to be put onto the market. Once a roll is completed, reaching the desired diameter, the sheet material is cut transversally, the tail end of the web is glued onto the formed roll and the roll is ejected from the winding assembly of the machine, where winding of a new roll commences.

[0003] In the prior art closest to the present invention, the cutting operation is normally carried out by passing the web between two rollers, one carrying a blade and the other having a cavity acting as a counter-blade. The blade can be mounted fixedly on the corresponding roller, or moveably so as to be able to withdraw thereinto. In the first case, when cutting has to be performed, the entire roller is moved with the blade, in the second case the blade is extracted from the surface of the roller. In both cases the sheet material is pushed by the blade into the cavity of the other roller and is torn by passing the elasticity limit of the material.

[0004] Such a cutting system has drawbacks. In fact is unsuitable for materials that have a high coefficient of elasticity, such as polyethylene, for example, which would dilate excessively, without reaching tearing point.

[0005] The cutting system by tearing according to the prior art does not ensure a perfect cutting line, indeed the cut profile often has tears and imperfections.

[0006] Furthermore, with the cutting system according to the prior art, it is necessary or at least advisable to create cutting lines beforehand, by means of perforations, to ensure that cutting of the web occurs along these lines.

[0007] The object of the invention is to eliminate said drawbacks, providing a cutting device for a rewinding machine also suitable for materials having a high coefficient of elasticity and that allows an extremely precise cutting profile to be obtained.

[0008] Another object of the present invention is to provide such a cutting system that is extremely safe, occupies little space and is easy to make.

[0009] These objects are achieved according to the invention with the characteristics listed in appended independent claims 1 and 10.

[0010] Preferred embodiments of the invention are apparent from the dependent claims.

[0011] The cutting device for a rewinding machine according to the invention provides a cutting roller on which the web is wound.

[0012] A mobile blade, substantially parallel to the axis of the roller, is mounted integrally on the cutting roller. Said mobile blade is extracted from the roller through special operating means, in order to bring the web into contact with cutting blades mounted fixedly on the frame of the machine.

[0013] These cutting blades are assembled with a particular configuration. They follow the cutting roller helically and have a cusp-shaped profile. In this manner the first cut of the web is performed by the central cutting blades (corresponding to the apex of the cusp) and then, through the pulling action of the winding assembly, shearing of the web continues until the ends are reached. In this manner extremely precise cutting is achieved, irrespective of the elastic strength of the material, since the web is not severed by tearing but is sliced by means of contact between blades.

[0014] A cam mechanism is provided in the cutting roller to ensure that the mobile blade retracts, in the utmost safety, once the cut has been made. In this manner it is independent from the operating mechanism of the mobile blade, and it avoids the possibility of the blade remaining extracted, when not necessary, thus damaging the other parts of the machine.

[0015] Again in the cutting roller, a pneumatic system is provided such as to form a vacuum in a certain area of the roller surface, so that the web adheres perfectly to said surface, avoiding possible slipping during cutting, which would cause imperfections along the cut edges. Once the cut has been made, the pneumatic system removes the vacuum, allowing detachment from the roller of the end of the web that will begin winding on the new roll.

[0016] Further characteristics of the invention will be made clearer by the detailed description that follows, referring to a purely exemplary and therefore non-limiting embodiment thereof, illustrated in the appended drawings, in which

Figure 1 is an axonometric view of the cutting device for a rewinding machine according to the invention;

Figure 2 is an enlarged side view of the cutting device in Figure 1, with some parts not on view shown hatched.

[0017] As shown in Figure 2, the cutting device, indicated as a whole with reference numeral 1, comprises a cutting roller 2 on which is wound a web 10 of sheet material (shown hatched) coming from an unwinding assembly and fed to a winding assembly, which can comprise said cutting roller 2.

[0018] The cutting roller 2 comprises a fixed central shaft 3 on which is rotatably mounted a skirt 4 set in rotation around the axis X of the roller.

[0019] Hinged on the skirt 4 at point 7 is a pneumatic or hydraulic actuator 5 comprising a cylinder 6 inside which slides a piston whose rod 8 acts on the end of an arm 12, hinged in point 13 to the skirt 4 of the roller

2. A blade 15 is provided at the other end of the arm 12, extending parallel to the axis X of the roller 2 for its whole length. The blade 15 is locked to the arm 12 by means of a clamp 14.

[0020] At the point of connection between the rod of the piston 8 and the arm 12 a cam follower 9 is provided that follows the profile of a cam 11 fixedly mounted on the shaft 3 of the roller 2.

[0021] As can be seen from Figure 2, when the rod of the piston 8 is retracted inside the cylinder 6, the mobile blade 15 is in its extracted position, that is, it protrudes outward from the skirt 4 of the roller 2. On the other hand, when the rod of the piston 8 is extracted from the cylinder 6 the mobile blade 15 is in a retracted position with respect to the skirt 4 of the roller.

[0022] A bar 20 with a rectangular section, of substantially the same length as the roller 2 and extending substantially parallel to the axis X of the roller 2 is secured to the frame of the rewinding machine.

[0023] A support 21 is secured to the bar 20, protruding toward the roller 2 and supporting a plurality of attachments or clamps 22 (in Fig. 2 only two are shown). A cutting blade 23 is fixed to each clamp 22.

[0024] As better illustrated in Figure 1, the clamps 22 and the cutting blades 23 follow a cusp-shaped path 24 that runs helically or spirally on the roller 2. In the cutting stage, during rotation of the roller 2, the blades 23' supported by the central clamps indicated by 22' are the first blades to encounter the web 10 and cut it against the blade 15. As the web 10 advances supported by the blade 15, it gradually comes into contact with the other blades 23 disposed symmetrically along the cusp-shaped path 24. In this manner the web 10 is gradually cut in a scissor-like fashion, allowing an extremely clean, precise cut, determined by the contact between the two blades, 15 and 23. The cut that is determined will be perfectly straight, lying parallel to the axis X of the roller 2.

[0025] The cam follower 9 and the cam 11 ensure that during rotation of the skirt 4 of the roller, the supporting blade 15 is always in the retracted position when it is not in the area of the cutting blades 23. Thus the cutting device 1 always works in conditions of the utmost safety. In fact, irrespective of the response times of the actuator 5, after having made the cut, there is the certainty that the blade 15 will return inside the surface of the skirt 4, avoiding any possible damage to the machine members.

[0026] A suction means 30 disposed longitudinally to the roller 2 is also provided on the skirt 4 of the roller 2, downstream of the blade 15. Said suction means comprise a plurality of holes 31 connected to the pneumatic system of the machine. The holes 31 are able to carry out air suction, so as to create a vacuum between the web 10 and the surface of the skirt 4. Thus there is a perfect grip of the web 10 on the surface of the skirt and slipping of the web 10 on the surface of the skirt 4 that might cause cutting imperfections is avoided.

[0027] Once the cut has been made, the vacuum is removed and the tail end of the web 10 is detached from the skirt 4 and can be glued, for example, onto a new core to begin winding of a new roll.

Claims

1. A cutting device for a rewinding machine comprising an unwinding assembly able to unwind a large-diameter roll of web sheet or material (10), and a winding group able to rewind the web (10) into rolls of smaller diameter, said cutting device (1) effecting cutting of the web at the end of winding of each single roll and comprising a cutting roller (2) mounted rotatably around its own axis (X) on which the web (10) is wound, and cutting means to cut said web (10) transversally, characterized in that said cutting roller (2) comprises first cutting means (15), mounted integrally thereon, able to bring said web (10) into contact with second cutting means (23) mounted fixedly on the frame of the machine.

2. A cutting device according to claim 1, characterized in that said first cutting means comprise a mobile blade (15) that extends longitudinally substantially for the whole length of the roller (2) parallel to its axis (X) and can be moved from a retracted position inside the roller (2) to a position protruding from the profile of said roller (2).

3. A cutting device according to claim 1 or 2, characterized in that said second cutting means (23) are cusp-shaped (24), so that during cutting the web (10) supported by the blade (15) comes into contact initially with the central tip of the cusp and subsequently gradually with symmetrical points of the two sides of the cusp.

4. A cutting device according to claim 2, characterized in that said mobile blade (15) is mounted on an arm (12) rocking around a fulcrum (13), operated by an actuator (5).

5. A cutting device according to claim 4, characterized in that said arm (12) and said actuator (5) are integral with a skirt (4) of the roller (2) mounted rotatably around a central fixed shaft (3).

6. A cutting device according to any one of the preceding claims, characterized in that provided inside said roller (2) is a cam system (9, 11) able to ensure the safe return of said first cutting means (15), once cutting has been performed.

7. A cutting device according to any one of the preceding claims, characterized in that said second cutting means comprise a plurality of cutting blades side by side.

8. A cutting device according to any one of the preceding claims, characterized in that on said roller (2) means (30) are provided to create a vacuum, so as to ensure retention of the web (10) downstream of the cutting area, to avoid slipping of the web during cutting.

9. A rewinding machine for sheet or web material (10) provided with a web cutting device according to any one of the preceding claims.

10. A method for transverse cutting of a web (10) in a rewinding machine, in which the web is unwound from a large-diameter log, passed around a cutting roller (2) and rewound into rolls of smaller diameter, characterized in that at the end of winding of each roll provision is made for a mobile cutting blade (15) to come out of said roller (2) and push the web (10) against a fixed cusp-shaped blade (23) causing clean, straight transverse cutting thereof, starting from the central tip of the cusp and gradually proceeding symmetrically toward the end of the two sides of the cusp.

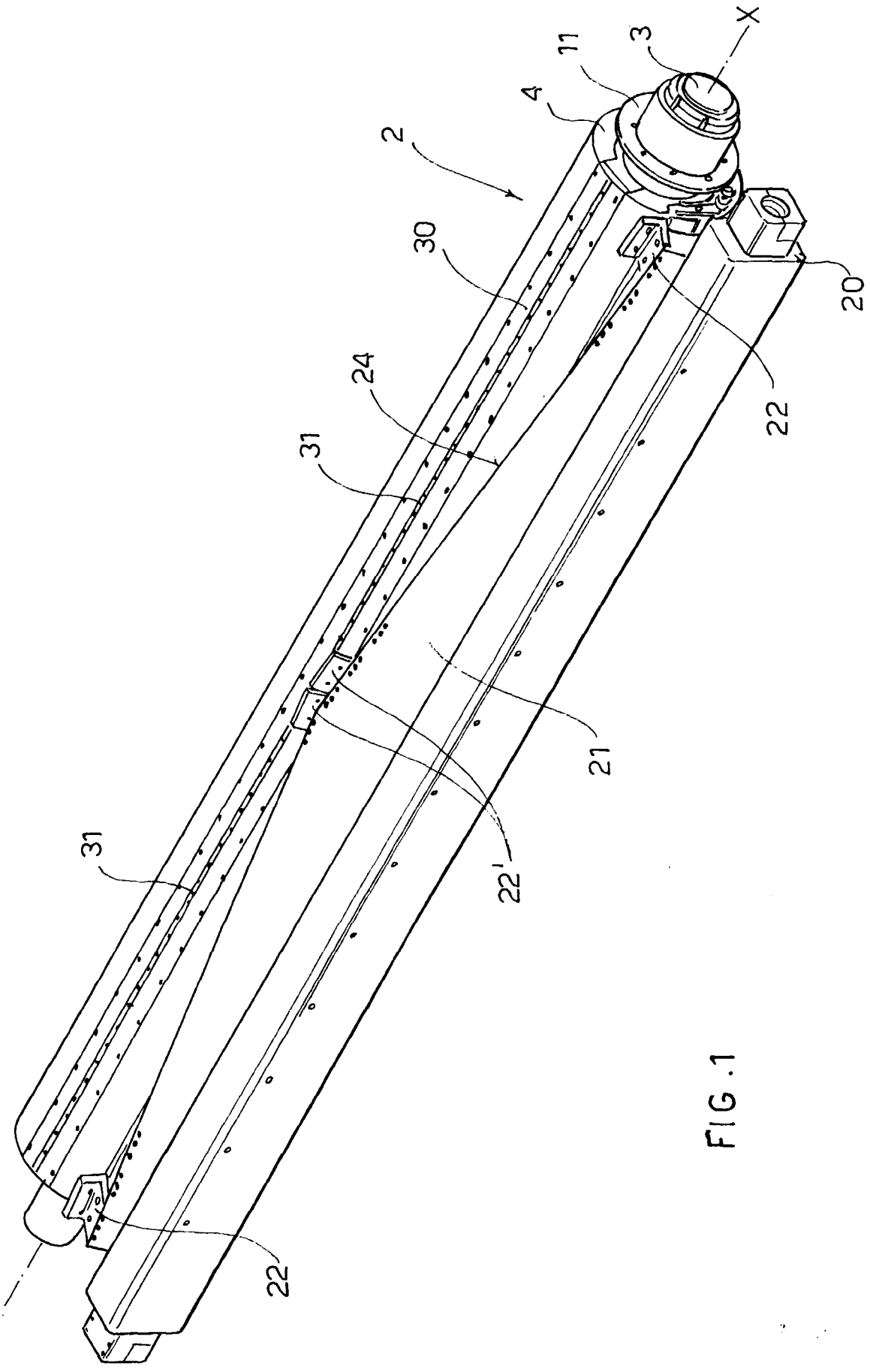

FIG.1

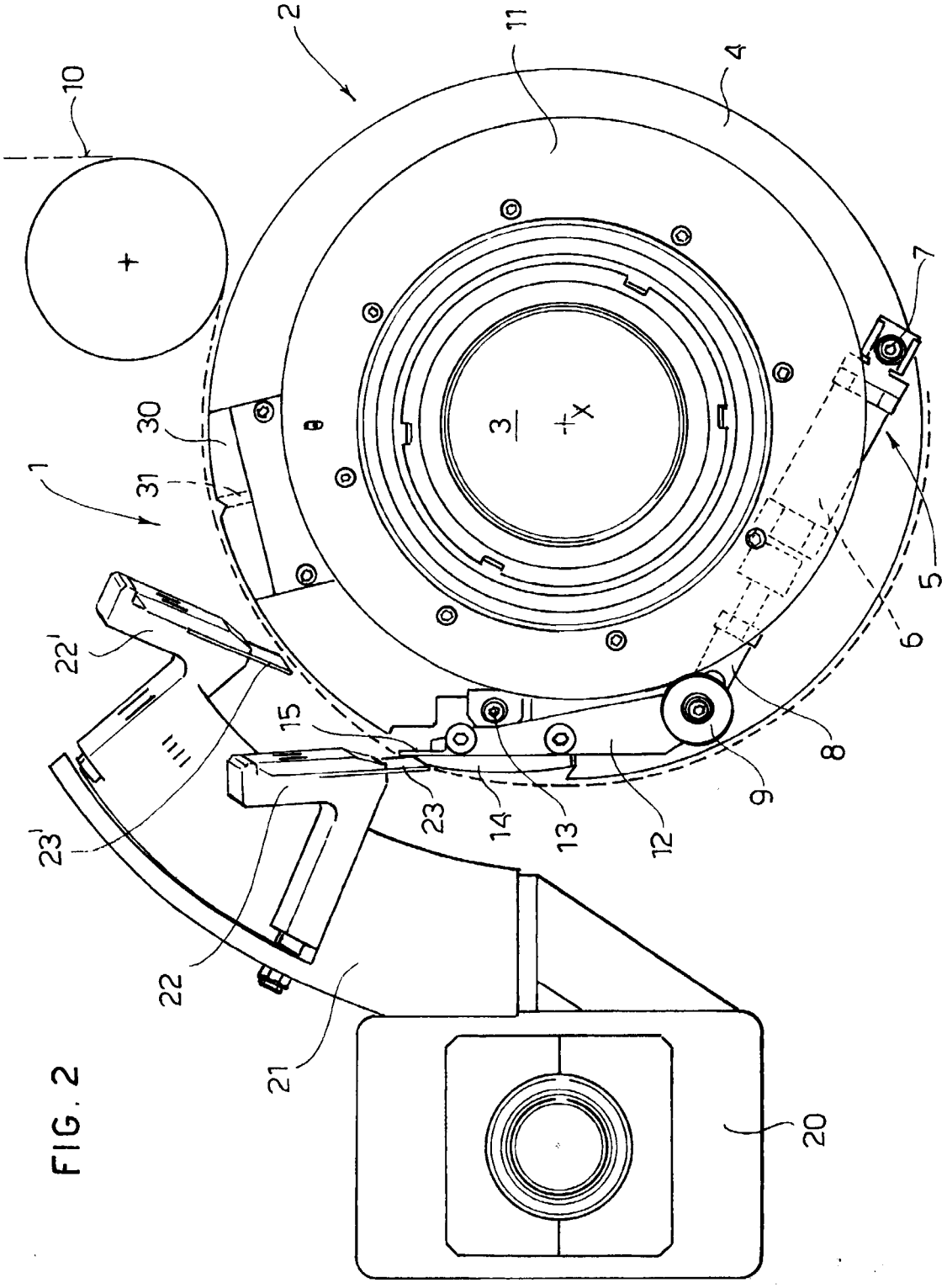

FIG. 2