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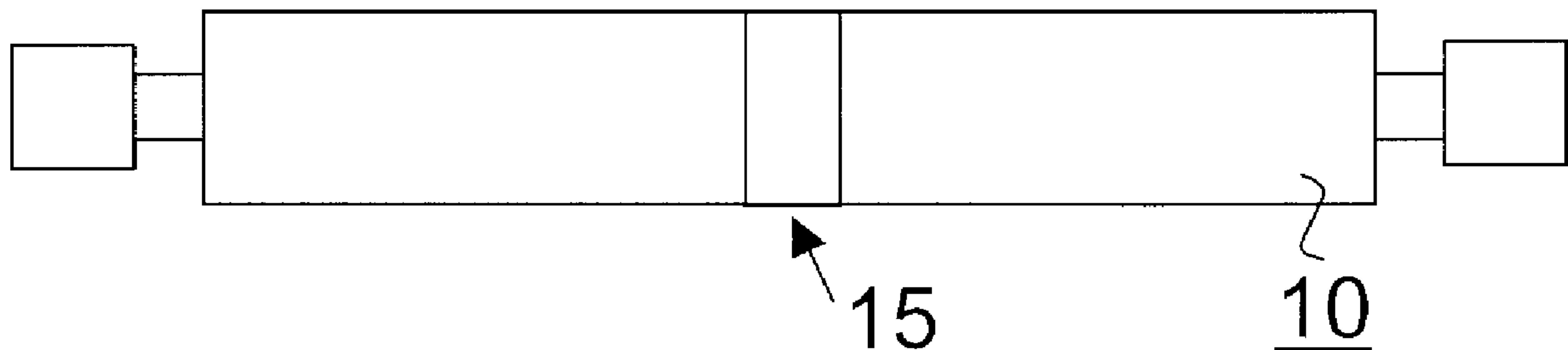
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(54) Title: A REELING SHAFT OF A FIBRE-WEB MACHINE REELER



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A reeling shaft (10) of a fibre- web machine reeler, which reeling shaft (10) comprises at least one smooth surface area (15), which smooth surface area (15) comprises at least the surface area of the reeling shaft (10) to which an adhesive material used in connection with a turn-up process in the reel-up for fastening the end of the web for starting the reeling of a new web roll is arranged to adhere, and that the smooth surface area (15) is smooth so that the adhesion of the adhesive material used in the turn-up is adequate for starting the reeling of a new web roll and that the adhesive material is easily removable after unreeling.

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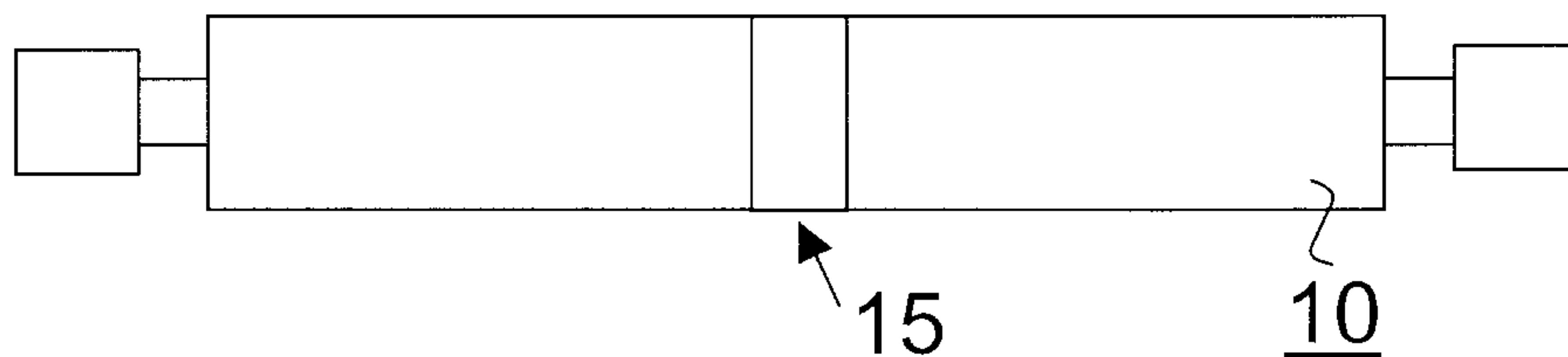
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(54) Title: A REELING SHAFT OF A FIBRE- WEB MACHINE REELER



(57) Abstract: A reeling shaft (10) of a fibre- web machine reeler, which reeling shaft (10) comprises at least one smooth surface area (15), which smooth surface area (15) comprises at least the surface area of the reeling shaft (10) to which an adhesive material used in connection with a turn-up process in the reel-up for fastening the end of the web for starting the reeling of a new web roll is arranged to adhere, and that the smooth surface area (15) is smooth so that the adhesion of the adhesive material used in the turn-up is adequate for starting the reeling of a new web roll and that the adhesive material is easily removable after unreeling.

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A reeling shaft of a fibre-web machine reeler

5 The invention relates to a reeling shaft of a fibre-web machine reeler.

From prior art are known reel-ups used in connection with fibre-web machines, such as paper and board machines, a fibre web being manufactured by which
10 fibre-web machines, such as a paper machine/board machine, is reeled as a full-width web into machine rolls for further processing. The web is reeled around a reeling shaft e.g. a reel spool/roll either by means of surface draw in a reeling nip between a reel drum and a web roll being formed or by utilising a centre drive, whereby also the reeling shaft is provided with a drive. In connection with fibre-
15 web machines, such as paper and board machines, are also used unreelers by means of which a web roll reeled by a reel-up is unreeled in a later stage of treatment for further processing of the fibre web. After unreeling, the emptied reeling shaft is returned for re-use on the reel-up.

20 In reel-ups, when the machine roll is being completed, a turn-up is made for starting the reeling of a new machine roll and for removing a completed machine roll from the reel-up. In the turn-up process the web is cut, whereby one end of the web goes into connection with the completed machine roll and the other end is guided around the reeling shaft for starting the reeling of a new machine roll. The
25 so-called traditional turn-up types include, inter alia, gooseneck, bag blowing, strip, water-cutting and side blowing turn-up types. From prior art is also known a so-called OptiReel type of turn-up, which is described e.g. in patent *FI91383*.

As is known from prior art in connection with the turn-up in reel-ups, for starting
30 the reeling of a new web roll, the end of the web is guided into connection with the reeling shaft and the end of the web is fastened to the reeling shaft by means

of glue, tape or other corresponding adhesive material. After unreeling, when unloading the bottom of the roll, the adhesive material must also be removed from the surface of the reeling shaft in order that it shall not cause problems when starting the reeling of the next web roll to be reeled up onto the reeling shaft.

- 5 Removing this adhesive material from the surface of the reeling shaft is many times difficult and time-consuming manual labour and thus causes additional costs.

With respect to prior art, reference can also be made to DE published application
10 10309049 which describes a process and an assembly for removing a first paper roll from the reeling assembly and replacing it with an empty reeling shaft for the next roll. In this known arrangement, glue is introduced onto the web for fastening the end of the web to the reeling shaft. Also in this known arrangement, the surface of the reeling shaft must be cleaned of possible glue after unreeling before
15 a new reeling process.

With respect to prior art, reference is further made to EP patent specification 0907600 which describes a turn-up device of a reeler in connection with which is arranged an apparatus for introducing an adhesive material, such as a two-sided
20 tape, onto the paper web for fastening the end of the web to the reeling shaft. The publication describes different embodiments for making the turn-up, but also in these embodiments the end of the web is fastened directly to the surface of the reeling shaft by an adhesive material, whereby the reeling shaft must be cleaned after unreeling before the next new reeling process.

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The present invention is directed towards eliminating or at least minimizing problems and disadvantages of the afore-described arrangements known from prior art.

- 30 The present invention is particularly directed towards eliminating problems related to the adhesive material remaining on the surface of the reeling shaft and to the cleaning measures of the reeling shaft caused by it.

According to one aspect of the present invention, there is provided a reeling shaft of a fibre-web machine reeler which comprises at least one smooth surface area which comprises at least the area of the surface of the reeling shaft to which the adhesive material adheres in connection with the turn-up performed in the reeling-up process for starting the reeling of a new web roll. The smooth surface area is smooth so that the adhesion of the adhesive material used in the turn-up is adequate for starting the reeling of a new web roll and that the adhesive material is easily removable after unreeling.

According to an advantageous exemplifying embodiment of the invention, the smooth surface area of the reeling shaft of a fibre-web machine reeler is formed on the surface of the reeling shaft in connection with manufacturing so that, at least on the area to which the adhesive material fastening the end of the web, such as tape, adheres, the adhesion of the adhesive material is adequate especially in a tangential direction and the adhesive material is easily removable e.g. in a radial direction by pulling or "peeling". The smooth surface area advantageously extends in the axial direction of the reeling shaft to a circumferential central area, but the smooth surface area can also extend in the circumferential and axial direction of the reeling shaft to a desired area and thus there can be, on the surface of the reeling shaft, several separate smooth surface areas extending in the circumferential and/or axial direction, e.g. on the central and end areas, or the smooth area can extend in the circumferential and/or axial direction of the reeling shaft substantially over the whole length, e.g. covering the reeling shaft substantially totally. Thus, there can be several smooth surface areas which are separate in the circumferential and/or axial direction of the reeling shaft. The smooth surface area of the reeling shaft has been manufactured by turning or by grinding or by polishing or by other corresponding treatment depending on the

desired surface-roughness value and on the adhesive material used. Advantageously, the surface roughness of the smooth surface area, to which the adhesive material used in the turn-up adheres for fastening the end of the web, and which is formed on the surface of the reeling shaft in connection with
5 manufacture, is $R_a = 0.8\text{--}3.2\text{ }\mu\text{m}$. The surface roughness of the other surface areas of the reeling shaft is typically $R_a = 3.2\text{--}6.3\text{ }\mu\text{m}$.

According to a second advantageous exemplifying embodiment of the invention, for achieving a smooth surface area of the reeling shaft of a fibre-web machine
10 reeler at least on the area to which the adhesive material fastening the end of the web adheres, the reeling shaft comprises a protective coating for protecting the surface from the adhesive material used in the turn-up. The protective coating covers at least that area of the surface of the reeling shaft to which the adhesive material fastening the end of the web is caused to adhere for starting the reeling of
15 a new web roll. According to this embodiment of the invention, the protective coating of the reeling shaft is advantageously tape, film, paper, board or other corresponding material, the bottom of which i.e. the surface coming onto the reeling shaft is fastenable to the surface of the reeling shaft and the top of which, on the other hand, enables the fastening of the end of the web reliably to the
20 surface of the reeling shaft in connection with the turn-up. According to an advantageous additional characteristic, the protective coating is detachably fastened to the surface of the reeling shaft.

In an exemplifying embodiment of the invention using a protective coating,
25 according to an advantageous additional characteristic, the protective coating is an electrically-charged plastic film which fastens by itself by means of an electric charge to the surface of the reeling shaft and the upper side of which is slippery, whereby the hold of the adhesive material used for fastening the end of the web in a tangential direction of the reeling shaft is extremely good, yet, on the other
30 hand, the adhesive material is easily cleanable from the surface of the film after unreeling and easily replaceable, if required. Such an electrically-charged plastic

film applicable for use in connection with the invention is described in EP patent specification 0775049 which describes a dielectric film containing gas bubbles which film is self-adhesive and the adhesion of which is based on a high unipolar charge inside the film, which charge is obtained by charging the film under a strong electric field, whereby partial discharges are created in the gas bubbles and the charges move into the dielectric material of the film.

In an exemplifying embodiment of the invention using a protective coating, according to a second advantageous additional characteristic, the protective coating is glossy-surfaced tape which adheres well to the surface of the reeling shaft and from which the web remaining at the bottom of the roll after unreeling is easily detachable and the adhesive material is removed easily along with the web material and the tape is easily replaceable, if required.

In an exemplifying embodiment of the invention using a protective coating, according to a third advantageous additional characteristic, the protective coating is paper or board, which is e.g. glued to the surface of the reeling shaft. The protective-coating material being fibre material, e.g. paper glues and corresponding glues can be used as the adhesive material for fastening the end of the web. On the other hand, a special advantage of using a protective coating which is board or formed of several thin paper layers is that the adhesive material is easily removable so that material is removed from the fibre surface when the tail of the web with its adhesive material is removed after unreeling.

In an exemplifying embodiment of the invention using a protective coating, there is no need to replace the protective coating of the reeling shaft after every turn-up but it is easily cleanable and, on the other hand, it is easily replaceable if its characteristics have changed so that its characteristic of detachable fastening to the reeling shaft or the adhesion of the adhesive material to it is no longer reliable.

In an exemplifying embodiment of the invention using a protective coating, the protective coating covers at least that area of the surface of the reeling shaft to which the adhesive material fastening the end of the web adheres. The protective coating can, however, extend over a desired area in the circumferential and axial
5 direction of the reeling shaft, e.g. covering the reeling shaft substantially totally or e.g. being formed of several separate areas provided with a protective coating in the circumferential and/or axial direction of the reeling shaft.

According to an advantageous exemplifying embodiment of the afore-described
10 invention in which a protective coating is used and in which the detachable fastening of the protective coating is implemented by means of a charge according to an advantageous additional characteristic, the invention also encompasses other fastening methods which enable reliable adhesion of the protective coating to the surface of the reeling shaft and, on the other hand, easy removing of the protective
15 coating, if required. The protective coating can be e.g. of shrink-sleeve type or butt-jointable. The protective coating can be removable e.g. by means of water, heat or solvents or by mechanical methods or corresponding methods.

According to an advantageous additional characteristic of the invention, a groove
20 or a recess is made on the surface of the reeling shaft for the protective coating, whereby it is possible to use a thicker protective coating.

The embodiment of the invention in which there are smooth surface areas on the surface of the reeling shaft in the central area and in the end areas of the reeling
25 shaft, is especially well suited for use in connection with a water-cutting turn-up process.

The invention will now be described in more detail with reference to the figures of the accompanying drawing, to the details of which the invention is, however, by
30 no means intended to be narrowly confined.

Fig. 1 schematically shows a reeling shaft of a reeler according to an embodiment of the invention.

Fig. 2 schematically shows a cross-section of a reeling shaft according to Fig. 1 in an embodiment in which the reeling shaft comprises a protective coating, at the protective coating.

Fig. 3 schematically shows a longitudinal partial section of a reeling shaft according to an embodiment of the invention.

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In the figures and in the description related to them, the same references are used of parts corresponding each other if not otherwise stated.

In the embodiment according to Fig. 1, a reeling shaft 10 comprises a smooth surface area 15 to which, in connection with a turn-up in a reel-up for starting the reeling of a new web roll, an adhesive material, used for fastening the tail of the web to the reeling shaft, adheres. In the embodiment of the figure, the smooth surface area 15 extends, in the axial direction of the reeling shaft, over a substantial partial length to which the adhesive material adheres, advantageously to the central area in the axial direction of the reeling shaft, but when desired the smooth surface area 15 can also extend substantially for the whole axial direction of the reeling shaft or there can be several, separate smooth surface areas in the axial direction of the reeling shaft. The smooth surface area of the reeling shaft 10 is, according to one embodiment, formed on the surface of the reeling shaft in connection with manufacture e.g. by turning or by grinding or by polishing the area in question to a desired surface-roughness value, advantageously 0.8–3.2 μm . The smooth surface area of the reeling shaft is, according to a second embodiment, obtained so that the reeling shaft comprises a protective coating 15 adhered to the surface of the reeling shaft 10 for obtaining said smooth surface area.

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In the embodiment according to Fig. 2, the protective coating 15 surrounds the reeling shaft 10 in its whole circumferential direction, but the protective coating 15 can also extend only for a part of the circumference or there can be several separate protective coatings in the circumferential direction.

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In the exemplifying embodiment of the invention according to Fig. 3, a groove is made in the surface of the reeling shaft 10, in which groove the protective coating 15 is positioned. In the example shown in the figure, the groove is made by removing material forming a surface layer 11 of the reeling shaft 10 at a point in
10 which the protective coating 15 is positioned.

The invention has been described above only referring to some of its advantageous embodiments, to the details of which the invention is, however, by no means intended to be narrowly confined.

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The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A reeling shaft of a fibre-web machine reeler, comprising at least one smooth surface area, which smooth surface area comprises at least the surface area of the reeling shaft to which an adhesive material used in connection with a turn-up process in the reel-up for fastening the end of the web for starting the reeling of a new web roll is arranged to adhere, wherein the smooth surface area is smooth so that the adhesion of the adhesive material used in the turn-up is adequate for starting the reeling of a new web roll and the adhesive material is easily removable after unreeling.
2. A reeling shaft according to claim 1, wherein, for providing the smooth surface area of the reeling shaft, the reeling shaft comprises a protective coating which is caused to adhere to the surface of the reeling shaft for protecting the surface of the reeling shaft from the adhesive material used in the turn-up.
3. A reeling shaft according to claim 1 or 2, wherein the protective coating of the reeling shaft is detachably fastened to the surface of the reeling shaft.
4. A reeling shaft according to any one of claims 1 to 3, wherein the protective coating of the reeling shaft is an electrically-charged plastic film.
5. A reeling shaft according to any one of claims 1 to 3, wherein the protective coating of the reeling shaft is a tape or a corresponding sticking plastic film.
6. A reeling shaft according to any one of claims 1 to 3, wherein the protective coating of the reeling shaft is fibre material.
7. A reeling shaft according to claim 6, wherein the fibre material is paper or board.
8. A reeling shaft according to any one of claims 1 to 7, wherein, on the surface of the reeling shaft, there is a groove or a recess in which the protective coating is positioned.

9. A reeling shaft according to any one of claims 1 to 8, wherein the protective coating is detachably fastened to the surface of the reeling shaft in a shrink-sleeve style or by a butt joint.
10. A reeling shaft according to any one of claims 1 to 9, wherein the protective coating is removable from the surface of the reeling shaft by means of water, heat or solvent and/or by mechanical methods.
11. A reeling shaft according to claim 1, wherein the smooth surface area of the reeling shaft is provided on the surface of the reeling shaft in connection with the manufacture of the surface of the reeling shaft.
12. A reeling shaft according to claim 11, wherein the surface roughness of the smooth surface area of the reeling shaft is such that the adhesion of the adhesive material is adequate especially in a tangential direction and that the adhesive material is easily removable.
13. A reeling shaft according to claim 12, wherein the adhesive material is easily removable in a radial direction by pulling or "peeling".
14. A reeling shaft according to any one of claims 11 to 13, wherein the surface roughness of the smooth surface area of the reeling shaft is $Ra = 0.8-3.2 \mu m$.
15. A reeling shaft according to any one of claims 11 to 14, wherein the smooth surface area of the reeling shaft is manufactured by turning or by grinding or by polishing.

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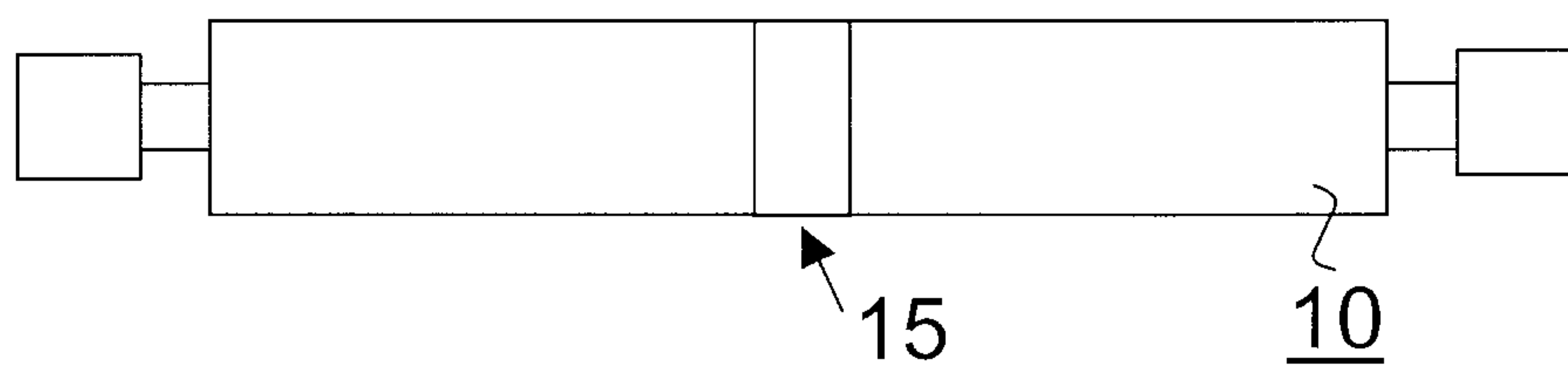


FIG. 1

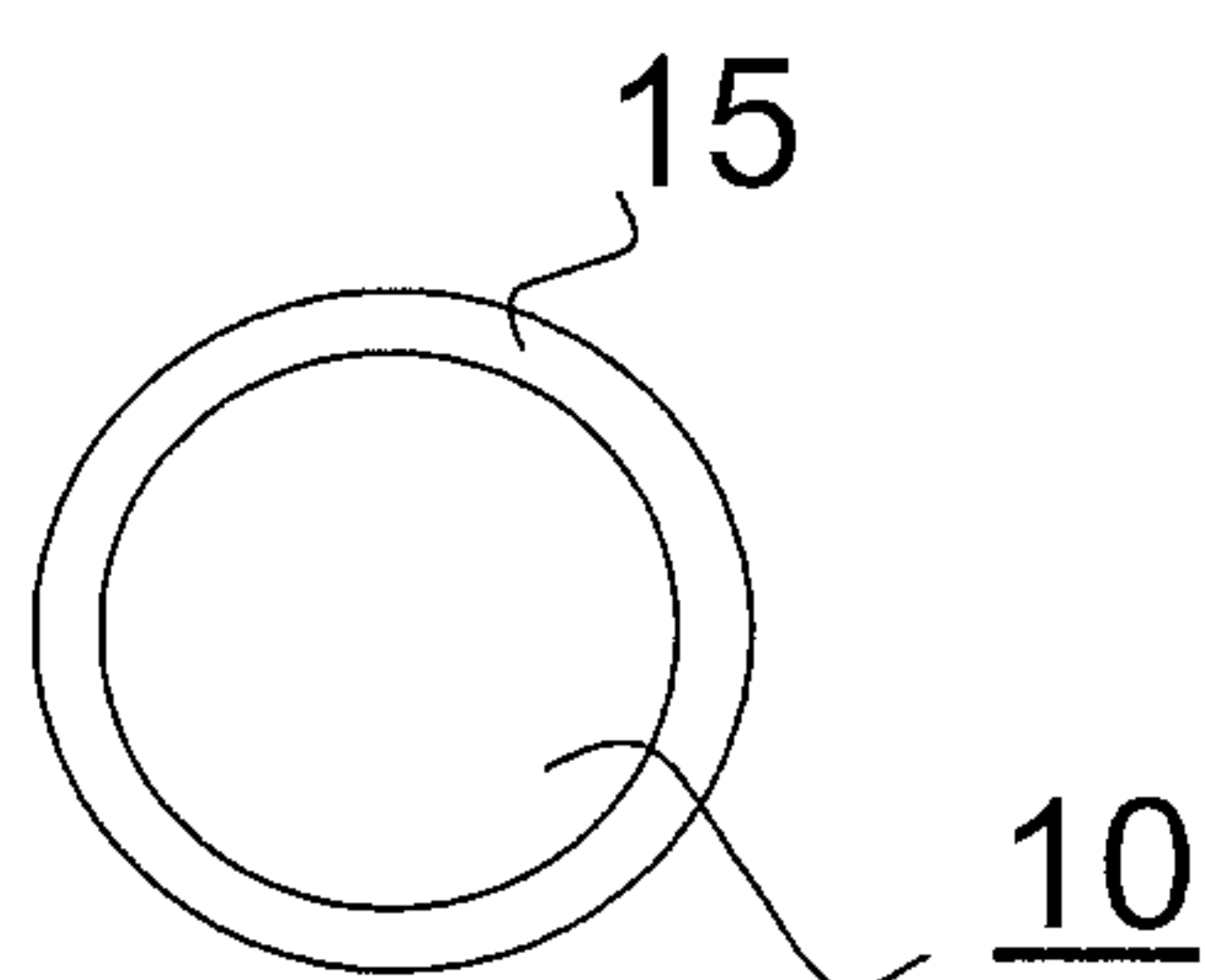


FIG. 2

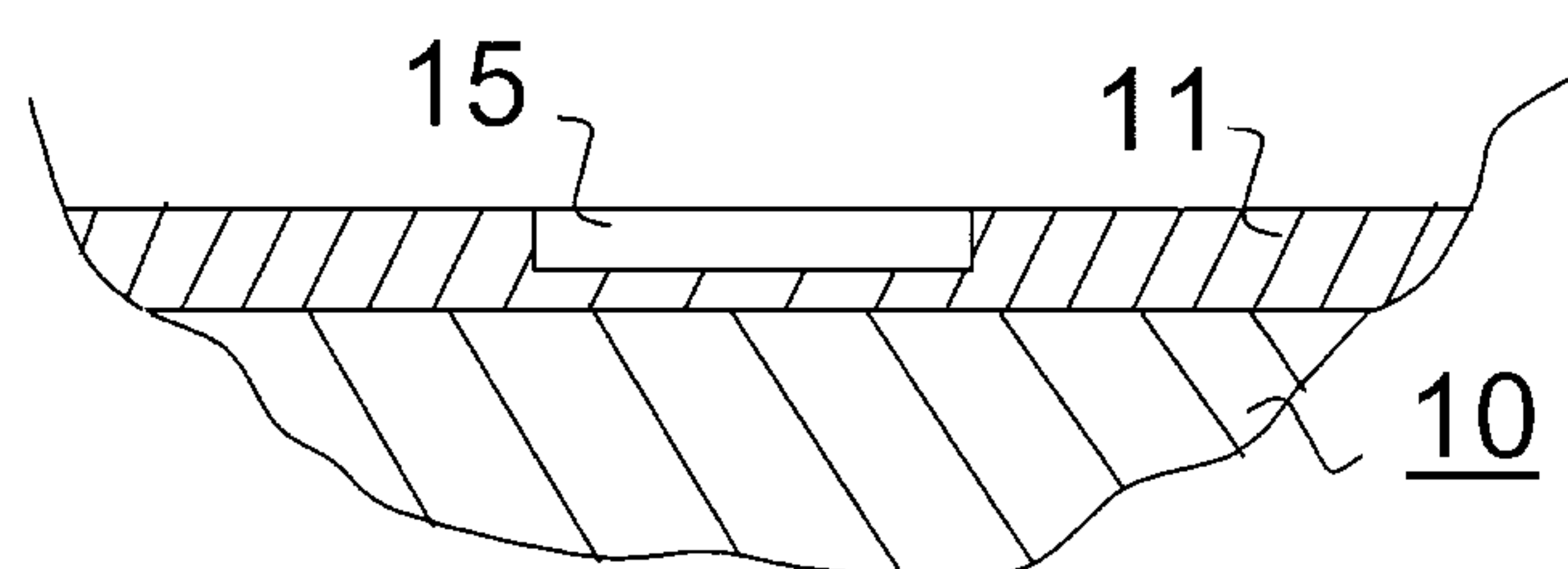
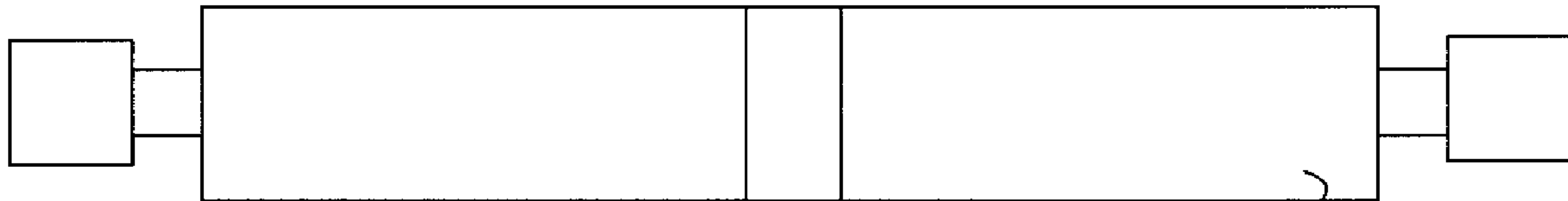


FIG. 3



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