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(54) **ROLL OF ELONGATED MATERIAL, METHOD FOR THE PRODUCTION THEREOF AND MEANS
FOR CARRYING OUT THE METHOD**

ROLLE EINES LANGGESTRECKTEN MATERIALS, VERFAHREN ZU DESSEN HERSTELLUNG
UND VORRICHTUNG ZUR DURCHFÜHRUNG DES VERFAHRENS

ROULEAU DE MATERIAU ALLONGE, SON PROCEDE DE PRODUCTION ET MOYENS
PERMETTANT DE METTRE CE DERNIER EN OUVRE

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(56) References cited:
SE-B- 399 694 **SE-B- 404 161**
US-A- 4 762 061

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Description

TECHNICAL FIELD:

The present invention relates to a roll of elongated material, especially soft paper which is used as toilet-rolls, kitchen rolls etc. The invention also comprises also a method for the production of such rolls and a means for carrying out the method. The roll according to the invention is of the type which does not have any separate sleeve-formed core around which it has been rolled. It has neither any round cross-section but is compressed to an oval or elliptical cross-sectional shape.

PRIOR ART:

Compressed rolls having an oval or elliptical cross-sectional shape of for instance paper are earlier known. Examples of such are EP-A-392 581, DE-A-3 418 951 and GB-A-709 363. The reason that the rolls according to these patents have an oval form is primarily that it shall be easier to pack the rolls so that in a packed state they require less space. In this manner both transport and storing of these are simpler. The rolls are primarily toilet-rolls which are produced round and which, after the winding, have been compressed in some way. Sophisticated machines and means for the compressing of rolls are described for instance in the above mentioned DE-A-3 418 951.

When for example toilet-rolls are to be used, they are usually put on a pin or a shaft in a holding fixture attached to a wall. For this to be done the rolls have therefore according to above known technique been provided with an inner core of rigid cardboard which has been flattened out in connection with the compression and which must be put back into a round shape when the roll is put on a shaft. This snapping back is brought about by applying a pressure to the shorter sides so that the core will open up again. This is not an easy operation as such and the core must be of a certain kind. If it does not open, substantial difficulties will occur when putting the roll on a shaft.

Paper-rolls without any inner core of rigid cardboard are also known. See for instance SE-B-399 694. According to this patent, instead of arranging a stiff core of cardboard, the inner turns are stabilized by means of water possibly having an addition of a binder. By stabilizing the inner turns in this way one has been able to maintain the hole without an inner core despite that the central hole would otherwise collapse immediately after the roll has been pulled off the winding shaft due to radially inwardly directed forces. The innermost turns are, however, not completely glued to each other so that it is possible to roll off the material from the central hole, which is also the purpose with this form of rolls. These rolls are not flattened, but instead they maintain their round shape and the purpose with the stabilizing is that the central hole also shall be kept open and round.

Means and methods of compressing and packaging compressed material such as rolls of paper and other compressible materials are also described in SE-B-404 161 and US-A-4 762 061.

TECHNICAL PROBLEM:

As mentioned above, round rolls require a large space when they are packed together with other rolls in big packages. One has therefore compressed these rolls together to some extent to an oval form, and later on before use they are pressed back to a round shape again. Separate stiff sleeves in the central hole have been used which however only with difficulty have been brought to an approximately round shape again. This separate stiff core costs money and is also unusable and has to be discarded after use. Without this core, a complete collapse of the central hole would however occur if special measures are not taken to stabilize it. It has therefore earlier been impossible to produce flattened rolls without special central cores of, for example, stiff cardboard.

THE SOLUTION:

According to the present invention, this problem has been solved and a roll of an elongated material, for example paper, especially paper and other nonwoven material has been created, which roll is wound on a core at the centre of the roll whereby the core is integrally formed with the rolled material thereon and consists of a number of turns thereof which are fixed in relation to each other, for example by gluing or the like, which roll is characterized in that the roll is in a compressed oval or elliptical form and that the core consists of at least five inner turns and is elastic in such a way that it can be opened from the compressed state by pressure against the shorter sides of the ellipse.

According to the invention, the elasticity in the core of the roll is achieved by fixation by means of a binder of the type polyvinylacetate, polyethylvinylacetate, polyacrylate, latex, starch, modified starch, cellulose derivatives, polyvinyl alcohol in water or other water-soluble binder.

The invention also relates to a process for the production of a roll, which method is characterized in that at least five of the first turns of the elongated material during conventional winding are sprayed or covered with a binder solution and that immediately after the completed winding and removal from the winding shaft, the roll is compressed to an elliptical or oval section form.

According to an alternative method of the invention, an auxiliary means with a smaller diameter than that of the winding shaft can first be introduced in the central hole of the roll after the removal of the winding shaft and be kept in the central hole during the first step of the compression and accordingly assist in forming this.

The invention also comprises a device for the pro-

duction of a roll according to the above and it is characterized by a means for spraying or covering at least five of the first turns of the elongated material during winding thereof with a binder; means for removing the roll of elongated material from the winding shaft after finished winding; and means for compressing the roll into an elliptical or oval section form immediately after winding, said means for compressing comprising to converging synchronically driven conveyor bands at one end of the winding shaft, which conveyor bands have a distance from each other corresponding to the diameter of the roll closest to the end of the shaft and converge in a direction from the end.

FIGURE DESCRIPTION:

Fig. 1 shows spraying of a binder on the first turns, Fig. 2 describes schematically a means for compressing a finished roll according to the invention and

Fig. 3 shows a finished compressed roll according to the invention.

PREFERRED EMBODIMENT:

The invention relates to a further development of winding of, for example, soft paper in conventional machines, such as a centrally-driven rolling machine or a carrier rolling machine. These machines are commonly known and are therefore not described further here. In these machines the rolls are rolled up on a rotating shaft from a larger feeding roll. The machine usually comprises more shafts which, in turn, roll up the paper strip. They therefore move stepwise to a correct position for winding, removal of the roll, etc.

When a roll has been finished, the paper strip is cut by means of a knife and the new end of the strip is brought to roll around a new shaft by means of air nozzles or the centrifugal force and the feeding speed. These methods are also known.

When a new roll is started and the end of the paper grips the winding shaft, then an application of a liquid will occur to the paper strip, which liquid is able to give the necessary elasticity of the inner turns after drying so that after compression they will open up again. The addition occurs through spray nozzles or by covering of the strip by means of a provides means, a gluepress or other mechanical means which provides a suitable spreading effect on and into the strip. However, spraying is preferred and by means of this method the amount of the impregnation agent can be controlled so that the paper in the core of the roll remains practically uninfluenced from a user's point of view and the whole roll, including the inner turns, will be useable.

Fig. 1 shows schematically spraying of a binder on the first turns. A paper strip 1 is wound up on a shaft 2 and the end of the paper 5 has only come half a turn on the shaft 2. The addition of binder occurs through a

spray nozzle 6.

The liquid which is preferably sprayed on these inner turns is primarily those latex-based or water-soluble binders which have been mentioned above and which can impart elasticity to the inner turns. The concentration of these agents should be a few percent and the amount of sprayed liquid in relation to the paper can be 1-80 ml/m² of the strip. The number of turns which should be sprayed with this elastic agent is not critical, but should at least consist of five turns if the core shall be able to open up again after compression. A greater number of turns can also be covered or immersed as these inner turns are also usable, but too great a number is of course unnecessary.

According to the invention, it is important that the compression of the roll occurs immediately after the winding has been terminated. Fig. 2 shows schematically a means for performance of the compression. Here, a finished paper-roll 1 is shown on a shaft 2. With the shaft 2 removed, the paper-roll 1 is moved in that state to the right in the figure in between two synchronized, driven conveyor bands 3 and 4 which converge with increasing distance from the winding shaft 2. When the paper roll 1 is pushed in between these bands 3 and 4, the roll 1 will be increasingly compressed and will finally obtain a shape in cross-section which is oval or elliptical. Behind the bands 3 and 4 are rails which support the bands 3 and 4. The removal means of the roll 1 from the shaft 2 can be conventional. The bands 3 and 4 also assist in removing the shaft 2 as these bands are driven.

The compression of the roll can also occur by means of other devices, for instance by means of a pneumatic or hydraulic pressing plate which presses the roll against a stationary plate.

The liquid in the applied covering or impregnation of the first turns will, though the compression has been made immediately after the finished rolling, partly evaporate from the roll, partly move in into the dry turns of the roll without influencing the properties of the rolls as this amount of liquid is so small. This makes it possible that the roll after the compression can be cut and packed directly using conventional means.

A roll, for example a toilet-roll, which has been produced according to the present invention is flat in its appearance but can easily be pressed to a round form again, whereby the core reopens so that a pin or shaft can be inserted into the same. The hole in the core will not usually be completely round but this has no importance since the opening will be so well shaped that a pin or shaft can be inserted into it. The opening can also be preformed to a certain extent so that an auxiliary means can be introduced in the hole before the compression, which means is withdrawn before the compression has been completed and thus contributes to form the re-opened hole.

Fig. 3 shows an example of a compressed toilet-roll.

In the figure, the roll 1 has been shown as one single continuous roll that is intended to be cut into smaller rolls after the compression. The invention also includes rolls which have been made separately on the winding shaft 2 laying side by side.

By means of the present invention, one has accordingly succeeded to bring about a compressed roll without a separate inner core, which roll can be opened again and put on a rod, pin, shaft or the like. This brings about the advantage that the rolls require less space when they are packed. In addition any separate non-usable core which has to be discarded and thereby creates an environmental problem is avoided. By omitting this inner core, the costs of the production are also decreased.

The invention is not limited to the above described embodiment example, but can be varied in different ways within the scope of the patent claims.

Claims

1. Roll of elongated material, for example paper and especially soft paper and other nonwoven material, which is wound on a core at the centre of the roll, whereby the core is integrally formed with the rolled material thereon and consists of a number of turns thereof which are fixed in relation to each other, for example by gluing or the like, **characterized in** that the roll is in a compressed elliptical or oval form and in that the core consists of at least five inner turns and is elastic in such a way that it can be opened from the compressed state by pressure against the shorter sides of the ellipse.
2. Roll according to claim 1, **characterized in** that the elasticity is obtained by fixation by means of water, a binder of the type polyvinylacetate, polyethylenvinylacetate and polyacrylate, latex, starch, modified starch, cellulose derivatives, polyvinyl alcohol in water or some other water-soluble binder.
3. Method for the production of a roll according to either of claims 1 and 2, **characterized in** that on at least five of the first turns of the elongated material during conventional winding, a binder is sprayed or covered thereon and that immediately after the finished winding and removal of the winding shaft, the roll is compressed into an elliptical or oval section form.
4. Method for the production of a roll according to either of claims 1 and 2, **characterized in** that on at least five of the first turns of the elongated material during conventional winding, a binder is sprayed or covered thereon and that an auxiliary means having a smaller diameter than that of the winding shaft is first introduced into the central hole of the roll after removal of the winding shaft and remains in

the central hole during a first step of compression and thus contributes to form the hole into an elliptical or oval section form.

5. Device including a winding shaft for the production of a roll (1) according to any one of claims 1-4, **characterized by** means for spraying or covering at least five of the first turns of the elongated material during winding thereof with a binder; means for removing the roll of elongated material from the winding shaft after finished winding; and means for compressing the roll into an elliptical or oval section form immediately after winding, said means for compressing comprising two converging synchronically driven conveyor bands (3, 4) at one end of the winding shaft (2), which conveyor bands (3, 4) have a distance from each other corresponding to the diameter of the roll (1) closest to the end of the shaft (2) and converge in a direction from the end.

Patentansprüche

1. Rolle aus einem langgestreckten Material, beispielsweise Papier und insbesondere weichem Papier und anderem nicht gewebten Material, das auf einen Kern in der Mitte der Rolle gewickelt ist, wodurch der Kern integriert in dem darauf aufgerollten Material ausgebildet ist und aus einer Anzahl an Windungen daraus besteht, die in bezug zueinander befestigt sind, beispielsweise durch Kleben oder dergleichen, **dadurch gekennzeichnet, daß** die Rolle in einer zusammengedrückten elliptischen oder ovalen Form ist und, daß der Kern aus zumindest fünf Innenwindungen besteht und derart elastisch ist, daß dieser aus dem zusammengedrückten Zustand durch Druck gegen die kürzeren Seiten der Ellipse geöffnet werden kann.
2. Rolle nach Anspruch 1, **dadurch gekennzeichnet, daß** die Elastizität durch Fixieren mittels Wasser, eines Bindemittels der Art Polyvinylacetat, Polyethylenvinylacetat und Polyacrylat, Latex, Stärke, modifizierte Stärke, Zellulosederivate, Polyvinylalkohol in Wasser oder einem anderen wasserlöslichen Bindemittel erhalten wird.
3. Verfahren zur Herstellung einer Rolle nach einem der Ansprüche 1 und 2, **dadurch gekennzeichnet, daß** auf zumindest fünf der ersten Windungen des langgestreckten Materials während eines herkömmlichen Wickelns, ein Bindemittel gesprüht oder darauf aufgetragen wird, und daß unmittelbar nach der Fertigwicklung und Entfernung des Wicklungsschafts, die Rolle in eine elliptische oder ovale Querschnittsform zusammengedrückt wird.
4. Verfahren zur Herstellung einer Rolle nach einem

der Ansprüche 1 und 2, **dadurch gekennzeichnet, daß** auf zumindest fünf der ersten Windungen des langgestreckten Materials während eines herkömmlichen Wickelns, ein Bindemittel gesprüht oder darauf aufgetragen wird, und daß eine Hilfseinrichtung mit einem kleineren Durchmesser als der des Wicklungsschafts zuerst in das Mittelloch der Rolle nach einem Entfernen des Wicklungsschafts eingeführt wird und in dem Mittelloch während eines ersten Schritts eines Zusammendrückens bleibt und auf diese Weise beiträgt, das Loch in einer elliptischen oder ovalen Querschnittsform auszubilden.

5. Vorrichtung, umfassend einen Wicklungsschaft für die Herstellung einer Rolle (1) nach einem der Ansprüche 1 bis 4, **gekennzeichnet durch** eine Einrichtung zum Besprühen oder Auftragen zumindest von fünf der ersten Windungen des langgestreckten Materials während dessen Wickelns mit einem Bindemittel; eine Einrichtung zum Entfernen der Rolle aus langgestrecktem Material aus dem Wicklungsschaft nach der Fertigwicklung; und eine Einrichtung zum Zusammendrücken der Rolle in eine elliptische oder ovale Querschnittsform unmittelbar nach dem Wickeln, wobei die Einrichtung zum Zusammendrücken zwei konvergierende synchron angetriebene Förderbänder (3, 4) an einem Ende des Wicklungsschafts (2) umfaßt, wobei die Förderbänder (3, 4) einen Abstand voneinander aufweisen, der dem Durchmesser der Rolle (1) am nächsten an dem Ende des Schafts (2) entspricht, und in eine Richtung von dem Ende aus konvergieren.

Revendications

1. Rouleau de matériau allongé, par exemple du papier et en particulier du papier doux ou un autre matériau non tissé, qui est enroulé sur un support placé au centre du rouleau, dans lequel le support est formé d'un seul tenant avec le matériau enroulé sur lui et comprend un certain nombre de tours de ce matériau qui sont fixés les uns aux autres, par exemple par collage ou analogue, caractérisé en ce que le rouleau est comprimé sous une forme elliptique ou ovale et en ce que le support comprend au moins cinq tours intérieurs et est élastique de manière à pouvoir être ouvert depuis l'état comprimé, par une pression exercée sur les plus petits cotés de l'ellipse.
2. Rouleau selon la revendication 1, caractérisé en ce que l'élasticité est obtenue par fixation au moyen d'eau, d'un liant du type poly(acétate de vinyle), poly(éthylène/acétate de vinyle) et polyacrylate, de latex, d'amidon, d'amidon modifié, de dérivés de la cellulose, de poly(alcool de vinyle) dans de l'eau ou

d'un autre liant soluble dans l'eau.

3. Procédé de production d'un rouleau selon l'une ou l'autre des revendications 1 et 2, caractérisé en ce qu'un liant est projeté ou déposé sur au moins cinq des premiers tours du matériau allongé pendant un enroulement traditionnel et, immédiatement après la fin de l'enroulement et l'enlèvement de l'arbre d'enroulement, le rouleau est comprimé pour avoir une section de forme elliptique ou ovale.
4. Procédé de production d'un rouleau selon l'une ou l'autre des revendications 1 et 2, caractérisé en ce qu'un liant est projeté ou déposé sur au moins cinq des premiers tours du matériau allongé pendant un enroulement traditionnel et un moyen auxiliaire qui a un diamètre plus petit que celui de l'arbre d'enroulement est d'abord introduit dans le trou central du rouleau après enlèvement de l'arbre d'enroulement et reste dans le trou central pendant une première étape de compression en contribuant ainsi à donner au trou une section de forme ovale ou elliptique.
5. Machine comprenant un arbre d'enroulement servant à la production d'un rouleau (1) selon l'une quelconque des revendications 1 à 4, caractérisée par un moyen servant à projeter ou déposer un liant sur au moins cinq des premiers tours du matériau allongé pendant l'enroulement de ce dernier, un moyen pour retirer le rouleau de matériau allongé de l'arbre d'enroulement une fois l'enroulement terminé, et un moyen pour comprimer le rouleau afin de lui donner une section de forme ovale ou elliptique immédiatement après l'enroulement, ledit moyen de compression comprenant deux bandes de convoyeur (3, 4), entraînées de manière synchrone et qui convergent, situées en une extrémité de l'arbre d'enroulement (2), lesdites bandes de convoyeur (3, 4) étant séparées l'une de l'autre par une distance qui correspond au diamètre du rouleau (1) à proximité de l'extrémité de l'arbre (2) et convergeant dans une direction qui s'éloigne de cette extrémité.

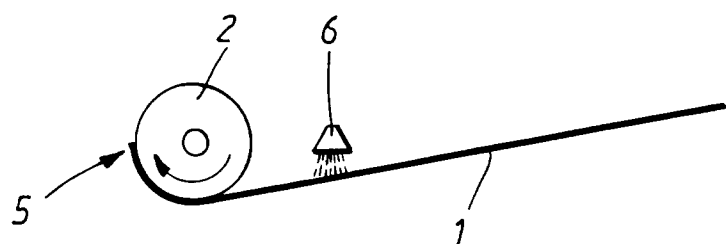


FIG. 1

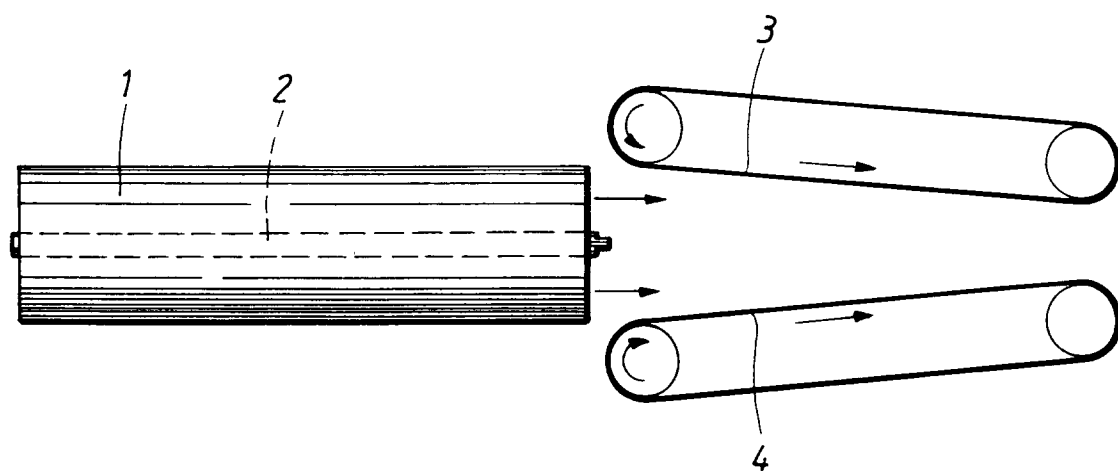


FIG. 2

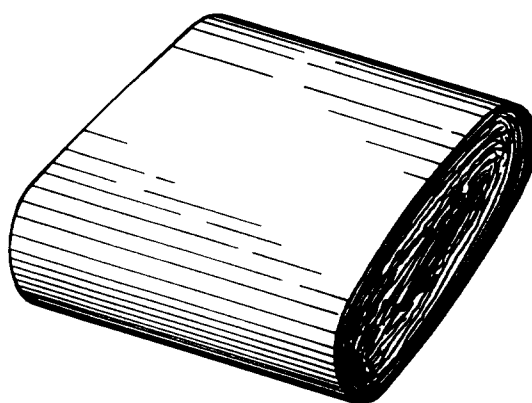


FIG. 3