

Description

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a method of cutting strips for a wound core of a transformer to which a cylindrical coil bobbin is applied.

The present invention also relates to an apparatus for carrying out the method.

2. Description of the Related Art

As the iron cores of transformers, wound cores in which a strip having excellent magnetic characteristics is wound in a ring shape are now used. For example, a wound core is obtained by winding a strip material on a winding spool to obtain a square, rectangular, stepwise, or circular cross-section (see: JP-examined patent publications 60-28375 and 61-22851, and JP-unexamined patent publication 55-132057). To form this wound core, two split cylindrical coil bobbins are pressure welded at pressure welding faces thereof, and windings are wound on the coil bobbins.

In the prior art, a material having straight line sides is cut along one or more predetermined curves to obtain one or more series of strips, as explained later in detail. In this case, however, unused portions remain between the series of strips, which is disadvantageous from the viewpoint of an efficient material utilization.

The Japanese unexamined patent publication (KOKAI) 56-80113 discloses prior art methods according to figures 2 to 4.

According to this publication, when cut band material is wound, the material is so cut as to form a curve capable of forming, for example, a circle in cross section, and the edge is retained as it is linearly. A margin is provided at the curve forming side, but is linear at one edge without necessity of margin.

In addition, the above-mentioned material is cut from a very wide silicon steel plate by using a plate slitter apparatus. In this case, however, since the plate-slitter apparatus is composed of a pair of shafts to which a large number of round blades are attached, the inner stress within the material in the width direction due to the cutting operation cannot be released, and as a result, a large distortion is generated in the cut portion of the plate. Also due to the configuration of the above-mentioned pair of shafts, it is impossible to carry out an ideal shear process, thereby causing a scratching of the cut material, and as a result, another large distortion is generated on the cut portions of the plate. Such a large distortion cannot be removed even by heat annealing after the cutting operation, and thus the magnetic characteristics are impaired.

Further, for economic reasons, usually the center portion of a directional silicon steel plate, which has relatively excellent magnetic characteristics, is used mainly for heavy electrical components and the like, and the side portions of the directional silicon steel plate are used for strips for wound cores. However, the surfaces of the side portions of the plate are uneven due to the manufacturing process thereof and in addition, defects such as cracks and holes are often generated therein. Such defects should be naturally removed when cutting the material for a wound cores from the plate, but may remain due to the high manufacturing yield. These defects reduce the magnetic characteristics and other physical characteristics.

Still further, a material coil for wound cores is heavy, and the thickness thereof is very thin, i.e., 0.02 to 0.03 cm, and the surface thereof is slightly uneven. Therefore, even when a protection process such as a paper wrapping process is carried out, the end faces of the material coil in the width direction are easily damaged during shipping or transfer and the like. Such damage in the width direction leads to a malfunction of the magnetic characteristics and other physical characteristics.

The above-mentioned defective portions are generated on one side or on both sides of a cut material, thus creating a large number of defective products. Particularly, when it is impossible to determine that a product is defective from the appearance thereof, so that such a product is not determined to be defective until a final stage test, the manufacturing costs is increased.

Note that, to completely remove the above-mentioned defective portions from a material for strips, it is possible to reduce the width of the strip material, but this increases the manufacturing cost of the material.

The German patent application DE - A - 2 719 075 discloses a method of cutting strip. According to this method a base band material is cut by a press working, and further, the cut material i.e strip, is used for a motor-blank and not used for the wound core by winding on a predetermined spool.

SUMMARY OF THE INVENTION

An object of the present invention is to provide a method of cutting strips for a wound core by which the manufacturing costs of the strip is reduced.

Another object of the present invention is to provide an apparatus for carrying out the above-mentioned method.

According to the present invention, there is provided a method of cutting strips for use in a wound core (1) to which a cylindrical coil bobbin (2) for winding is applied, each of said strips being wound on a predetermined spool to form a predetermined cross section, comprising the steps of:

preparing a material having parallel straight sides; and

performing a cutting operation by using slitter blades (14a, 14b) upon said material along a plurality of predetermined curves to thereby continuously obtain a plurality of series of strips (a, b, c, ...); each one of said plurality of series of strips being in direct continuous contact with another adjacent one of said plurality of series of strips whereby a non-straight part of at least one of said predetermined curves separates adjacent series of strips for use in the wound core; each one of said series of strips comprises a series of maximum and minimum material widths positioned at predetermined intervals along the length of said series of strips; and each maximum width position and each minimum width position of one of said series of strips substantially corresponds to each minimum width position and each maximum width position of an adjacent one of said series of strips, respectively.

Also, there is provided a cutting apparatus which comprises slitter blades for cutting the material along the predetermined curves; a base for supporting the slitter blades; a pivot shaft, positioned immediately below the slitter blades, for supporting the base in parallel with the material; guide rollers for sandwiching the material; an adjusting mechanism for adjusting the base; and a temporary winding frame for winding a series of strips.

Accordingly, little material remains between the two series of strips, and thus the utilization efficiency is raised.

Also, defective portions positioned on one side or both sides of the material are removed from the cut strips.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention will be more clearly understood from the description given with reference to the accompanying drawings, wherein:

Fig. 1 is a cross-sectional view showing an example of a wound core;

Figs. 2, 3, and 4 are plan views showing prior art methods of cutting strips for a wound core;

Figs. 5A and 5B are plan views of a material illustrating a first embodiment of the method of cutting strips for a wound core according to the present invention;

Fig. 6 is a diagram explaining Figs. 5A and 5B;

Figs. 7A and 7B are plan views of a material illustrating a second embodiment of the method of cutting strips for a wound core according to the present invention;

Fig. 8 is a plan view of a material illustrating a third embodiment of the method of cutting strips for a wound core according to the present invention;

Fig. 9 is a plan view of a material illustrating a

fourth embodiment of the method of cutting strips for a wound iron core according to the present invention;

Figs. 10A and 10B are plan views of a material illustrating a fifth embodiment of the method of cutting strips for a wound iron core according to the present invention;

Fig. 11 is a front view of a cutting (slitter) apparatus according to the present invention;

Fig. 12 is a traverse view of Fig. 11;

Fig. 13 is a plan view of Fig. 11; and

Figs. 14A and 14B are plan views of a material, for explaining the operation of the slitter apparatus of Fig. 11.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Before the description of the embodiments of the present invention, prior art methods of cutting strips for a wound core will be explained with reference to Figs. 1, 2, 3, and 4.

In Fig. 1, which is a cross sectional view of a wound core, a wound core 1 is obtained by winding a shaped strip having a predetermined width and excellent magnetic characteristics on a spool to form a circular cross section. To form this wound core 1, two split cylindrical coil bobbins 2, are pressure welded at pressure welding faces 3 thereof, and the windings (not shown) are wound on the coil bobbin 2 by rotating the coil bobbin 2 with respect to the wound core 1. Therefore, in this case, an air gap 4 between the wound core 1 and the coil bobbin 2 becomes small, and thus excellent magnetic characteristics are obtained. Note that the air-gap 4 is provided to avoid the scratching of the coil bobbin 2 and difficulties with the pressure welding.

In view of the material utilization efficiency and the ease of cutting, known cutting methods as illustrated in Figs. 2, 3, and 4 have been proposed.

In Fig. 2, a cutting operation is performed along a predetermined curve upon one side of a material having straight lines on both sides, and the other side thereof remains as it is. Also, as illustrated in Fig. 3 a material having straight lines on both sides is cut along two predetermined curves, and both sides thereof remain as they are. Further, as illustrated in Fig. 4 a material having straight lines on both sides is cut along two or more predetermined curves, and both sides thereof remain as they are (see already mentioned KOKAI No.56-80113). That is, in Fig. 2 a series of strips "a" for the wound core 1 are obtained; In Fig. 3, a series of strips "a" and a series of strips "b" for the wound core 1 are obtained; and in Fig. 4, a series of strips "a", a series of strips "b", a series of strips "c", and a series of strips "d" for the wound core 1 are obtained.

In Fig. 1, a large unused area of the material ex-

ists and, in Figs. 3 and 4, unused areas exist between the two adjacent series of strips, thus lowering the utilization efficiency. Also, in Figs. 2 and 3, if a shaded defective portion is present on one side of the material, the possibility of a generation of defective strips is high. Further, if shaded defective portions are present on both sides of the material, the possibility of a generation of defective strips is also high.

In Figs. 5A and 5B, which illustrate a first embodiment of the present invention, a series of strips "a" and a series of strips "b" are obtained (Fig. 5A), and further, a series of strips "a", a series of strips "b", a series of strips "c", and a series of strips "d" are obtained (Fig. 5B). Also, in Figs. 5A and 5B, defective portions exist only on one side of a material. In this case, as shown in Fig. 5A, the series of strips "a" is in a direct contact with the series of strips "b", and the maximum width position and the minimum width position of the strips "b" substantially correspond to the minimum width position and the maximum width position of the strips "a", respectively. Note that, since the winding center portion of one strip does not correspond to that of another strip if the maximum width position of the strip "b" corresponds to the minimum width position of the strip "a", the minimum width position of the strip "b" is slightly shifted to the left in Fig. 5A, with respect to the maximum width position. The material utilization efficiency is remarkably improved, as shown in Fig. 5A, in view of the number of defective portions compared with those of the prior art method shown in Fig. 3.

Note that a dot and solid line in Fig. 5A indicates a winding center line.

In Fig. 5B, a series of strips "c" and a series of strips "d" are in direct contact with the strips of Fig. 5A. The maximum width position and the minimum width position of the strip "c" substantially correspond to the maximum width position and the minimum width position of the strip "a", respectively, and the utilization efficiency is further improved compared with the prior art shown in Fig. 4.

Note that, if the four series of strips of Fig. 5B are expanded to become a general multi-series of strips as illustrated in Fig. 6, the maximum width MAX, e.g., 1 cm, and the minimum width MIN, e.g., 0.6 cm, of a series of strips substantially correspond to the minimum width MIN and the maximum width MAX of an adjacent series of strips.

In Figs. 7A and 7B, which illustrate a second embodiment of the present invention, three series, i.e., a series of strips "a", a series of strips "b" and a series of strips "c", are obtained (Fig. 7A) and seven series, i.e., a series of strips "a", a series of strips "b", a series of strips "c", a series of strips "d", a series of strips "e", a series of strips "f", and a series of strips "g" are obtained (Fig. 7B). In Figs. 7A and 7B defective portions exist on both sides of a material, and further, the series of strips "a" are provided at the center of the ma-

terial and the other series of strips are in direct contact with the immediately adjacent inner side series of strips. The correspondence of the positions of the adjacent series of strips in the same as that of the first embodiment of Figs 5A and 5B. The second embodiment is particularly suitable for an odd-number of series of strips. Also, in the second embodiment, in view of the shaded defective portions, the material utilization efficiency is remarkably improved compared with the prior art shown in Fig. 4. Also when the number of series of strips is increased, the utilization efficiency is further improved. In Fig. 8, which illustrates a third embodiment of the present invention, four series, i.e., a series of strips "a", a series of strips "b", a series of strips "c", and a series of strips "d", are obtained. Also, in Fig. 8, shaded defective portions exist on both sides of a material, the two series of strips "a" and "c" are provided at the center of the material, and the other series of strips "b" and "d" are in direct contact with the series of strips "c" and "a" respectively. The correspondence to the positional relationship of the adjacent series is a mirror image relationship with respect to the center of the material. Therefore, the third embodiment is particularly suitable for an even-number of series of strips. In the third embodiment, the material utilization efficiency from the viewpoint of appearance is not improved, compared with the prior art as shown in Fig. 4, but in view of the defective portions, the actual utilization efficiency is improved. Further, if the number of series of strips is increased, the material utilization efficiency is further improved.

In Fig. 9, which illustrates a fourth embodiment of the present invention, a similar configuration to the second embodiment is illustrated. Note, each of strips "a" to "e" is used for semicircular shaped wound cores. In this case, the same effect as in the above-mentioned embodiments can be obtained.

In Figs. 10A and 10B, which illustrates a fifth embodiment of the present invention, the series of strips of Fig. 3 is improved. That is, in Figs. 10A and 10B, the series of strips "a" is in direct contact with the series of strips "b". Also the maximum width position and the minimum width position of the strips "a" substantially correspond to the minimum width position and the maximum width position of the strips "b". In Fig. 10A, however, a straight line exists between the series of strips "a" and the series of strips "b", but in Fig. 10B, a curve exists between the series of strips "a" and the series of strips "b". That is, a straight line X of Fig. 10A is changed to a curve Y of Fig. 10B, and as a result, both sides of the two series of Fig. 10B are compressed compared with those of Fig. 10A. In other words, in Fig. 10B, the center position of the two series of strips "a" and "b" defined by three predetermined curves substantially conforms to the center position of the material. Therefore, the utilization efficiency as illustrated in Fig. 10B is improved, since the shaded defective portions on both sides of the

material can be removed.

Note that, in practice, the length of a strip is very long, for example, about 20 m, and the width thereof is very narrow, for example, about 1 to 3 cm. Therefore, in the above-mentioned plan views, the length is reduced by 1/200 compared with the width direction.

Also the present invention can be applied to a semicircular cross-sectional wound core and a step-wise cross sectional wound core, in addition to the circular cross-sectional wound core illustrated in Fig. 1.

In Figs. 11, 12, and 13, which illustrate a cutting apparatus according to the present invention for carrying out the above-mentioned cutting methods, a material 11 is supplied from a material coil 12 via a pair of guide rollers 13 (13') to an upper round blade 14a and a lower round blade 14b. Then, a cut strip 11' is supplied from the round blades 14a and 14b via a pair of guide rollers 15 (15') to a temporary winding frame 16. The round blade 14a and 14b are supported by a base 17 which is rotated by a pivot shaft 18. The pivot shaft 18 is supported by a bearing 19. The pivot shaft 18 is rotated by rotating a gear 20 through a driver 21. The bearing 19 and the driver 21 are both mounted on a moving base 22 which can move in a direction perpendicular to the flow of the material 11.

The moving base 22 is driven by a driver 23 (Fig. 12), as indicated by an arrow. Also, the entire apparatus including the moving base 22 can be driven by moving a base 24 along rails 25. Further, one of the pairs of guide rollers, e.g., 13' and 15', is pulled by springs 26.

In Fig. 13, a rack gear 21' is provided instead of the driver 21.

The apparatus of Fig. 11, 12, and 13 is controlled by a microcomputer (not shown).

In the apparatus of Figs. 11, 12, and 13, the pivot shaft 18 is positioned immediately below the round blades 14a and 14b, and this is one of the features of the present invention. For example, as illustrated in Fig. 14A, if the pivot shaft 18 is positioned upstream of the round blades 14a and 14b, the actual cut line indicated by a dot line A is shifted from a designated line indicated by a solid line. Contrary to this, as illustrated in Fig. 14B, if the pivot shaft 18 is positioned immediately below the round blades 14a and 14b, the actual cut line indicated by dot lines B and C is not shifted from a designated line indicated by a solid line. Note that, in Fig. 14B, the dot line B shows the case wherein the running speed of the material 11 is relatively low and the dot line C shows the case wherein the running speed of the material 11 is relatively high.

Also, the apparatus of Figs. 11, 12 and 13 can be expanded to form an apparatus which simultaneously performs a cutting operation upon the material 11 along a plurality of curves.

As explained above, according to the present invention, since the series of strips are in direct contact

with each other, the utilization efficiency can be enhanced. Also, if defective portions exist on one or both sides of the material, the rate of generation of defective products can be reduced, and thus the manufacturing cost can be reduced.

Claims

1. A method of cutting strips for use in a wound core (1) to which a cylindrical coil bobbin (2) for winding is applied, each of said strips being wound on a predetermined spool to form a predetermined cross section, comprising the steps of :
 - preparing a material having parallel straight sides; and
 - performing a cutting operation by using slitter blades (14a, 14b) upon said material along a plurality of predetermined curves to thereby continuously obtain a plurality of series of strips (a, b, c, ...); each one of said plurality of series of strips being in direct continuous contact with another adjacent one of said plurality of series of strips whereby a non straight part of at least one of said predetermined curves separates adjacent series of strips for use in the wound core; each one of said series of strips comprises a series of maximum and minimum material widths positioned at predetermined intervals along the length of said series of strips; and each maximum width position and each minimum width position of one of said series of strips substantially corresponds to each minimum width position and each maximum width position of an adjacent one of said series of strips, respectively.
2. A method as set forth in claim 1, wherein an additional series of strips is defined by an outer most of said predetermined curves and one of said straight sides of said material.
3. A method as set forth in claim 1 or 2, wherein said predetermined curves are symmetrical with respect to a center line of said material.
4. A method as set forth in any of claims 1-3, wherein a number of said series of strips is an odd-number.
5. A method as set forth in any of claims 1-3, wherein a number of said series of strips is an even number, a center one of said predetermined curves being a straight line.
6. A method as set forth in claim 1 wherein the number of predetermined curves is three, and wherein said three predetermined curves are selected so that a center position of two series of strips de-



material can be removed.

Note that, in practice, the length of a strip is very long, for example, about 20 m, and the width thereof is very narrow, for example, about 1 to 3 cm. Therefore, in the above-mentioned plan views, the length is reduced by 1/200 compared with the width direction.

Also the present invention can be applied to a semicircular cross-sectional wound core and a step-wise cross sectional wound core, in addition to the circular cross-sectional wound core illustrated in Fig. 1.

In Figs. 11, 12, and 13, which illustrate a cutting apparatus according to the present invention for carrying out the above-mentioned cutting methods, a material 11 is supplied from a material coil 12 via a pair of guide rollers 13 (13') to an upper round blade 14a and a lower round blade 14b. Then, a cut strip 11' is supplied from the round blades 14a and 14b via a pair of guide rollers 15 (15') to a temporary winding frame 16. The round blade 14a and 14b are supported by a base 17 which is rotated by a pivot shaft 18. The pivot shaft 18 is supported by a bearing 19. The pivot shaft 18 is rotated by rotating a gear 20 through a driver 21. The bearing 19 and the driver 21 are both mounted on a moving base 22 which can move in a direction perpendicular to the flow of the material 11.

The moving base 22 is driven by a driver 23 (Fig. 12), as indicated by an arrow. Also, the entire apparatus including the moving base 22 can be driven by moving a base 24 along rails 25. Further, one of the pairs of guide rollers, e.g., 13' and 15', is pulled by springs 26.

In Fig. 13, a rack gear 21' is provided instead of the driver 21.

The apparatus of Fig. 11, 12, and 13 is controlled by a microcomputer (not shown).

In the apparatus of Figs. 11, 12, and 13, the pivot shaft 18 is positioned immediately below the round blades 14a and 14b, and this is one of the features of the present invention. For example, as illustrated in Fig. 14A, if the pivot shaft 18 is positioned upstream of the round blades 14a and 14b, the actual cut line indicated by a dot line A is shifted from a designated line indicated by a solid line. Contrary to this, as illustrated in Fig. 14B, if the pivot shaft 18 is positioned immediately below the round blades 14a and 14b, the actual cut line indicated by dot lines B and C is not shifted from a designated line indicated by a solid line. Note that, in Fig. 14B, the dot line B shows the case wherein the running speed of the material 11 is relatively low and the dot line C shows the case wherein the running speed of the material 11 is relatively high.

Also, the apparatus of Figs. 11, 12 and 13 can be expanded to form an apparatus which simultaneously performs a cutting operation upon the material 11 along a plurality of curves.

As explained above, according to the present invention, since the series of strips are in direct contact

with each other, the utilization efficiency can be enhanced. Also, if defective portions exist on one or both sides of the material, the rate of generation of defective products can be reduced, and thus the manufacturing cost can be reduced.

Claims

1. A method of cutting strips for use in a wound core (1) to which a cylindrical coil bobbin (2) for winding is applied, each of said strips being wound on a predetermined spool to form a predetermined cross section, comprising the steps of:
preparing a material having parallel straight sides; and
performing a cutting operation by using slit blades (14a, 14b) upon said material along a plurality of predetermined curves to thereby continuously obtain a plurality of series of strips (a, b, c, ...); each one of said plurality of series of strips being in direct continuous contact with another adjacent one of said plurality of series of strips whereby a non straight part of at least one of said predetermined curves separates adjacent series of strips for use in the wound core; each one of said series of strips comprises a series of maximum and minimum material widths positioned at predetermined intervals along the length of said series of strips; and each maximum width position and each minimum width position of one of said series of strips substantially corresponds to each minimum width position and each maximum width position of an adjacent one of said series of strips, respectively.
2. A method as set forth in claim 1, wherein an additional series of strips is defined by an outer most of said predetermined curves and one of said straight sides of said material.
3. A method as set forth in claim 1 or 2, wherein said predetermined curves are symmetrical with respect to a center line of said material.
4. A method as set forth in any of claims 1-3, wherein a number of said series of strips is an odd-number.
5. A method as set forth in any of claims 1-3, wherein a number of said series of strips is an even number, a center one of said predetermined curves being a straight line.
6. A method as set forth in claim 1 wherein the number of predetermined curves is three, and wherein said three predetermined curves are selected so that a center position of two series of strips de-



finied by said three predetermined curves substantially conforms to a center position of said material.

7. An apparatus for carrying out the method as set forth in any of claims 1-6, comprising :
- slitter blades (14a, 14b) for cutting said material along said predetermined curves;
 - a base(17) for supporting said slitter blades;
 - a pivot shaft (18) positioned immediately below said slitter blades, for supporting said base in parallel with said material;
 - guide rollers(13, 13', 15, 15') for sandwiching said material;
 - an adjusting mechanism (21, 21') for adjusting said base; and
 - a temporary winding frame for winding a cut series of strips.

Patentansprüche

1. Verfahren zum Schneiden von Streifen für einen gewickelten Kern (1), bei dem ein zylindrischer Spulenträger (2) zum Wickeln Verwendung findet, wobei jeder Streifen auf eine vorgegebene Spule gewickelt wird, um einen vorgegebenen Querschnitt auszubilden, mit den Schritten:
Herstellen eines Materiales, das parallele gerade Seiten besitzt, und
Durchführen eines Schneidvorganges unter Einsatz von Rollenschneidmessern (14a, 14b) auf dem Material entlang einer Vielzahl von vorgegebenen Kurven, um auf diese Weise kontinuierlich eine Vielzahl von Reihen von Streifen (a, b, c...) zu erhalten, wobei jede der Vielzahl der Reihen von Streifen in direktem kontinuierlichen Kontakt mit einer anderen benachbarten Reihe aus der Vielzahl der Reihen von Streifen steht und wobei ein nicht gerader Teil von mindestens einer der vorgegebenen Kurven benachbarte Reihen von Streifen zur Verwendung im gewickelten Kern voneinander trennt, wobei ferner jede der Reihen der Streifen eine Reihe von maximalen und minimalen Materialbreiten umfaßt, die in vorgegebenen Intervallen über die Länge der Reihen von Streifen angeordnet sind, und wobei jede Maximalbreitenposition und jede Minimalbreitenposition von einer der Reihen der Streifen im wesentlichen jeder Minimalbreitenposition und jeder Maximalbreitenposition einer benachbarten Reihe aus der Reihe der Streifen entspricht.
2. Verfahren nach Anspruch 1, bei dem eine zusätzliche Reihe von Streifen von einer äußersten der vorgegebenen Kurven und einer der geraden

Seiten des Materiales begrenzt wird.

3. Verfahren nach Anspruch 1 oder 2, bei dem die vorgegebenen Kurven in bezug auf eine Mittellinie des Materiales symmetrisch sind.
4. Verfahren nach einem der Ansprüche 1 bis 3, bei dem die Zahl der Reihen der Streifen ungerade ist.
5. Verfahren nach einem der Ansprüche 1 bis 3, bei dem die Zahl der Reihen der Streifen gerade ist, wobei eine mittlere Kurve der vorgegebenen Kurven eine gerade Linie ist.
6. Verfahren nach Anspruch 1, bei dem die Zahl der vorgegebenen Kurven drei beträgt und bei dem die drei vorgegebenen Kurven so ausgewählt sind, daß eine mittlere Position von zwei Reihen von Streifen, die von den drei vorgegebenen Kurven begrenzt werden, im wesentlichen einer mittleren Position des Materiales entspricht.
7. Vorrichtung zur Durchführung des Verfahrens nach einem der Ansprüche 1 bis 6 mit
Rollenschneidmessern (14a, 14b) zum Schneiden des Materiales entlang den vorgegebenen Kurven;
einer Basis (17) zum Lagern der Rollenschneidmesser;
einer unmittelbar unter den Rollenschneidmessern angeordneten Drehachse (18) zum Lagern der Basis parallel zum Material;
Führungsrollen (13, 13', 15, 15') zum sandwichartigen Aufnehmen des Materiales;
einem Einstellmechanismus (21, 21') zum Einstellen der Basis; und
einem zeitweisen Wickelrahmen zum Wickeln einer abgeschnittenen Reihe von Streifen.

Revendications

1. Un procédé de découpe de bandes destiné à être utilisé dans un noyau enroulé (1) sur lequel est appliquée une bobine cylindrique (2) recevant un bobinage; chacune des dites bandes étant enroulée sur un mandrin prédéterminé afin de former une section transversale prédéterminée, le procédé comprenant les étapes suivantes:
 - préparation d'un matériel présentant des côtés droits parallèles et
 - réalisation d'une opération de découpe au moyen de couteaux à lames circulaires (14a, 14b) par leur passage sur ledit matériel le long de plusieurs courbes prédéterminées afin d'obtenir en permanence plu-



sieurs séries de bandes (a, b, c, ...); chacune des nombreuses séries de bandes étant en contact direct continu avec une des autres séries adjacentes de bandes, une partie non droite d'au moins une desdites courbes prédéterminées séparant les séries adjacentes de bandes destinées à être utilisées dans le tore enroulé, chacune desdites séries de bandes comprenant une série de largeurs maximum et minimum de matériel positionnées à des intervalles prédéterminés le long de la longueur desdites séries de bandes; et chaque position de largeur maximum ainsi que chaque position de largeur minimum d'une desdites séries de bandes correspondant substantiellement à chaque position de largeur minimum et à chaque position de largeur maximum d'une des séries adjacentes de bandes respecti-

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2. Un procédé selon la revendication 1, caractérisé en ce que une série supplémentaire de bandes est définie par une desdites courbes prédéterminées située le plus à l'extérieur et par un des côtés droits dudit matériel. 25
3. Un procédé selon l'une ou l'autre des revendications 1 et 2, caractérisé en ce que lesdites courbes prédéterminées sont disposées symétriquement par rapport à la ligne centrale dudit matériel. 30
4. Un procédé selon l'une ou l'autre des revendications 1 à 3, caractérisé en ce que le nombre desdites séries de bandes est un nombre impair. 35
5. Un procédé selon l'une ou l'autre des revendications 1 à 3, caractérisé en ce que le nombre desdites séries de bandes est un nombre pair, une ligne centrale desdites courbes prédéterminées étant une ligne droite. 40
6. Un procédé selon la revendication 1, caractérisé en ce que le nombre de courbes prédéterminées est de trois et en ce que les trois dites courbes prédéterminées sont sélectionnées de telle sorte que une position centrale de deux séries de bandes définies par les trois dites courbes prédéterminées est adaptée à une position centrale dudit matériel. 45
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7. Un appareil destiné à la mise en oeuvre du procédé conforme à l'une ou l'autre des revendications 1 à 6, ledit appareil comprenant : 55
 - des couteaux à lames circulaires (14a, 14b) destinés à découper ledit matériel le long desdites courbes prédéterminées;
 - une base (17) qui supporte lesdits cou-

teaux;

- un axe d'articulation (18) positionné immédiatement en-dessous desdits couteaux à lames et destiné à supporter ladite base parallèlement audit matériel;
- des rouleaux de guidage (13, 13', 15, 15') destinés à guider ledit matériel entre eux;
- un mécanisme d'ajustage (21, 21') destiné à ajuster ladite base; et
- un rouleau temporaire destiné à enrouler une série découpée de bandes.