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(54) Method of winding cables

Verfahren zum Wickeln von Kabeln

Procédé pour enrouler des cables

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- **PATENT ABSTRACTS OF JAPAN** vol. 017, no. 268 (M-1416), 25 May 1993 (1993-05-25) -& JP 05 004627 A (HEISEI POLYMER CO LTD), 14 January 1993 (1993-01-14)
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Description

BACKGROUND OF THE INVENTION

TECHNICAL FIELD

[0001] The invention relates to a method for winding cables, wires, cords or other materials of extended length, specifically to a method suitable for packing a spooled product into a plastic film (also called foil) in an automatic or semiautomatic process. In the description, "cables, wires, cords, or other materials of extended length" are commonly referred to as "cables". In the description, "winding" comprises both "spooling" (i.e., winding cables onto spools, reels, drums, or the like cores) and "coiling" (i.e., winding cables without cores) and "cable product" comprises both "spooled product" and "coiled product".

BACKGROUND ART

[0002] Cable is normally manufactured in great lengths during a continuous process. Most are delivered wound onto spools, drums or reels of various sizes. Fully automatic winding apparatus is developed by and described, e.g., in European Patent No 0754160B1 (owner Windak AB).

[0003] In such apparatus, empty reels are introduced to a winding position. After the full length has been reached and the reel has come to full stop, a hydraulic cutter cuts the cable and the reel is automatically covered with a thin, self-adhesive plastic wrap at the same location. Wrap film on the roll with variable width and thickness approximately 25 micrometers is used. Only then, the finished reel is removed from the winding position and the next empty reel can be moved to the winding position. The main disadvantage of such apparatus is that wrapping the reel can take almost as much time (e.g., 15 seconds) as winding the reel (e.g., 20 seconds for a reel with 100m of cable on it) and thus, the efficiency and the productivity of the device is low, particularly for smaller reels.

[0004] One way to improve the productivity is to use more than one winding head, i.e., winding the cable onto the drums is carried on in more than one separate location intermittently (in fact, the above patent describes an apparatus with two spooling heads). In such apparatus, while one reel is being wound, the full spool is automatically wrapped with plastic film to secure the cable end and to make the spool ready for delivery. The obvious disadvantage of dual spooling head apparatus over single head apparatus is increased complexity and cost.

[0005] On the other hand, other methods for packing are known. For example, in US 4,413,463 is described a pass through apparatus and process for wrapping a web of stretched material around a conveyor transported load. The pass through apparatus has a film supply assembly on opposite sides of the load, each of the assem-

blies comprising a film dispenser and a powered roller mechanism which takes film from the film dispenser and pre-stretches it in the powered roller mechanism prior to the application of the film around the load. Once the load passes a sensing station, it is stopped and the clamping jaws draw the tensioned film around the load and clamp together.

[0006] Further, in US 4,905,457 is described a machine for wrapping cylindrical articles in a thermally weldable web. The system automatically guides the free end of a new web downwardly by a deflector connected to the upper jaw member of a double-welding system in which pairs of electrodes are energized to form two seams.

[0007] Further, JP-A-05 004 627 discloses a method of packaging a finished cable product by moving the product through a band of film stretched between two rotatable shafts.

[0008] The object of the invention is therefore to provide a novel method for packing spooled or coiled product into a plastic film that can be used in the cable winding apparatus (including fully automatic and semi-automatic cable winding machines).

[0009] Advantages of the invention are that the end of the cable of the finished product is fastened quickly and the finished product can be quickly removed from the winding position, making room for the new product. Another advantage is that the packaging method provides a package that will not need further treatment. For example, trademarks and other information pertinent to the product may be preprinted on the film.

[0010] Additional advantage for a coiled product is that the package also functions as a dispenser. The film allows access to the inner end of the coil. This end and desired amount of cable can be pulled out of the package from the middle opening of the coil and film. The film and the remaining coil will remain intact until the last of the product is dispensed.

DISCLOSURE OF THE INVENTION

[0011] The invention achieves this object by providing a method as defined in claim 1.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012]

FIG. 1 A shows a cable winding apparatus for carrying out the method of the invention. FIG. 1B is an extended view D of hard to see elements in FIG. 1A.

FIGS. 2 to 7 show the steps of securing the end of the cable, cutting the cable and packing the finished product by surrounding the product with a stretched plastic film and welding the film, using a pair of sealing bars.

FIGS. 8A and 8B depict two examples of sealing bars that can be used to practice the invention.

MODES FOR CARRYING OUT THE INVENTION

[0013] The invention is now illustrated by reference to the enclosed drawings. Fig. 1A shows a cable winding apparatus 1, having a frame 2, a conveyor 3 for delivering empty reels 4 into a winding position 5. The winding position comprises several elements, such as a feeding arm for lifting the reel into the right position, an outer pintle for fixing the reel into its winding position, means for fastening the cable to the core of the reel (as described, e.g., EP 0754160), cable supplying and measuring means, and cable laying element 6 which is preferably integrated with a cable cutter 7 (see Figs. 2 and 3).

[0014] The apparatus further comprises a conveyor 8, a pair of rotatable shafts 9 and 10 adapted to receive and hold plastic film supply rolls 11 and 12, and the band of film 13, stretched between rotatable shafts 9 and 10. The apparatus also comprises sealing bars 14 and 15 (see Figs. 5 to 7), comprising heating elements 16 and 17 (see Figs. 8A and 8B) and a cutter (see 18 on Fig. 8A and 19 on Fig. 8B).

[0015] The apparatus is operated as follows. After the predetermined amount of cable 20 is wound on the reel (Fig. 2), the finished reel 21 is moved away from the winding position with conveyor 8 towards the band of film 13, stretched between the shafts 9 and 10. The finished reel is pushed against the band of film so that the cable is secured (Fig. 3). Then the cable is cut with the cutter 7 (for example, hydraulic cutter may be used), leaving a cable tail 22 with a predetermined length.

[0016] Now, an empty reel 4 can be moved into winding position 5 and the winding process can start again. At the same time, the finished reel 21 is moved further against the band of film 13 (Fig. 4), passing the shafts 9 and 10 (Fig. 5). Now, the band covers the reel in the extent of 1/8 to 1/2 of the full circle. Now, sealing bars 14 and 15 are activated and moved towards each other to push the band of film 13 so that the band of film 13 fully surrounds the reel 21 (Fig. 5 and 6). Then, the heating elements 16 or 17 (see Figs. 8A or 8B, respectively) are activated within the sealing bars 14 and 15 to weld the band of film with two substantially parallel welds. Then, the band of film is cut between the two welds, using a cutter (see 18 in Fig. 8A or 19 in Fig. 8B).

[0017] Note that if the sealing bars as shown in Fig. 8A are used, both welding and cutting are performed simultaneously.

[0018] Alternatively, instead of first moving the finished reel out of the winding position, the film bend is moved towards the finished reel so the reel and the film bend come into contact prior to reel moving. The reel is then moved forward against the band of film, passing the shafts 9 and 10 as described above.

[0019] Using the tension of the film on the reel allows the reel to transfer without loss of integrity and creates

this unique package. The film now enclosed in the band of film can additionally be transferred through a shrink tunnel (oven) for the purpose of shrinking the film and creating an even tighter package.

[0020] Apparatus according to the invention can be used for winding cables with diameters up to 20mm and more. The reel diameter can be up to 1200mm. The film could be a shrink poly or shrink polyethylene with suitable thickness (in one embodiment, the thickness is typically between 1 and 2mm).

[0021] It is apparent, that when coiled products are desired, no reels are fed into the winding position. A modified winding head is used to coil the cable. The finished coiled product is then handled as described above. For the coiled product, the package also functions as a dispenser. The film allows access to the inner end of the coil. This end and desired amount of cable can be pulled out of the package from the middle opening of the coil and film. The film and the remaining coil will remain intact until the last of the product is dispensed.

[0022] It is apparent, that although in this embodiment, the cable is fed horizontally and the reel is rotated around a vertical axle, the cable can also be fed vertically and the reel rotated around a horizontal axle. The latter is commonly used in dual head winding devices.

[0023] The exemplary embodiments presented herein illustrate the principles of the invention and are not intended to be exhaustive or to limit the invention to the form disclosed; it is intended that the scope of the invention be defined by the claims appended hereto.

Claims

1. Method of securing an end of a finished cable product and for packaging the same, in a cable winding apparatus (1), the method comprising:

moving a band of film (13), stretched between two plastic film supply rolls (11, 12) on respective rotatable shafts (9, 10), and the finished cable product (21) relatively towards each other, so that the band of film (13) comes into contact with the finished cable product (21) and holds the cable (20) in place;
cutting the cable (20), leaving a cable tail (22) with a predetermined length;
further relatively moving the band of film (13) and the finished cable product (21) so that the finished cable product (21) further advances at least partially into between the rotatable shafts (9, 10) until the band of film (13) covers the finished cable product (21) in a predetermined extent;
surrounding the finished cable product (21) with the band of film (13) by moving two oppositely located sealing bars (14, 15) relatively towards each other and pushing the band of film (13)

until the ends of the band of film (13) meet;
connecting the two ends with two welds; and
cutting the film (13) between the two welds.

2. As in claim 1, wherein the predetermined extent is approximately 1/8 to approximately 1/2 of the full circle. 5
3. As in claim 1, wherein both the sealing bars (14, 15) move towards each other. 10
4. As in claim 1, wherein one of the sealing bars (14, 15) is moving while another stays in place.
5. As in claim 1 to 4, wherein moving the rotatable shafts (9, 10) with the stretched band of film (13) towards the finished cable product (21) while keeping the finished cable product (21) in place. 15
6. As in claim 1 to 4, wherein keeping the rotatable shafts (9, 10) with the stretched band of film (13) in place while moving the finished cable product (21) towards the rolls (11, 12). 20
7. As in claim 1 to 4, wherein moving both the finished cable product (21) and the rotatable shafts (9, 10) towards each other. 25
8. As in claim 1 to 7, wherein the cable (20) is cut so that the length of the cable tail (22) is less than 1/2 of the diameter of the top layer of the finished cable product (21). 30
9. As in claim 1 to 8, wherein the direction of winding the cable (20) on the finished cable product (21) is selected so that the cable (20) winds tighter when pushed against the stretched film (13) while the finished cable product (21) is still rotating before coming to full stop. 35
10. As in claim 1, wherein the finished cable product (21) is a spooled cable product. 40

Patentansprüche 45

1. Eine Methode zur Befestigung des fertigen Kabelendes und zum gleichzeitigen Verpacken des Kabels in der Kabelspulmaschine (1), diese die Methode umfasst folgendes: 50

das Bewegen des zwischen zwei Plastikfilm Spulen (11, 12) auf entsprechende drehende Wellen (9, 10) bespannten Films (13) und des fertigen Kabels (21) aufeinander zu, so dass der Film (13) das fertige Kabel (21) berührt und das Kabel (20) an seiner Stelle festhält; 55

das Schneiden des Kabels (20), indem das Ka-

belende (22) eine vordefinierte Länge hat;
das Bewegen des Films (13) und des fertigen Kabels (21), so dass das fertige Kabel (21) sich mindestens teilweise zwischen zwei drehenden Wellen (9, 10) bewegt bis der Film eine definierte Länge des Kabels (21) abdeckt;
das Abdecken des fertigen Kabels (21) mit dem Film (13), indem sich zwei entgegengesetzte Schweißarme (14, 15) aufeinander zu bewegen und den Film (13) so weit schieben, dass seine Enden sich treffen;
das Verbinden von zwei Enden durch zwei Schweißnähte; und
das Schneiden des Films (13) zwischen zwei Schweißnähten.

2. Wie im Patentanspruch 1, in dem die vordefinierte Länge etwa 1/8 bis etwa 1/2 des ganzen Kreises beträgt.
3. Wie im Patentanspruch 1, in dem sich beide Schweißarme (14, 15) aufeinander zu bewegen.
4. Wie im Patentanspruch 1, in dem sich ein Schweißarm (14, 15) bewegt, wenn der andere Arm steht.
5. Wie im Patentanspruch 1 bis 4, in dem sich die drehenden Wellen (9, 10) in der Spule des bespannten Films (13) in die Richtung des fertigen Kabels (21) bewegen, indem sie das fertige Kabel (21) festhalten.
6. Wie im Patentanspruch 1 bis 4, in dem die drehenden Wellen (9, 10) in der Spule des bespannten Films (13) stehen, das fertige Kabel (21) bewegt sich in die Richtung der Spule (ei, 12).
7. Wie im Patentanspruch 1 bis 4, in dem sich sowohl das fertige Kabel (21) als auch die drehenden Wellen (9, 10) aufeinander zu bewegen.
8. Wie im Patentanspruch 1 bis 7, in dem das Kabel (20) so geschnitten wird, dass die Länge des Kabelendes (22) kleiner als 1/2 des Durchmessers der oberen Schicht des fertigen Kabels (21) ist.
9. Wie im Patentanspruch 1 bis 8, in dem die Spulrichtung des Kabel (20) für das Fertigprodukt (21) so gewählt ist, dass das Kabel (20) enger an den gespannten Film (13) gespult wird, wenn das fertige Kabel (21) sich vor dem endgültigen Stopp noch dreht.
10. Wie im Patentanspruch 1, in dem das fertige Kabel (21) gespult ist.

Revendications

1. Méthode pour fixer le bout du produit de câble et l'emballer dans la machine de rangement de câble (1), cette méthode comprenant:

bouger la bande de film (13) qui s'étend entre deux film de plastique fournir rouleaux (11, 12) au respectif axes pivotants (9, 10) et le produit final de câble (21) envers l'un et l'autre d'une telle manière que la bande de film (13) touche le produit final de câble (21) et tient le câble (20) immobile;

couper le câble (20), en laissant le bout du câble (22) d'une longueur prédéterminé;

ensuite bouger la bande de film (13) et le produit final de câble (21) envers l'un et l'autre pour que le produit final de câble (21) avance au moins partiellement entre les axes pivotants (9, 10) jusqu'à ce que la bande de film (13) couvre le produit final de câble (21) dont l'étendu de surface est prédéterminé;

emballer le produit final de câble (21) avec la bande de film (13), en bougeant les deux bras de scellement (14, 15) envers l'un et l'autre et poussant bande de film (13) jusqu'à ce que les bouts de la bande de film (13) se retrouvent;

connecter les deux bouts la bande de film (13); et

couper la film (13) entre les deux soudages.

2. Selon la revendication 1, étant donné que le longueur prédéterminée est à peu près 1/8 jusqu'à peu près 1/2 du cercle entier.

3. Selon la revendication 1, étant donné que les deux bras de scellement (14, 15) bougent envers l'un et l'autre.

4. Selon la revendication 1, étant donné qu'un bras de scellement (14, 15) reste immobile quand l'autre se bouge vers lui.

5. Selon les revendications 1 jusqu'à 4, étant donné que les axes pivotants (9, 10) avec la bande de film (13) qui s'étend bougent vers le produit final de câble (21) en tenant le produit final de câble (21) immobile.

6. Selon les revendications 1 jusqu'à 4, étant donné que l'on tient les axes pivotants (9, 10) avec la bande de film (13) qui s'étend immobiles en bougeant le produit final de câble (21) vers les rouleaux (11, 12).

7. Selon les revendications 1 jusqu'à 4, étant donné que l'on bouge le produit final de câble (21) et les axes pivotants (9, 10) envers l'un et l'autre.

8. Selon les revendications 1 jusqu'à 7, étant donné que la câble est coupé de telle manière que le lon-

gueur du bout de câble (22) est moins que 1/2 du diamètre de la film supérieure du produit final de câble (21).

9. Selon les revendications 1 jusqu'à 8, étant donné que la direction de rangement du câble (20) sur le produit final de câble (21) est choisi de telle manière que la câble (20) se réplie plus fermement quant il est poussé vers la bande de film (13) qui s'étend, en même temps que le produit final de câble (21) est toujours pivotant avant de s'arrêter finalement.

10. Selon la revendication 1, le produit final de câble (21) étant une bobine de câble.

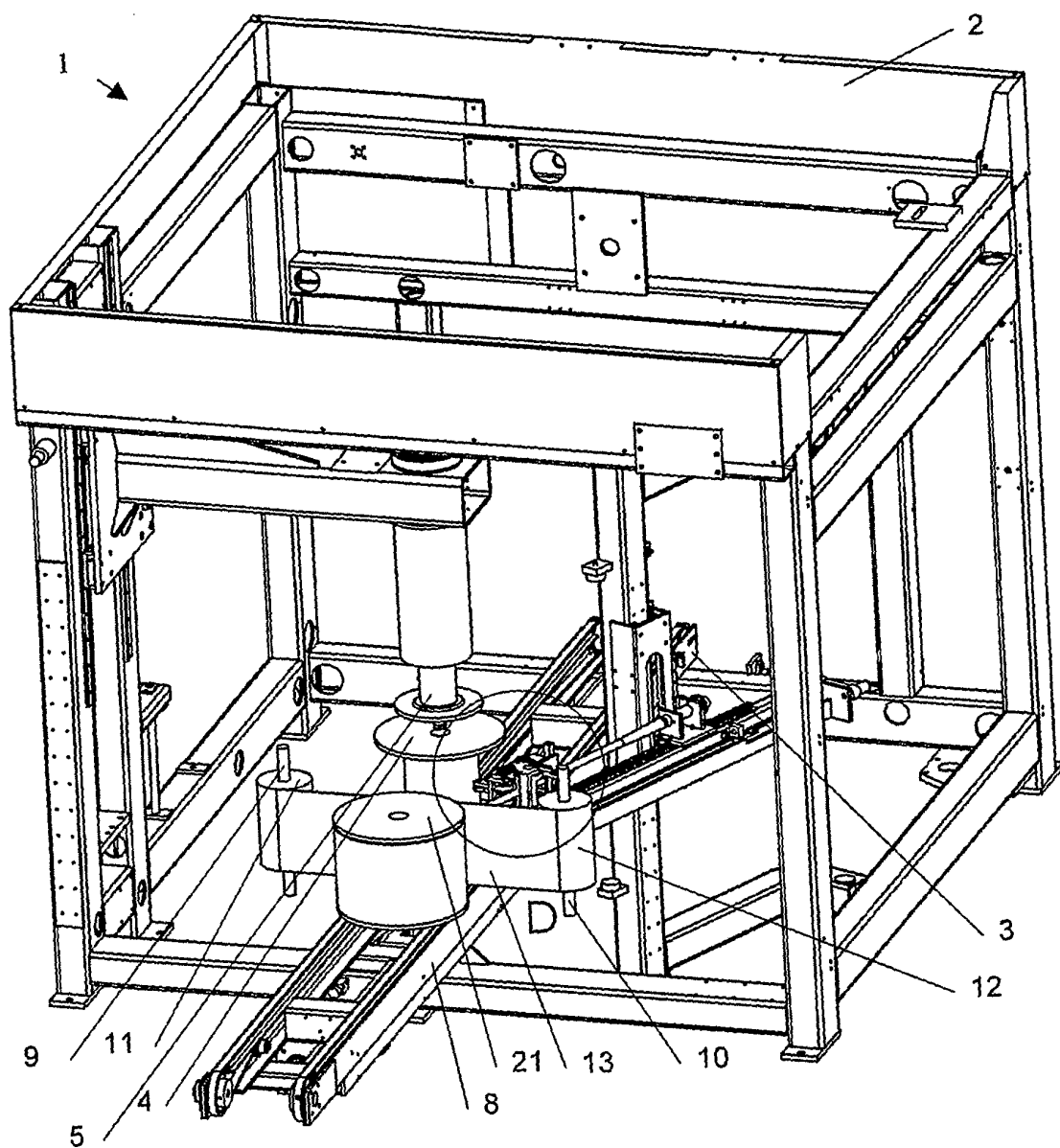


FIG. 1A

D

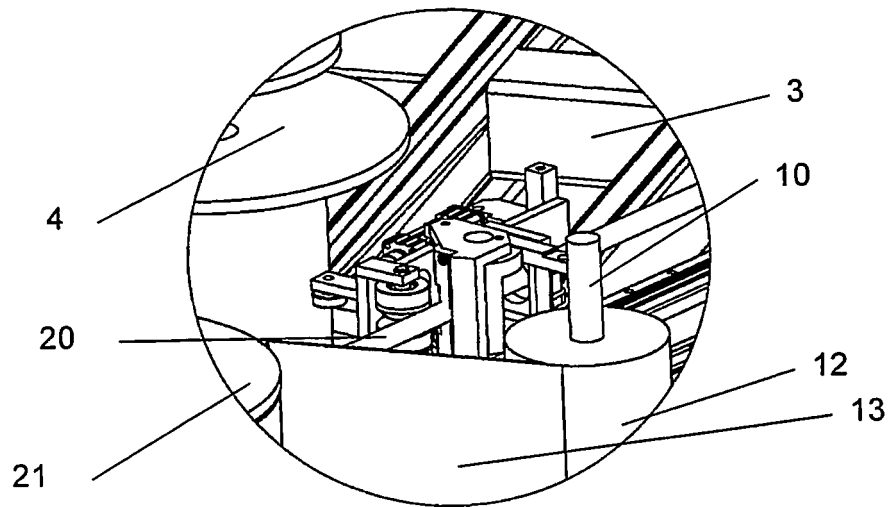


FIG. 1B

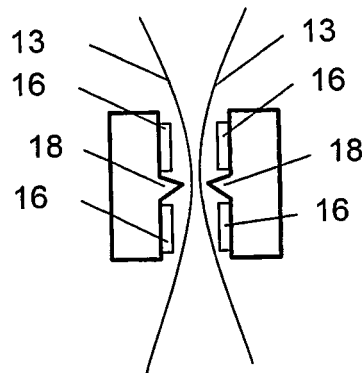


FIG. 8A

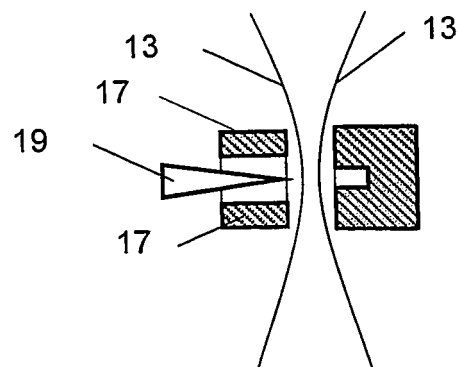


FIG. 8B

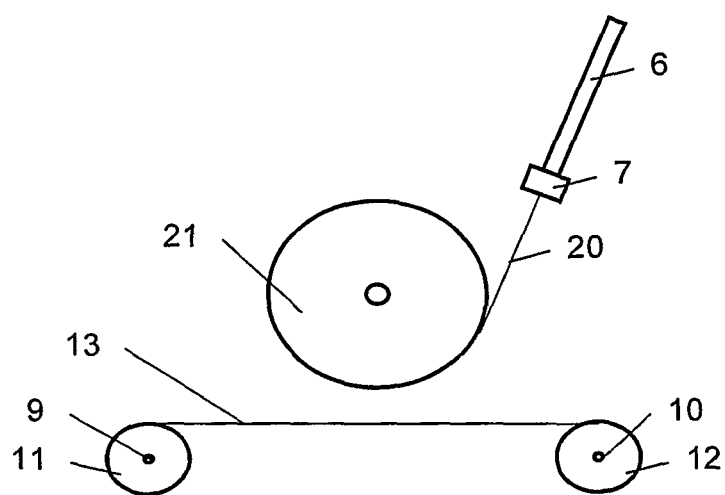


FIG. 2

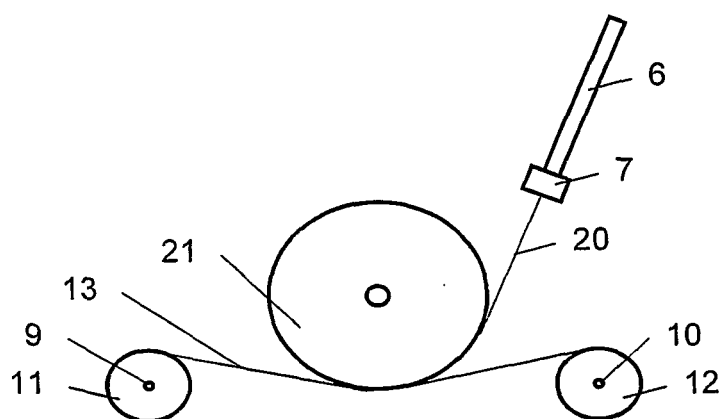


FIG. 3

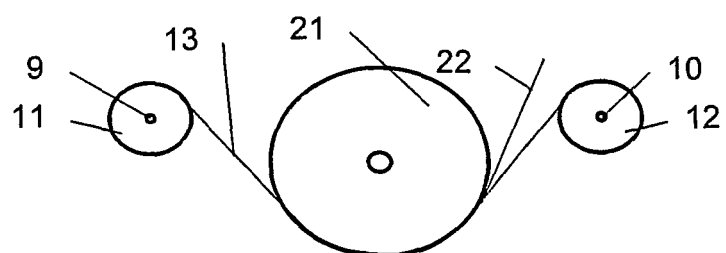


FIG. 4

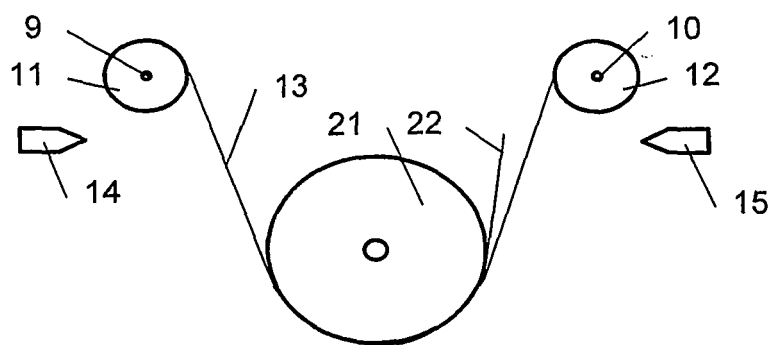


FIG. 5

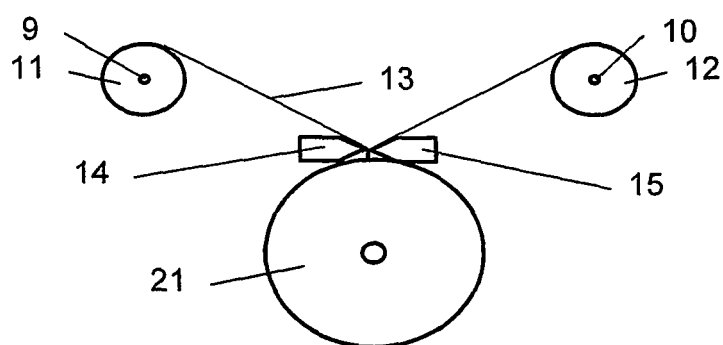


FIG. 6

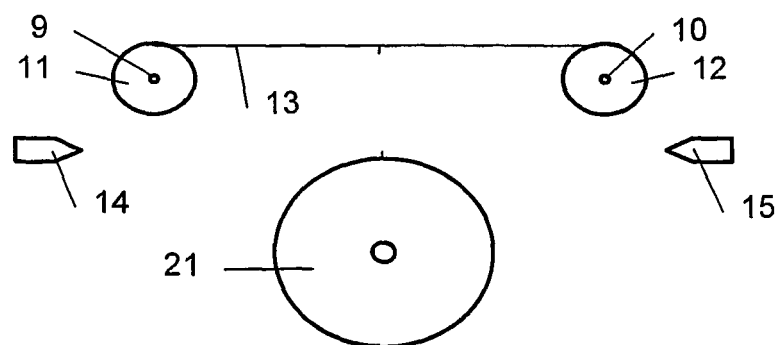


FIG. 7

REFERENCES CITED IN THE DESCRIPTION

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