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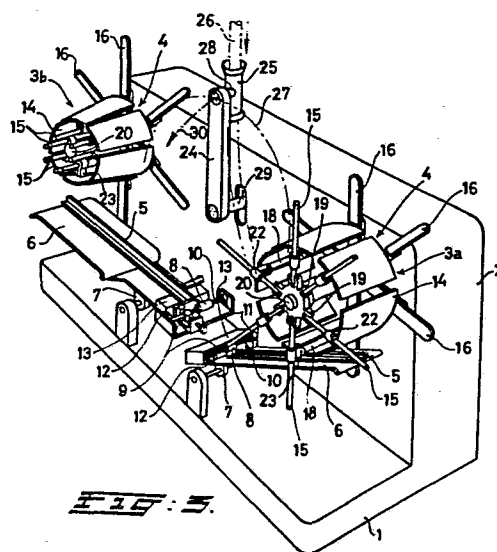
54 **Apparatus for coiling flexible stretched materials, particularly tubes or cables.**

57 An apparatus for coiling flexible elongated materials such as tubes or cables, a composite coiling device is provided, one component (6; 14; 25) of which controls the deposit of the material in radial direction of the reel (4), an other component (5; 15; 25) fulfilling the same function in axial direction of the reel.

In one embodiment of the idea of the invention there is a guiding ledge (5), a side face of which keeps the axial control, the main body of the ledge providing the necessary radial force, particularly in that it is backed by a swinging plate which is under spring tension in radial direction. The ledges move over the entire width of the plate, equal to the reel width, and the friction between the two is adjustable.

In an other embodiment the composite guiding device comprises one component in form of a radial expandability of parts (14) of the reel core, the other component being a set of pivoting arms (15) movable between a retracted position and one in which they are radial and confine the coil.

In a third embodiment the composite guiding device is a guiding eye (25) mounted with three degrees of freedom.



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Apparatus for coiling flexible stretched materials,
particularly tubes or cables.

The invention relates to an apparatus for coiling to
packages flexible elongated materials, particularly tubes
or cables, more particularly plastics corrugated tubes,
consisting of a frame comprising one or more driveable
5 reels and a guiding device for the material to be coiled
upon a reel.

In order to coil flexible elongated materials, such as tubes,
(more particularly plastics corrugated tubes), said material
is usually coiled, with a certain pre-tension, upon the
10 core of a reel, the material being guided in axial direction
by means of a reciprocating movable guide eye so that the
windings upon the reel may adjoin each other as close as
possible. In some cases even a pressure plate is used for
coiling the material upon a reel in order to retain the
15 windings upon the core of said reel as tightly as possible.

The prior art apparatus is, however, less suitable for coiling
plastics corrugated tubes, although it could be used formerly
with a low speed extruder for manufacturing said plastics

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corrugated tubes.

As the speed of extruders has considerably increased, said known apparatus can no longer be used, especially not so in case the materials which have been coiled to packages,
5 have to be removed from the reels.

Problems occurring when coiling a corrugated tube (more particularly a plastics corrugated tube) particularly occur because the material of said corrugated pipe is unable to slide along the material of the corrugated tube part having
10 already been coiled upon the reel. This applies both as regards adjoining the windings near each other and as regards super-imposing a layer of windings upon a layer previously applied upon the reel. Actually a corrugation in the tube may cause adjacent portions of said tube to get hooked into
15 each other.

In order to obtain a tube package which can be handled mechanically, a tight winding is essential and the package has to be rather stable.

From this it follows that the corrugated tube has to be
20 disposed upon the reel in an accurate manner so that a subsequent sliding of the respective plastics material owing to the corrugations is impossible.

The invention aims to provide coiling apparatus which provides at any moment a sufficient support of the tubes to

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be coiled in order to accurately guide and dispose the windings upon the reel.

- This is attained according to the invention with a machine of the kind described in the first paragraph above, which
- 5 is characterized in that a composite guiding device is provided, one component of which is adapted to dispose or to release the material in a radial direction of the reel, a second component being adapted to enclose or to release said material in an axial direction of the reel.
- 10 The advantage of the above is that not only the separate windings will be disposed accurately one beside the other upon the reel, but that the layers of windings are also tightly superimposed, such that a package of stable form is obtained which can be easily and quickly removed from
- 15 a reel core after the windings have been tightened upon each other by means of wrapping material.

In a practical embodiment of the apparatus according to the invention, the composite guiding device consists of a pressure member extending tangentially with respect to

20 the reel core and being movable towards said reel core thereby exerting a certain pressure, whilst the material to be coiled upon said core can be moved away from said core.

The latter enables the windings of a corrugated tube, to

25 be coiled upon a reel, to be disposed accurately beside

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each other, by means of the pressure member, said pressure member being automatically urged sidewardly by the coiled material by the end of a coiled layer in order to dispose a subsequent layer while being guided by the pressure member in a returning movement. From the latter it follows that an additional drive of the guiding member is not required.

In a further practical embodiment of the apparatus according to the invention, one component of the composite guiding device for radially disposing or releasing material coiled upon the reel, comprises movably supported parts of the reel core, the other component, for enclosing the material in axial direction of the reels and releasing the same, consisting of pivotably supported swinging arms which move away from each other into a radial position or move towards each other into a retracted position in which said swinging arms making an acute angle with the shaft of the reel or are parallel thereto, and the arms in their radial position forming a side face of the reel.

Due to the above, the material in the form of a corrugated tube (more particularly a plastics corrugated tube) can be coiled tightly upon the reel, although a quick release of the formed package of the material can be effected.

In order that the apparatus according to the invention can be handled quickly coiled, the apparatus is carried out such, that the composite guiding device is a device mounted upon a swinging arm and surrounding the material

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to be coiled, said device being reciprocating with respect to the reel core and allowing, in a position away from said reel core, a displacement in axial direction of the material near the reel. Said embodiment is particularly
5 suitable when the swinging arm has been mounted centrally, between two spaced reels and the device surrounding the material can be swung from a central position, both towards one or towards the other reel core.

During the coiling of the material upon the one reel, the
10 material upon the other reel can then be tightened to each other by wrapping it by means of, for example, separate bands or cards, and be removed from the reel core without any interruption in the production, which operation provides the advantage that there will not occur any dis-
15 turbances or interruptions at the high productive speeds.

The invention will be illustrated with reference to the accompanying drawing, wherein:

- fig. 1 is a front view of apparatus according to the invention for coiling to packages of flexible stretched
20 materials;
- fig. 2 is a diagrammatical side elevation of the apparatus of fig. 1; and
- fig. 3 is a perspective view of the apparatus.

The apparatus as shown in the drawing, consists of a base
25 1, with a box-shaped frame 2, in which driving devices for two reels 3a and 3b have been mounted. The reels 3a

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and 3b operate alternatively, that is to say, when material is being coiled upon one reel, the other reel, supporting a package of material having been coiled upon it, is stationary in order to allow the coiled up package to be wrapped by a band or card in order to retain the windings close and tightly to each other when said package as a whole is removed from the reel. Thereupon said reel is ready to be put into operation again after the package on the other reel has been completed. In order to coil corrugated tubes, more particularly plastics corrugated tubes, to a package, a guiding device has been provided for coiling material upon one of reels 3a, 3b, respectively which guiding device is, according to the invention, a composite guiding device. One component of it is adapted to dispose material in radial direction of the reel, or to release said material, the other component being adapted to enclose said material in axial direction of the reel or to release the material.

The composite guiding device may comprise a pressure member 5 extending tangentially with the reel core 4, being urged with a certain pressure towards said reel core and being movable away from it by material to be coiled upon the core. Said guiding device may, more particularly, be a ledge 5 extending tangentially with respect to the reel core 4. It is movable in axial direction with respect to said core under the influence of a force exerted by the material to be coiled. Such force is exerted upon a side face of ledge 5 being positioned transversely to the

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core axis. As ledge 5, in the position represented in fig. 3 for reel 3a, directly adjoins the reel core 4 or bears with a component upon windings already coiled upon the reel, arriving material to be disposed upon said

5 reel will exert a lateral force upon ledge 5. Under the influence of this force ledge 5 can be moved so that the windings will be disposed tightly upon the reel one beside the other. When a coiled layer is finished arriving material will "jump" across ledge 5, thus causing the latter to

10 temporarily deviate, after which the windings will be disposed upon the reel in a reversed axial sense; the material will then exert a force against the other side of ledge 5.

Ledge 5 is confined between reel core 4, or material having

15 been coiled hereupon, and a plate 6 extending tangentially with the coiling core and having a width equal to the entire width of the reel core 4. Plate 6 is pivotably supported at 7, so that it may swing away from core 4 under the influence of the coiled material. Ledge 5 is slideable

20 laterally along said plate 6, the sliding resistance being adjustable. For that purpose ledge 5 has been slidably mounted upon the axle 10 by means of a bush 8 and an adjustable clamp 9. One end of axle 10 comprises a fixed abutment 11, the other end comprising an adjustable abut-

25 ment 12. Thus, the path of ledge 5 with respect to the length of core 4 of a reel can be accurately adjusted in relation to the position of the last winding at either end of the core. As soon as ledge 5 abuts one of the abutments

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11 or 12, the material to be coiled passes across the ledge 5 and exerts a force at the other side of it as soon as the formation of the subsequent layer is started. The apparatus according to the invention thus operates
5 entirely automatically, plate 6 tightly retaining previously applied windings upon the reel core or upon a previously laid layer of windings.

The pressure of plate 6 and therefore also of ledge 5, is obtained in that a counter weight 13 is provided on
10 plate 6 at the other side of the pivotal support 7. In view of said pivotal support, plate 6 and ledge 5 may also be entirely detached from the reel, for example, by urging said reel downwardly by means of a foot pedal, when a coiled package has to be removed from said reel. Figures
15 1 and 2 show the lowest position of plate 6 with ledge 5. A ledge 5 and a plate 6 together form a composite guiding device for each of the reels 3a and 3b. The sliding resistance of ledge 5 along axle 10 is adjustable by means of the adjustable clamp 9, in order to adapt said sliding
20 resistance to the resiliency of the material or to the thickness of the material to be coiled.

The idea of the invention is also embodied in the reels 3a and 3b to be applied in the novel apparatus according to the invention.

25 This is effected in that the component of the composite guiding device for radially disposing or releasing material

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coiled upon the reel consists of movably supported parts 14 of the reel core 4 and in that the component for enclosing material in axial direction of the reel consists of pivotably supported swinging arms 15. These arms move 5 towards each other in a coiling position (see fig. 3 for reel 3b), or away from each other into a radial position (see fig. 3 for reel 3a). The arms 15, in the former position, make an acute angle with the axis of the reel or extend parallel thereto, and in their extended or 10 radial position constitute a side face of the reel.

Reels 3a and 3b also comprise stationary arms 16 which constitute a stationary side face of the respective reel.

The apparatus according to the invention comprises as side faces or flanges the arms 15 and 16, and no closed 15 discs or wheels, as the former do allow wrapping of portions of a package coiled upon the reel.

The portions 14 of the reel core are pivotably supported at 17 (fig. 2) near a stationary side face of the reel, said parts being pivotably connected to a rod system 18 for 20 radially retracting the swingable arms.

Each part 14 has a curved outer face, all these outer faces together describing a cylinder when said parts occupy their most outward position (see fig. 3 for reel 3a). The swinging arms 15 pivotably supported at 19, are pivotably connected 25 to a part 21, sliding about a central supporting shaft 20

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of the reel(s), while each swinging arm 15 is at some distance from its pivot 19 slideably passed through a pivotably disposed guiding member 22. Said guiding member 22 for the swinging arms 15 has a pivot 23 at the
5 swingeable end of a part 14.

When a package coiled upon a reel 3a or 3b has to be removed from a reel, after parts of said package have been wrapped by a separate band or cord for retaining the windings, part 21 is, from the position shown in fig. 3
10 for reel 3a, slid along shaft 20, to a position denoted with a dotted line in fig. 2. The sliding operation may occur in various ways, e.g. manually or by means of a sliding bar disposed and driven within shaft 20, part of said bar passing through a slot of shaft 20 and cooperating
15 with part 21. The latter need not to be elucidated as the manner of displacement of part 21 does not form part of the scope of the present invention. On displacing part 21 from its, most outward position to a most inward position, the swinging arms 15 will swing outwardly and will come
20 to lie within the core 4, as shown in fig. 3 for reel 3b. At the event of said displacement of the swinging arms 15, the core parts 14 are compressed, providing said core 4 with an almost conical circumferential face, so that the package may be easily removed from said core. A compression
25 of core portions 14 may occur under the influence of the package, but particularly due to the cooperation of swinging arms 15 with members 22 and pivots 19. When part 21 is moved to its outermost position, swinging arms 15 will

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automatically regain their radial position so that the respective reel is ready to be re-used.

The invention can also be used in an apparatus comprising two continuously operating reels, without interrupting
5 the production or the supply of material. According to the invention reels 3a and 3b can be used alternatively in that in accordance with the invention the composite guiding device is a device 25 surrounding material to be coiled and being mounted upon a swinging arm 24, said device 25
10 being reciprocating with respect to the reel core 4, and allowing, in a position away from said reel core, a displacement in axial direction of material near the reel.

The supplied material to be coiled, in form of a tube, particularly a corrugated tube, more particularly a plastic corrugated tube, has been represented in fig. 3 with
15 broken lines 26. The device surrounding the material is a guiding bush or a guiding eye which is swingeable together with swinging arm 26 in a plane perpendicular to the reel axis. Said swinging has been indicated in fig.
20 1 and 3 by means of a broken line 27. It serves to install the beginning of a tube to be coiled near the core of a reel, said beginning being fixed upon the reel by means of a device not to be further elucidated. Subsequently, guiding bush 25 is placed in its initial position so that the
25 coiling operation can start. A correct position of bush 25 is ensured by a parallel guide being mounted upon said bush and cooperating with a swinging arm for maintaining the

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axis of guiding bush 24 to an extend tangentially with respect to the reel. As there are various solutions for the latter, a preferred system may e.g. exist of a gearwheel, mounted on a rotatable axle 28 of the guiding bush 25 inside the swinging arm 24. A chain running past said gearwheel is also swung around a stationary gearwheel of a non-rotatable axle 29 of the swinging arm 24. As a similar parallel guide is generally known, the latter need not be described further on.

- 10 As a tube to be coiled upon a reel is moving in an axial direction with respect to said reel(s), guiding bush 25 and the essential coiling tension upon tube 26 could exert a braking force, so that the direction of the tube windings to be coiled could be changed too early and a reversed
- 15 axial movement would occur prior to the tube having reached one of the side faces of the reel(s). In order to prevent the latter, the guiding bush 25 with swinging arm 24 is swingeable into a position away from the reel in a plane extending parallel to the axis of the reel. Said
- 20 swinging movement has been denoted by arrow 30 in fig. 3. It can be effected e.g. by supporting shaft 29 in frame 2 on a horizontal transverse shaft and by balancing the entirety so that only a very slight lateral force need be exerted upon bush 25 in order to have it moved in the
- 25 sense of the arrow 30. The use of the guiding bush 25 on the swinging arm 24 is particularly suitable in the embodiment as illustrated in which the swinging arm 24 is mounted centrally between two spaced reels 3a, 3b respec-

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tively, the guiding bush being swingeable from a central position (fig. 3) towards both one or the other reel core.

Although the invention has been described with particular
5 reference to plastics corrugated tubes, where indeed its
advantages are striking, it can also be applied for coiling
other elongated materials, because in any case the advantage will be a perfect control of the coiling process and
therefore a perfect shape, structure and stability of the
10 coiled packages obtained.

Claims:

1. Apparatus for coiling to packages flexible elongated materials particularly cables, tubes or pipes, more particularly plastics corrugated tubes consisting of a frame 2, comprising one or more driveable reels 3a and 3b, and a guiding device for the material to be coiled upon a reel, characterized in that a composite guiding device is provided, one component 6; 14; 25 of which is adapted to dispose or to release the material in a radial direction of the reel(s), the other component 5; 15; 25 being adapted to enclose or to release said material in an axial direction of the reel.
2. Apparatus according to claim 1, characterized in that the composite guiding device comprises a pressure member 6 extending tangentially with respect to the reel core 4 and being movable towards said reel core thereby exerting a certain pressure, whilst the material to be coiled upon said core can be moved away from said core.
3. Apparatus according to claims 1 or 2 characterized in that the composite guiding device is a ledge 5 extending tangentially to the reel core and being movable in an axial direction with respect to said core under the influence of material to be coiled upon the reel core and exerting a force upon a side face of the ledge 5 which side face is transverse to the axis of the reel core.

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4. Apparatus according to claims 1 to 3, characterized in that the ledge 5 is enclosed between the reel core 4 or material coiled upon it, and a plate 6 extending tangentially with respect to the coiling core or the material
5 upon it, and extending along the entire width of the reel core, said plate being radially movable away from said core under the action of the pressure of the coiled material.

5. Apparatus according to claims 1 to 4, characterized
10 in that plate 6 is pivotably supported and in that ledge 5 is transversely slideable across said plate parallel to the axial direction of the core, the sliding resistance of the ledge being adjustable.

6. Apparatus according to claim 1, characterized in
15 that one component of the composite guiding device for radially disposing or releasing material coiled upon the reel, comprises movably supports parts 14 of the reel core, the other component, for enclosing the material in axial direction of the reel(s) and releasing the same, consist-
20 ing of pivotably supported swinging arms (15) which move away from each other into a radial position or move towards each other into a retracted position in which said swinging arms making an acute angle with the shaft 20 of the reel or are parallel thereto, and the arms in their
25 radial position forming a side face of the reel.

7. Apparatus according to claims 1 and 6, characterized

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in that the movable parts 14 of the reel core 4 are at one, stationary side face of the reel, pivotably supported and at an opposite side face pivotably connected to a rod system for radially retracting the swingeable ends
5 of the displaceable parts of the core.

8. Apparatus according to claims 1, 6 and 7, characterized in that each movable part 14 is provided with a curved outer face, all outer faces of the movable parts together describing a cylinder when said parts occupy
10 their most outward position.

9. Apparatus according to claims 1 and 6, characterized in that the pivotably supported swinging arms 15 forming in their radial position a side face of the reel, are pivotably connected to a slideable part 21 around a
15 central supporting shaft 20 of the reel, each swinging arm at distance from its pivot 19, being slideable through a pivotably disposed guiding member 22.

10. Apparatus according to claims 1 and 6 to 9, characterized in that the guiding member 22 for the
20 swinging arm 24 is pivotably connected at the swingeable end of the displaceable part 14 of the reel core 4.

11. Apparatus according to claim 1, characterized in that the composite guiding device is a device 25 mounted upon a swinging arm 24 and surrounding the material to be
25 coiled, said device being reciprocating with respect to

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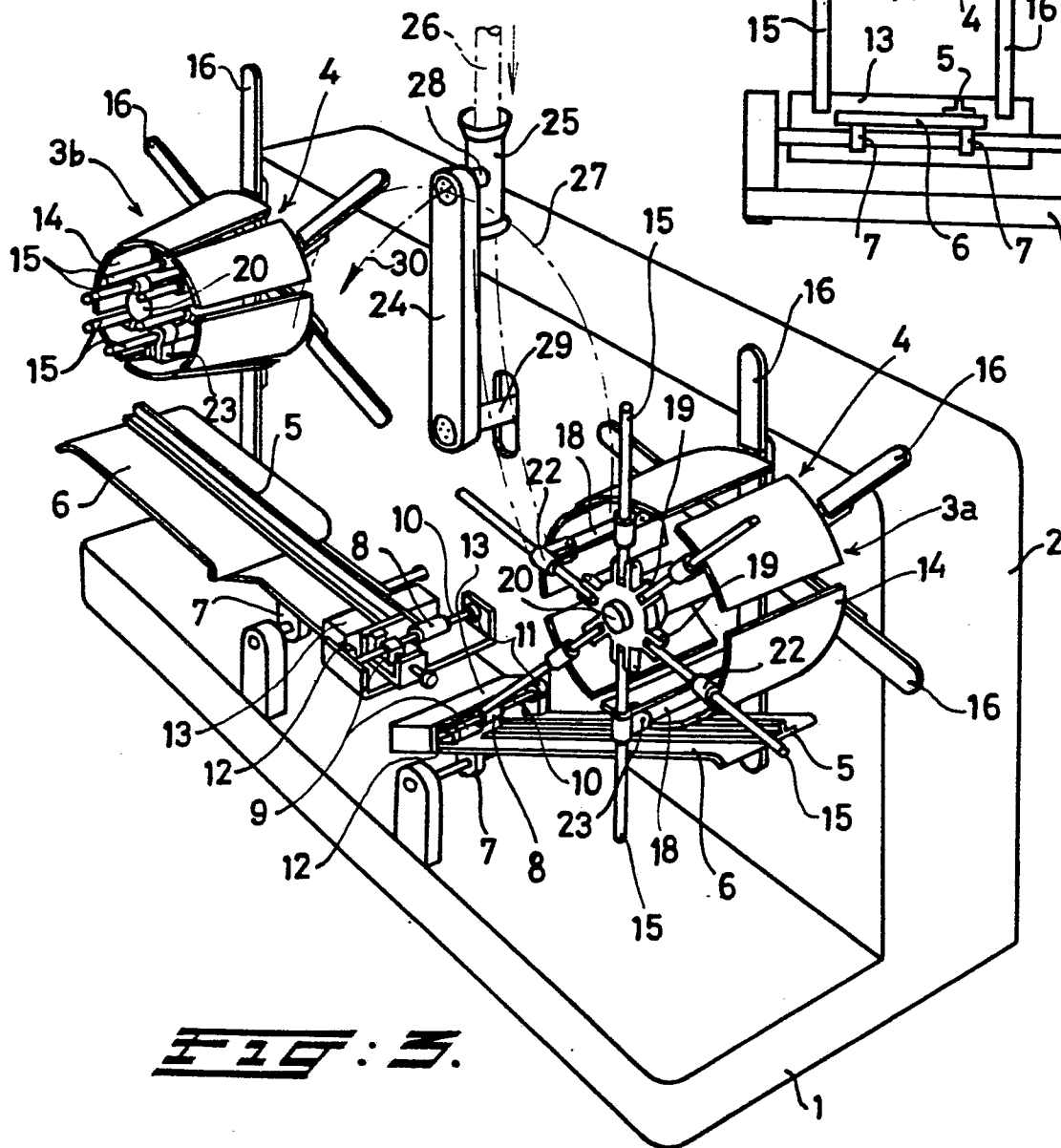
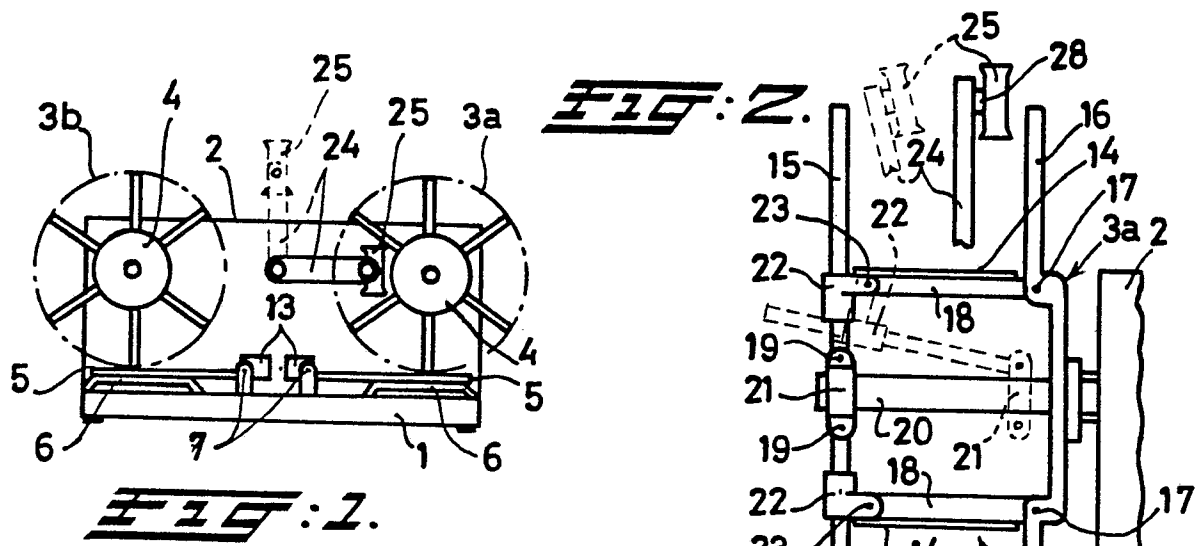
the reel core and allowing, in a position away from said reel core, a displacement in axial direction of the material near the reel.

12. Apparatus according to claims 1 and 11, characterized
5 in that the device surrounding the material is a guiding bush 25 or a guiding eye being swingeable with the swinging arm in a plane perpendicular to the axis of the reel.

13. Apparatus according to claims 1, 11 and 12,
characterized in that a parallel guiding means cooperating
10 with the swinging arm 24 is mounted on the guiding bush 25 in order to maintain the tangentially extending direction of the axis of the guiding bush 25 with respect to the reel.

14. Apparatus according to claims 1, 11, 12 and 13,
15 characterized in that the guiding bush 25 with the swinging arm 24 is swingeable into a position away from the reel in a plane parallel to the reel axis.

15. Apparatus according to claims 1 and 11 to 14,
characterized in that the swinging arm 24 is centrally
20 mounted between two spaced reels 3a and 3b, the guiding bush 25 being swingeable from a central position towards one or the other reel core.





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Application number

EP 81 20 1117

DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int. Cl.)
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
	<u>US - A - 4 202 512 (NICHOLSON)</u> * Column 2, lines 13-24; column 3, lines 20-68; column 4, lines 1-23 * -- <u>GB - A - 980 903 (LICENTIA)</u> * Page 1, lines 75-86; page 2, lines 1-39 * -- <u>DE - A - 1 574 422 (ROSENDAHL)</u> * Page 2, line 20 to the end; page 3, figures * -- <u>US - A - 2 738 161 (CHUPP)</u> * Column 1, lines 42-47; column 3, lines 11-75; column 4, lines 1-19 * -- <u>US - A - 4 103 841 (FLYNN, WURSTER)</u> * Column 5, lines 9-68; column 6, lines 1-39, 58-62 * -- <u>GB - A - 1 270 819 (OLYMPUS OPTICAL)</u> * Page 1, lines 84-90; page 2, lines 1-15, 116-130; page 3, lines 1-92 * -- <u>CH - A - 618 141 (S.U.T.E.)</u> * Page 3, left-hand column, lines 65-68; right-hand column, lines 1-21; ./.	1-3 1-3,5 1 1,12 1,2 1,2 1,6-12	B 65 H 54/58 54/28 TECHNICAL FIELDS SEARCHED (Int. Cl.) B 65 H CATEGORY OF CITED DOCUMENTS X: particularly relevant A: technological background O: non-written disclosure P: intermediate document T: theory or principle underlying the invention E: conflicting application D: document cited in the application L: citation for other reasons &: member of the same patent family, corresponding document
The present search report has been drawn up for all claims			
Place of search	Date of completion of the search	Examiner	
The Hague	05-01-1982	D'HULSTER	



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A	<u>GB - A - 1 471 051</u> (OLIVER) * Page 2, lines 68-129 * --		
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