

(19)



Europäisches Patentamt
European Patent Office
Office européen des brevets



(11) Publication number:

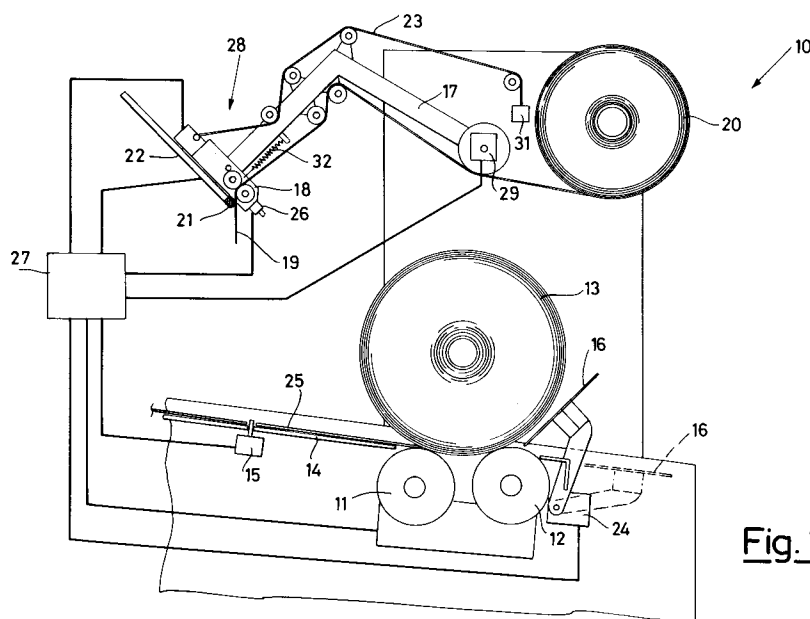
0 481 567 A1

(12)

EUROPEAN PATENT APPLICATION(21) Application number: **91202682.0**(51) Int. Cl.⁵: **B65B 25/14**, B65B 51/06,
B65H 19/29(22) Date of filing: **16.10.91**(30) Priority: **18.10.90 IT 2178890**(43) Date of publication of application:
22.04.92 Bulletin 92/17(84) Designated Contracting States:
AT BE CH DE DK ES FR GB GR IT LI LU NL SE(71) Applicant: **OF.FRI S.r.l. OFFICINE FRIGERIO**
Via Repubblica, 6
I-22075 Lurate Caccivio (Como)(IT)(72) Inventor: **Frigerio, Vittorio**
Frazione Sopravilla, 70/bis
I-22020 Blevio (Como)(IT)
Inventor: **Frigerio, Pierandrea**
Via Bellinzona, 7
I-22100 Como(IT)(74) Representative: **Faraggiana, Vittorio, Dr. Ing.**
Ingg. Guzzi e Ravizza S.r.l. Via Boccaccio, 24
I-20123 Milano(IT)(54) **Automatic peripheral wrapping machine for rolls of material in strips such as cloth.**

(57) A packaging machine (10) for peripheral winding of a tape (19) around a roll (13) of strip material comprises rollers (11,12) for controlled rotation of the roll. An arm (17) moves around a pivot to position a packaging unit (28) near the periphery of the roll (13). Said packaging unit delivers the tape (19) on the end section (25) of the strip being rolled up, said end being thus taken at least partly from the last turn

of material. Rotation of the roll continues to complete winding of the material and simultaneously wrap the tape peripherally on the roll until it overlaps itself. The packaging unit (28) comprises a head (21) which fixes together the overlapping parts of the tape and cuts it upstream from the fixing zone to supply the packaged roll.

**Fig. 1****EP 0 481 567 A1**

In the art of production of rolls, e.g. of cloth, the necessity of stopping the end of the wound strip and completely packing the roll to protect it from the environment is known.

Meeting said necessities is made difficult by the desire to perform the operations in a completely automatic manner to comply with the ever advancing automation of entire production lines.

The problem consists principally of the fact that the initial edge of a tape or a sheet, usually of plastic material, that it is desired to wrap around the periphery of the roll, tends to escape without allowing completion of the turn to fix it to itself. The use of glues or the like to hold in position on the roll the beginning of the tape or sheet until complete wrapping involves an unavoidable deterioration of the section of strip of the roll involved by the glueing. Especially in the case of valuable materials the loss upon unpacking is an added cost poorly tolerated by users. In addition, the method is clearly inapplicable for rolls of material by nature difficult or impossible to glue.

The general object of the present invention is to obviate the above mentioned drawbacks by providing a packing device for rolls which would allow rapid and accurate automatic packing thereof without the use of glue or the like to stop the beginning of the tape employed for packing.

In view of said object it has been sought to provide in accordance with the present invention a packaging machine for peripheral wrapping of a tape around a roll of strip material supported by support means designed to keep it in axial rotation and characterized in that it comprises means of supply of the free end of the tape on the terminal section of the strip being wound, said end being thus taken at least partly from the last turn of material; means for activating the supplementary rotation of the roll for at least one turn after completion of the winding of the material to wind the tape peripherally on the roll until it overlaps itself; means of fixing and cutting which can be drawn near the periphery of the roll to fix together overlapped parts of the tape and cut it upstream of the fixing zone to provide the packaged roll.

To further clarify the explanation of the innovative principles of the present invention and its advantages as compared with the known art there are described below with the aid of the annexed drawings possible embodiments as examples applying said principles. In the drawings -

- FIG. 1 shows schematically a side elevation view of a packaging machine for rolls provided in accordance with the innovative principles of the present invention,
- FIG. 2 shows schematically a partial view of a first operative phase of the machine of FIG. 1,

- FIG. 3 shows schematically a partial view of a second operative phase of the machine of FIG. 1,
- FIG. 4 shows schematically a partial view of a third operative phase of the machine of FIG. 1,
- FIG. 5 shows schematically a partial view of the machine of FIG. 1 operating on a narrower roll, and
- FIG. 6 shows a partial view of a different embodiment of the packaging machine in accordance with the present invention.

With reference to the FIGS. as may be readily seen in FIG. 1 a packaging machine indicated generally by 10 comprises two powered rollers 11 and 12 for support and rotation of a roll 13, e.g. of cloth. A slide 14 conveys the roll from a known machine (not shown) for formation of the rolls by winding of a continuous strip.

Along the slide 14 is placed a device 15 for cutting the strip from which the roll was formed. Said cutting device is of the known art and therefore not shown. For example it can comprise a rotating circular blade moving transversely to the path of the strip as will be readily imaginable to those skilled in the art.

A plane 16 is moved by a drive 24 between a raised stop position controlled for positioning of the roll on the rollers 11 and 12 and an unloading position of the roll by the rollers. Said two positions are shown in FIG. 1 in unbroken and broken lines respectively.

Above the rolls 11 and 12 is placed a moving pivoted arm 17 powered and bearing at the free end a packaging unit 28 comprising an unrolling device 18 for a strip 19 of plastic material, e.g. a heat welding film, fed from a spool 20. The unit 28 comprises also a welding and cutting head 21 sliding thanks to a powered guide 22.

Advantageously for reasons which will be clarified below the arm 17 is equipped with an encoder 29 for detection of its angular position.

The packaging unit 28 is connected to the arm by a pivot and connected to a kinematic mechanism 23 for its inclination in relation to the longitudinal extension of the end part of the arm 17 as a function of the rotation of the arm as will be clarified below.

The kinematic mechanism can for example consist of a tie-rod 23 sliding on a system of pulleys under the effect of a weight 31 opposed by a drawing spring 32 as shown schematically in the drawings.

Advantageously there is present a sensor which detects the reaching by the unit 28 of a roll to be packaged. Said sensor can be for example a proximity sensor 26 supported by the packaging unit 28 and provided in the form of a microswitch

so as to detect the approach of the periphery of the roll.

It could be thought also to provide other systems for detecting the approach of a roll by the unit 28. For example, stopping of the arm 17 in the low position could be detected by the encoder 29.

The various component parts of the machine are interconnected for operation to a control device 27, e.g. electronic with cabled or programmed logic. On the basis of the following operative description such a control device is readily imaginable to those skilled in the art and is therefore not further shown nor described.

In the use of the machine the roll to be packaged rolls along the slide 14 until it is positioned on the rollers 11 and 12. The plane 16, in said raised position, stops the travel of the roll. Simultaneously the cutting device 15 separates the roll from the strip from which it was wound.

The powered rollers rotate the roll to wind the free terminal edge 25 and simultaneously the arm 17 is commanded to rotate until the sensor 26 detects the periphery of the roll while the feed device 18 unrolls the tape 19 so that its free end lies on the edge being wound as shown in FIG. 2. The tape 19 is thus gripped and pulled by the rolling of the edge 25 as may be readily seen in FIG. 3.

Rotation of the roll continues until the plastic tape 19 has entirely covered the periphery of the roll until it overlaps itself. As seen in FIG. 4 the guide 22 is then moved along the welding head so that it enters in contact with the tape 19, welding it and cutting it at the overlapping point to form the complete wrapping of the roll. The tape is welded to itself and therefore there are no alterations or damage to the material of the roll. Advantageously the angular rotation of the arm 17, necessary for the sensor 26 to encounter the surface of the roll and detected by the encoder 29, allows the control circuit 27 to calculate the diameter of the roll and hence rotation of the roll necessary for the tape 19 to completely wrap the roll. In this manner the quantity of tape used is surely sufficient and can also be adjusted to the minimum necessary for packaging, whatever the diameter of the roll, with no need to adjust the machine in advance. Again to be able to handle rolls of various diameters, the kinematic mechanism 23 orients the unit 28 so that the welding and cutting head is always substantially perpendicular to the surface of the roll regardless of the diameter thereof.

By way of example in FIG. 5 is shown the machine during packaging of a roll 13' of small diameter.

Once the roll is packaged the arm 17 is raised again and the roll is removed from the machine by rolling it along the inclined plane formed by com-

manding the actuator 24 to lower the plane 16. Rolling along the plane 16 can be started for example by stopping the rotation of the roller 12 while that of the roller 11 continues so as to supply to the roll a momentum which causes it to roll on the roller 12 toward the inclined plane 16.

As an alternative there can readily be provided a mechanism for raising the roller 11 to push the roll beyond the roller 12.

Obviously it is not strictly necessary that the packaging take place by welding of the tape.

FIG. 6 shows schematically a different embodiment of the machine in accordance with the present invention. In said different embodiment a packaging unit 28' (the rest of the machine being substantially the same as that of FIG. 1 it is not further shown nor described here) comprises a nozzle 30 for controlled delivery of the glue for its spreading on the surface of a tape 19' already partly wrapped in the position of the subsequent overlapping on itself. A cutting head 21' sliding with a guide 22' performs the cutting of the tape after covering by the tape of the glued zone, thus completing the packaging. Advantageously there is again present a sensor 26' similar to the sensor 26 of FIG. 1 to detect the correct positioning of the unit 28'. The tape 19' can for example be made of paper.

Naturally the above description of embodiments applying the innovative principles of the present invention is given merely by way of example and therefore is not to be taken as a limitation of the patent right claimed here. For example, the blocking of the movement of the roll at the end of the slide 14 to position it correctly on the rollers 11 and 12 can be secured by providing a vertical movement of the roller 12 to arrange itself momentarily in a higher position than the roller 11 so as to constitute a stop ledge for the roll and then move to the same height as the roller 11 for the packaging phase. For unloading the roll there could be utilized the same vertical movement of the roller 12 by lowering it beneath the level of the roller 11 to make the roll pass over the roller 12. Naturally there must be provided an outlet slide from the machine arranged at the height reached below by the roller 12, i.e. lower than the inclined plane 16 which in this case will not be present. As an alternative the roll 13 can be supported at the ends by rotating chucks moving along guides, first to carry the roll to the machine and then to remove it therefrom.

The welding head 21 could also be provided integral with the unrolling device and then taken into contact with the part to be welded by means of another rotation of the arm 17.

Finally the tape 19 can of course be of a different width than the roll, e.g. if smaller with

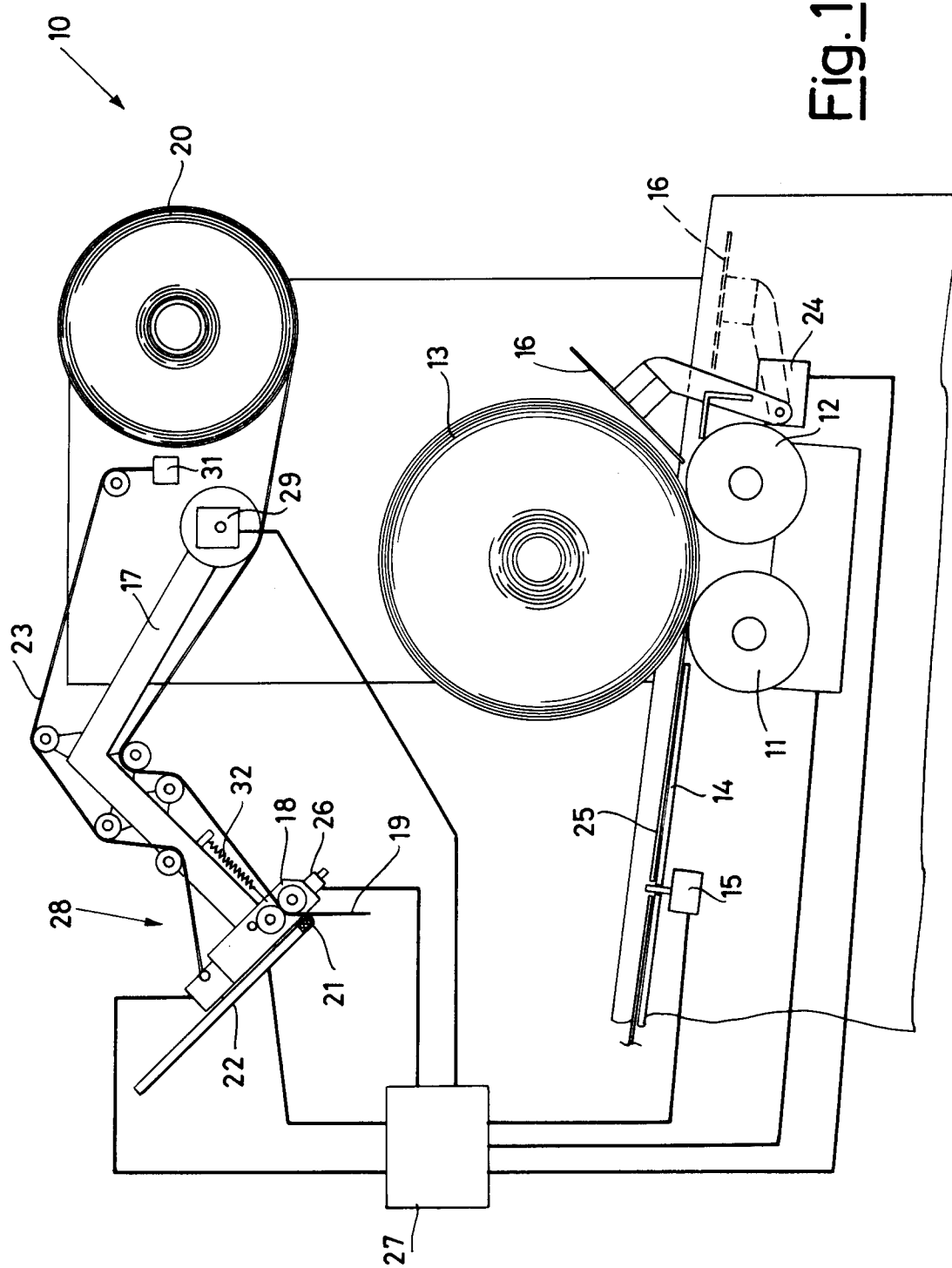
prevalently only fixing function of the free end of the roll or if greater side edges folding on the ends of the roll. It is also possible to use several tapes arranged parallel to link the roll along various circumferences.

Claims

1. Packaging machine for peripheral wrapping of a tape around a roll of strip material supported by support means designed to keep it in axial rotation and characterized in that it comprises means of supply of the free end of the tape on the terminal section of the strip being wound, said end being thus at least partly gripped by the last turn of material; means for activating the supplementary rotation of the roll for at least one turn after completion of the winding of the material to wind the tape peripherally on the roll until it overlaps itself; means of fixing and cutting which can be drawn near the periphery of the roll to fix together overlapped parts of the tape and cut it upstream of the fixing zone to provide the packaged roll.
25
2. Packaging machine in accordance with claim 1 characterized in that the support means comprise a pair of parallel powered rollers between which the roll is supported with its axis parallel thereto.
30
3. Packaging machine in accordance with claim 1 characterized in that the fixing and cutting means comprise a fixing and cutting head extending along the width of the tape and born by an arm moving between a first position drawn away from and a second position wherein the head is substantially in contact with the roll.
40
4. Packaging machine in accordance with claim 1 characterized in that the fixing and cutting means comprise means of approach substantially perpendicular to the surface of the roll.
45
5. Packaging machine in accordance with claim 1 characterized in that the means for actuating the supplementary rotation comprise sensor means for sensing the roll circumference controlling the support means to cause the roll to complete said at least one turn.
50
6. Packaging machine in accordance with claims 3 and 5 characterized in that the circumference sensor means comprise a device for measuring the movement of the arm in the sense of detecting the diameter of the roll on the basis of the amount of the movement of the arm
55

between said two positions.

7. Packaging machine in accordance with claim 3 characterized in that there is present a sensor for detection of the reaching by the arm of the second position.
8. Packaging machine in accordance with claim 3 characterized in that said arm also supports the tape feed means.
9. Packaging machine in accordance with claim 1 characterized in that the tape is of weldable material such as plastic and the fixing and cutting means comprise heating elements for melting together said overlapped parts of the tape.
10. Packaging machine in accordance with claim 1 characterized in that the fixing and cutting means comprise nozzles for delivery of glue between the tape surfaces constituting subsequently said overlapped parts.



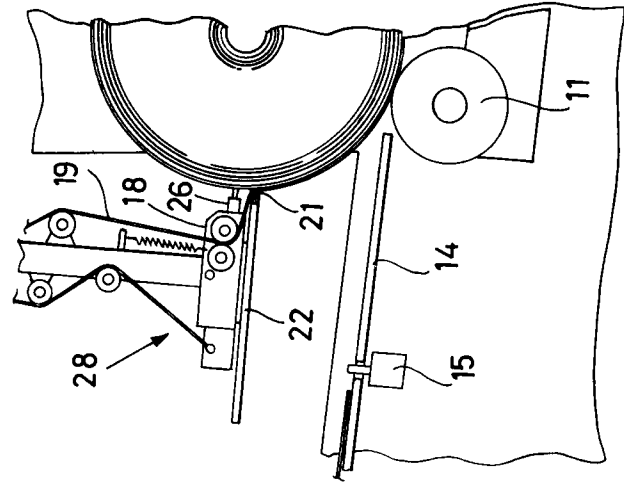


Fig. 2

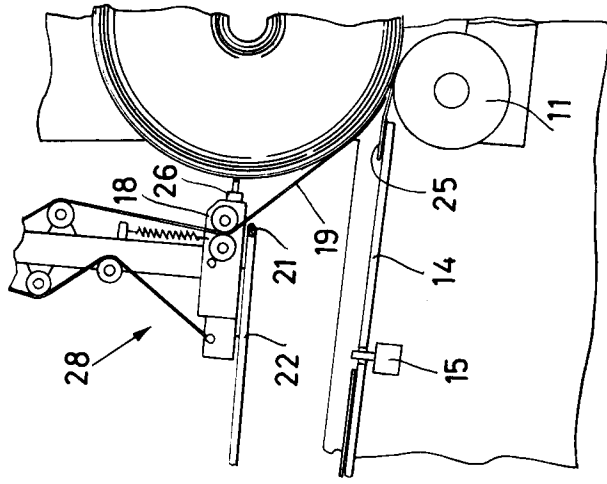


Fig. 3

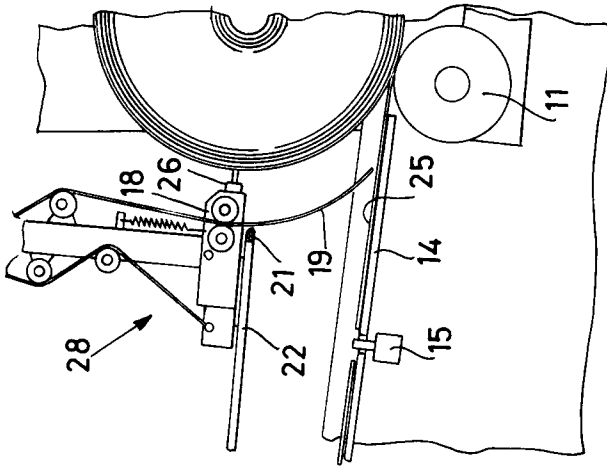


Fig. 4

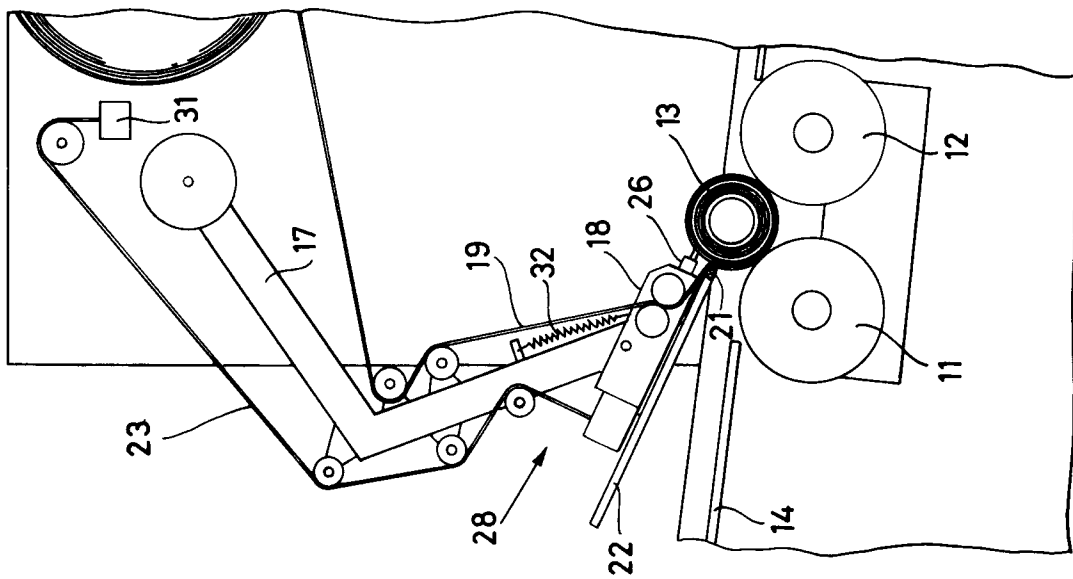


Fig. 5

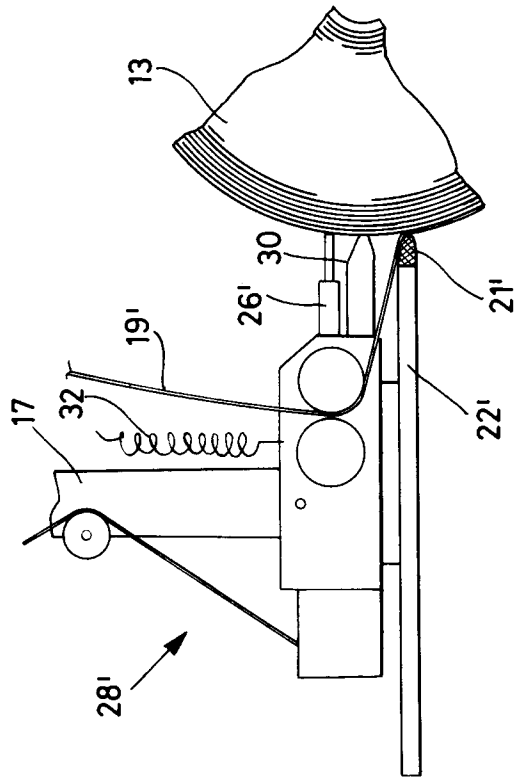


Fig. 6



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number

EP 91 20 2682

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
X Y	FR-A-1 360 865 (N. NEBOUT) * page 3, column 1, line 20 - line 53; figures 1, 1A *	1, 3, 4 5, 9, 10	B65B25/14 B65B51/06 B65H19/29
X	US-A-3 901 757 (R. EGLINTON) * column 2, line 27 - column 3, line 44; figures *	1-4, 8	
Y	EP-A-0 374 872 (P. GASTOLDI) * column 3, line 37 - column 5, line 10; figures *	5	
A		6	
Y	US-A-4 716 709 (V. LAMB) * column 2, line 8 - line 60 * * column 3, line 51 - column 4, line 34; figures *	9	
A		1, 2	
Y	US-A-3 407 565 (R. BENDER) * column 5, line 40 - column 6, line 22; figures *	10	TECHNICAL FIELDS SEARCHED (Int. Cl.5)
A	US-A-4 299 642 (W. BERKHOLTZ)		B65B B65H
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 04 FEBRUARY 1992	Examiner JAGUSIAK A.H.G.
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			