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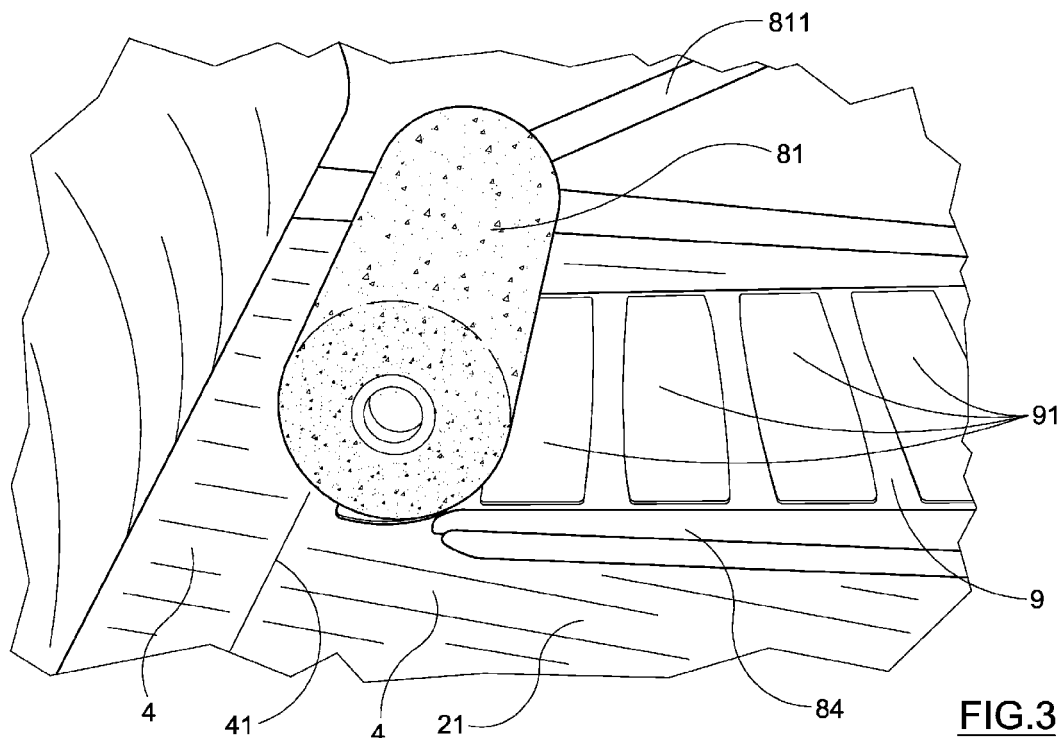
(54) **Production line for plastig bags with RFID**

(57) There is disclosed herein a production line for plastic bags (4), comprising:

- means (2) for feeding a film material (21);
- means (3, 33) for converting said film material (21) into a plurality of bags (4, 4, ... 4), with walls formed of said film material (21);
- a tagging machine (8) for self-adhesive radio frequency tags (91), which is adapted to be fed with a web (9) with

self-adhesive radiofrequency tags (91) glued thereto, said tagging machine (8) being adapted to attach radiofrequency tags (91) to one side (211) of said film material (21);

- means (18) located upstream from said tagging machine (8) for eliminating static electricity from the side (211) of said film material (21) upon which the tags (91) are attached.



**FIG.3**

## Description

**[0001]** There is disclosed herein a production line for plastic bags, particularly for rolled plastic bags, where each bag produced has a radio-frequency tag.

**[0002]** The need is currently felt in the art, of monitoring the origin and amount of plastic bags designed for garbage collection, and particularly plastic bags designed for separate garbage collection.

**[0003]** This will allow users more committed to separate garbage collection to be rewarded, e.g. with incentives.

**[0004]** For this purpose, plastic bags are known to receive a radio-frequency tag (known as RFID tag) attached thereto, which may contain information, such as: bag's weight, bag's origin, user's personal details, user's health insurance card data, etc.

**[0005]** The information stored in the RFID tag may be used to monitor the amount and quality of the garbage collected by each user.

**[0006]** In former times, radio-frequency tags were attached to plastic bags manually, which considerably increased the overall bag production times and costs.

**[0007]** CN 101 462 603 discloses a production line for plastic bags manufactured from a flat moving film, which is fed beneath a tagging machine, which intermittently attaches tags.

**[0008]** Then, the film is folded into a one-ply film.

**[0009]** Sealing and cutting means are further provided for converting the one-ply film into bags, with a radio-frequency tag attached to the inner side of the bags.

**[0010]** One of the drawbacks of the prior art is the non-negligible amount of waste caused by defective radio-frequency tags being applied to plastic bags.

**[0011]** Therefore, an operation check is required on the radio-frequency tags attached to the bags, to eliminate waste; this involves an increase of production times and costs for bags with RFID tags.

**[0012]** The object of this invention is to obviate at least some of prior art problems and particularly to reduce the waste caused by faulty radio-frequency tags.

**[0013]** This object is fulfilled by a production line for plastic bags as defined in claim 1.

**[0014]** Further advantages may be achieved by the additional features of the dependent claims.

**[0015]** A possible embodiment of the invention will be now described with reference to the accompanying drawings in which:

- Figure 1 is a perspective view of a tagging machine, installed on a plastic bag production line;
- Figure 2 shows the same tagging machine as Figure 1, with the addition of a roll of self-adhesive radio-frequency tags;
- Figure 3 is an enlarged view of a particular embodiment of a tagging machine, which shows how a self-adhesive radio-frequency tag is attached during bag production; and

- Figures 4a and 4b are two diagrammatic views of a production line for plastic open-mouth bags;
- Figure 5 shows a tagging machine, installed on a plastic bag production line, and an anti-static bar mounted upstream from the tagging machine; and
- Figure 6 shows a detail of the anti-static bar of Figure 5.

**[0016]** Referring to the accompanying drawings, numeral 1 generally designates a plastic bag production line, particularly for polyethylene open-mouth bags with string closure.

**[0017]** The production line 1 comprises means 2 for feeding a film material 21 and means 3, 33 for converting the film material 21 into a plurality of bags 4, 4, ... 4, with walls formed of the film material 21.

**[0018]** A tagging machine 8 is also provided, for attaching self-adhesive radio-frequency tags 91 to one side of the film material 21 that is used to form the bags 4, 4, ... 4 (see Figures 1, 2 and 3).

**[0019]** In one possible embodiment, the tagging machine 8 comprises an unwinder 82 for a web roll 9 which acts as a backing material for the self-adhesive tags 91.

**[0020]** The web 9 is fed by a drive shaft 83 with a stepper motor.

**[0021]** In order to peel the self-adhesive tags, the tagging machine 8 comprises a plate 84 that forces the backing web 9 to make a U-turn.

**[0022]** The tagging machine 8 is adapted to attach the radio-frequency tags 91 to one side 211 of the film material 21.

**[0023]** One feature of the bag production line is that it has means 18 located upstream from the tagging machine 8, for eliminating static electricity from the side 211 of the film material 21 upon which the tags 91 are attached (Figure 5).

**[0024]** Due to this feature, the waste caused by defective radio-frequency tags is reduced to negligible levels.

**[0025]** While the present inventors do not intend to provide a scientific explanation for this result, they nevertheless believe that the elimination of the electrostatic charge from the surface 211 of the film 21, upon which the tags 91 are later attached, avoids the risk of electrostatic charges that might destroy the microchip in the radio-frequency tags.

**[0026]** Usually, the electrostatic charge to be eliminated is already on the roll of the film material 21 that is used for bag production (e.g. due to the mechanical processing required to form the reel itself, such as: stretching, compression and rubbing).

**[0027]** Furthermore, the film material 21 may also become electrostatically charged during processing in the various workstations of the bag production line.

**[0028]** In the illustrated embodiment, the means 18 for eliminating the electrostatic charge include an anti-static bar 18 extending transverse to the direction of movement of the film 21 and substantially parallel to the surface 211 upon which the tags 91 are attached.

**[0029]** In the illustrated embodiment, the anti-static bar 18 is located in an intermediate position between two successive rollers 11, 12.

**[0030]** The distance between the anti-static bar 18 and the surface 211 of the film 21 preferably ranges from 10 to 30 mm and the supply voltage for the anti-static bar 18 is preferably at least 5000 Volt.

**[0031]** The power supply polarity of the anti-static bar depends on the film material being used.

**[0032]** The anti-static bar creates an ionized air zone between the bar and the surface 211 of the film 21; the generated ions neutralize excess charges on the surface 211 of the film 21, thereby reducing the electrostatic voltage on the surface 211 of the film to a value close to zero Volt, or anyway to a voltage value low enough to avoid damages to the radio-frequency tags.

**[0033]** As shown in Figure 6, the anti-static bar 18 comprises an outer tubular member 181, electrically connected to ground, which has transverse holes 182 with discharge points 183 held therein, and capacitively coupled to the power source.

**[0034]** The anti-static bar 18 may be of traditional type, and will not be further described herein.

**[0035]** In an alternative embodiment (not shown), the means 18 for eliminating the electrostatic charge are of passive type, i.e. of the type comprising grounded carbon fiber brushes.

**[0036]** In the illustrated embodiment, the means 2 for feeding the films 21 include an unwinder 2 for a roll of one-ply film 21, particularly a powered unwinder.

**[0037]** With this solution the work speed of the production line 1 can be maximized.

**[0038]** Alternatively, the machine is fed with a flat film from a roll, which is used to obtain a one-ply film.

**[0039]** In the illustrated example, the means 3, 33 for converting the film material 21 into a plurality of bags 4, 4, ... 4 include a sealing unit 3, which divides the one-ply film 21 into a succession of bags 4, 4, ... 4, joined by transverse sealing lines.

**[0040]** A pre-cutting unit 33 is provided downstream from the sealing unit 3, and pierces a series of aligned holes defining a tear-off line 41 transverse to the direction of movement of the one-ply film 21, proximate to each sealing line.

**[0041]** The sealing and pre-cutting unit 3 comprises actuator means (not shown), e.g. brushless motors, for moving the sealing and pre-cutting unit 3, 33 up and down.

**[0042]** The sealing and pre-cutting unit 3, 33 may be of traditional type, and will not be further described herein.

**[0043]** In the illustrated embodiment, the tagging machine 8 is located downstream from the antistatic bar 18 which is in turn located downstream from the sealing 3 and precutting 33 unit.

**[0044]** In this embodiment, the radio-frequency tags 91 are attached to the side 211 of the film 21 after the formation of the bags 4, 4, ..., 4.

**[0045]** The position of the tagging machine 8 down-

stream from the sealing 3 and precutting 33 unit has certain advantages: particularly, it minimizes the mechanical stresses acting on radio-frequency tags during bag production.

**[0046]** In an alternative embodiment, the tagging machine 8 and the antistatic bar 18 may be located upstream from the sealing 3 and pre-cutting 33 unit, i.e. prior to conversion of the film 21 into joined bags 4, 4, 4..., 4.

**[0047]** The plastic bag production line may include a dandy roll unit 6, which is located downstream from the sealing 3 and pre-cutting 33 unit, as well as a winder 7 which is in turn located downstream from the dandy roll unit 6, to create rolls of successive bags, joined by pre-cut lines.

**[0048]** The dandy rolls 6 hold the bags 4 under tension during the time from the end of the formation of a roll of bags to the start of the formation of the next roll.

**[0049]** In an alternative embodiment, not shown, the bags may be manufactured in loose form.

**[0050]** The speed at which the one-ply film 21 is fed and the rate at which the sealing and pre-cutting unit is lowered may be adjusted as needed, by console control.

**[0051]** This will allow adjustment of both bag size and bag throughput.

**[0052]** In the illustrated embodiment, the tagging machine 8 is located downstream from the sealing unit 3 and the pre-cutting unit 33 and upstream from the dandy roll unit 6, and the radio-frequency tags 91 are attached to an outer side 211 of the bags 4, 4, ... 4 while they are being fed.

**[0053]** The tagging machine 8 is synchronized with the sealing 3 and pre-cutting 33 unit, thereby ensuring the proper pitch of the tags 9 on the bags 4.

**[0054]** In a possible embodiment, the synchronization of the tagging machine 8 with the sealing unit 3 (and pre-cutting unit 33) is controlled by a relay (not shown), which is in turn controlled by an electric signal which is synchronized (in phase) with the signal that controls the descent of the sealing unit 3 (and precutting unit 33).

**[0055]** In the preferred embodiment, the pulse that controls the tagging machine 8 comes from a PLC (not shown).

**[0056]** The tagging machine 8 is equipped with an optical sensor which is adapted to read the pitch and number of self-adhesive radio-frequency tags 9, which are attached to the surface 211 of the film 21.

**[0057]** This further enhances reliability of the operation of the tagging machine.

**[0058]** In order to ensure perfect adhesion and positioning of radio-frequency tags in the same location on each bag being manufactured, an idle roller 81 having an axis of rotation substantially parallel to the surface 211 is added, where the radio-frequency tags 91 are peeled off the backing web 9.

**[0059]** The idle roller 81 is adapted to apply pressure to the radio-frequency tags 91, as they are peeled off the backing web 9, thereby ensuring proper positioning of the tags 91 on each bag 4, 4, ... 4 and preventing the

tags 91 from being blown off during peeling.

**[0060]** Therefore, the idle roller 81 affords a further increase of the throughput of the equipment, by maximizing production without the risk that the radio-frequency tags (RFID tags) 91 might be blown off or be inaccurately attached.

**[0061]** The above arrangements allow operation with a throughput of about 4 bags/second, corresponding to a linear speed of about 2.4 meters/second.

**[0062]** In the illustrated embodiment, the idle roller 81 applies pressure to the tags 91 with its own weight; for this purpose, the idle roller 81 is fixed to an arm 811 which is hinged to the tagging machine 8.

**[0063]** In the illustrated embodiment, the idle roller 81 is a roller made of synthetic sponge or foam rubber.

**[0064]** In the above example, the bag production line produces bag rolls.

**[0065]** Of course, the invention may be also used in production lines for loose bags.

**[0066]** In the illustrated embodiment, the radio-frequency tag is placed on the exterior of the bag.

**[0067]** The material that forms the bags and the conformation of the bags being produced may change as needed, and no limitation is imposed thereto.

**[0068]** Therefore, the invention may be also used in production lines for handled bags, shoppers, die-cut handle bags, bags made of biodegradable materials, etc.

## Claims

1. A production line for plastic bags (4), comprising:

- a) means (2) for feeding a film material (21);
- b) means (3, 33) for converting said film material (21) into a plurality of bags (4, 4, ... 4), with walls formed of said film material (21);
- c) a tagging machine (8) which is adapted to be fed with a web (9) with self-adhesive radio-frequency tags (91) glued thereto, said tagging machine (8) being adapted to attach radio-frequency tags (91) to one side (211) of said film material (21), as it is being fed;

**characterized in that** it has

- d) means (18) located upstream from said tagging machine (8) for eliminating static electricity from said side (211) of said film material (21) upon which said tags (91) are attached.

2. A production line for plastic bags (4), wherein

- a1) said film material (21) is fed in the form of a one-ply film (21); and wherein
- said means (3, 33) for converting said film material (21) into a plurality of bags (4, 4, ... 4), comprise
- b1) a sealing unit (3) for transversely sealing said one-ply film (21) with a predetermined pitch

along a sealing line, thereby forming a plurality of bags (4, 4, ... 4) joined at the sealing lines created by said sealing line (3) and

b2) a pre-cutting unit (33), for forming a transverse tear-off line (41) close to each sealing line, said sealing (3) and pre-cutting (33) unit comprising actuator means (31) adapted to cause the descent of said sealing and pre-cut unit (3); and wherein

d1) said means (18) for eliminating static electricity are located downstream from said pre-cutting unit (33).

3. A production line for plastic bags (4) as claimed in claim 2, further comprising

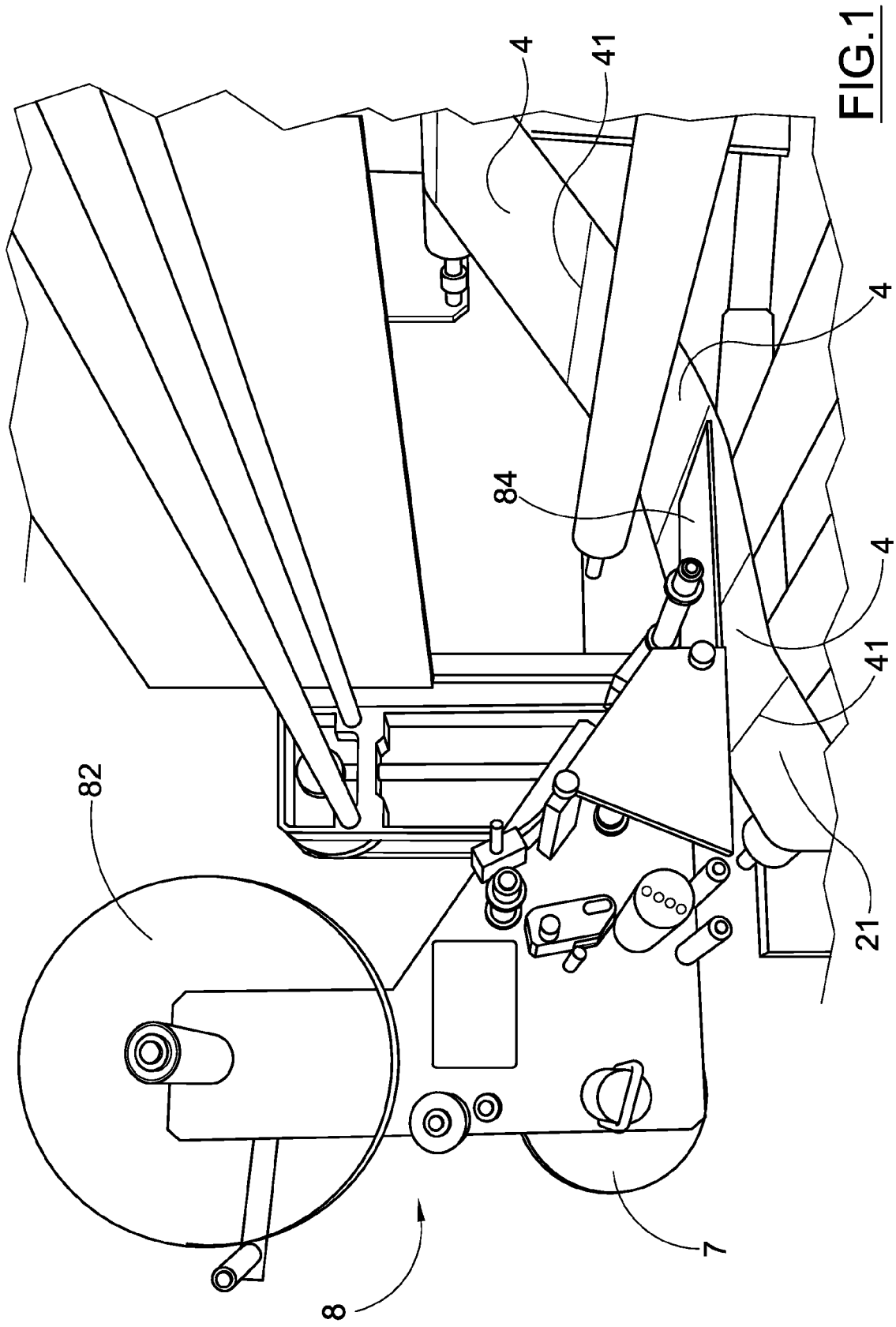
e) a dandy roll unit (6) located downstream from said tagging machine (8);

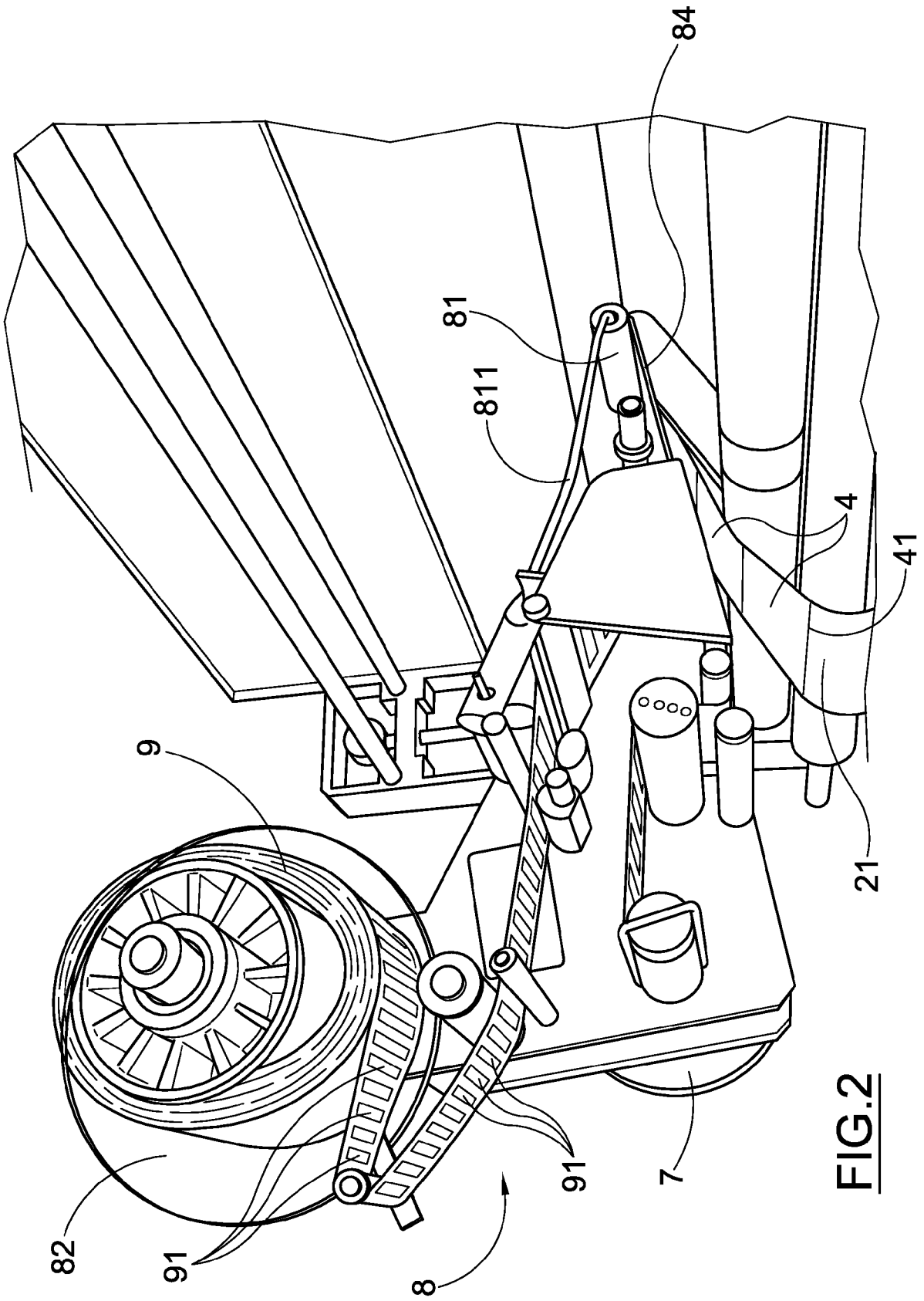
f) a winder (7), located downstream from said dandy roll unit (6) for forming a plurality of bag rolls.

4. A production line for plastic bags (4, 4, ... 4) as claimed in claim 1 or 2 or 33, wherein an optical sensor is provided, which is adapted to read the pitch of the self-adhesive radio-frequency tags (9) to be peeled off.

5. A production line for plastic bags (4, 4, ... 4) as claimed in any preceding claim, wherein an idle roller (81) is provided, which is located where the radio-frequency tags (91) are peeled off the backing web (9), said idle roller (81) being adapted to apply pressure to the radio-frequency tags (91) as they are being peeled off said backing web (9).

6. A production line for plastic bags (4, 4, ... 4), as claimed in any preceding claims, wherein said means (18) for eliminating static electricity include a DC powered anti-static bar.





**FIG.2**

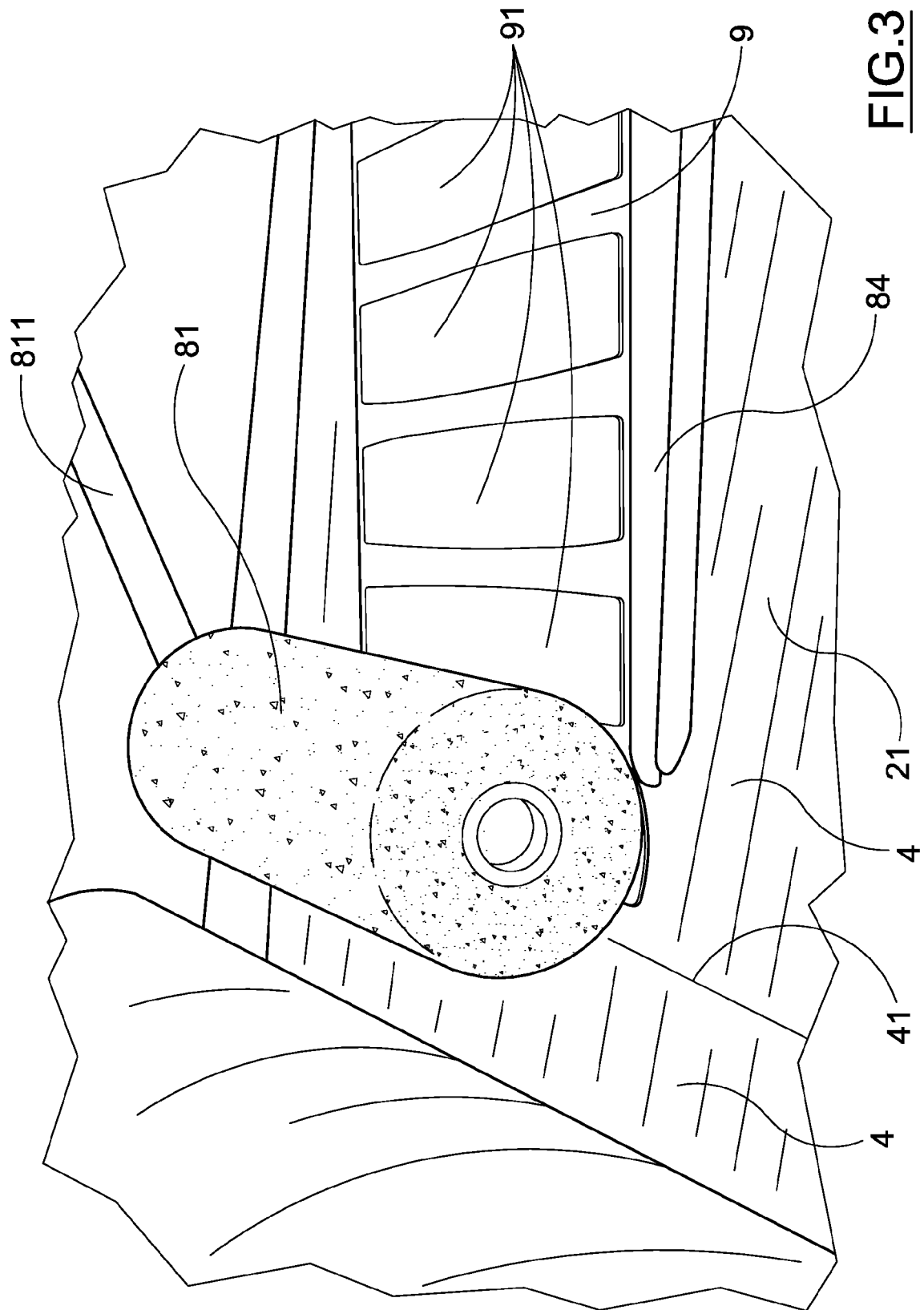
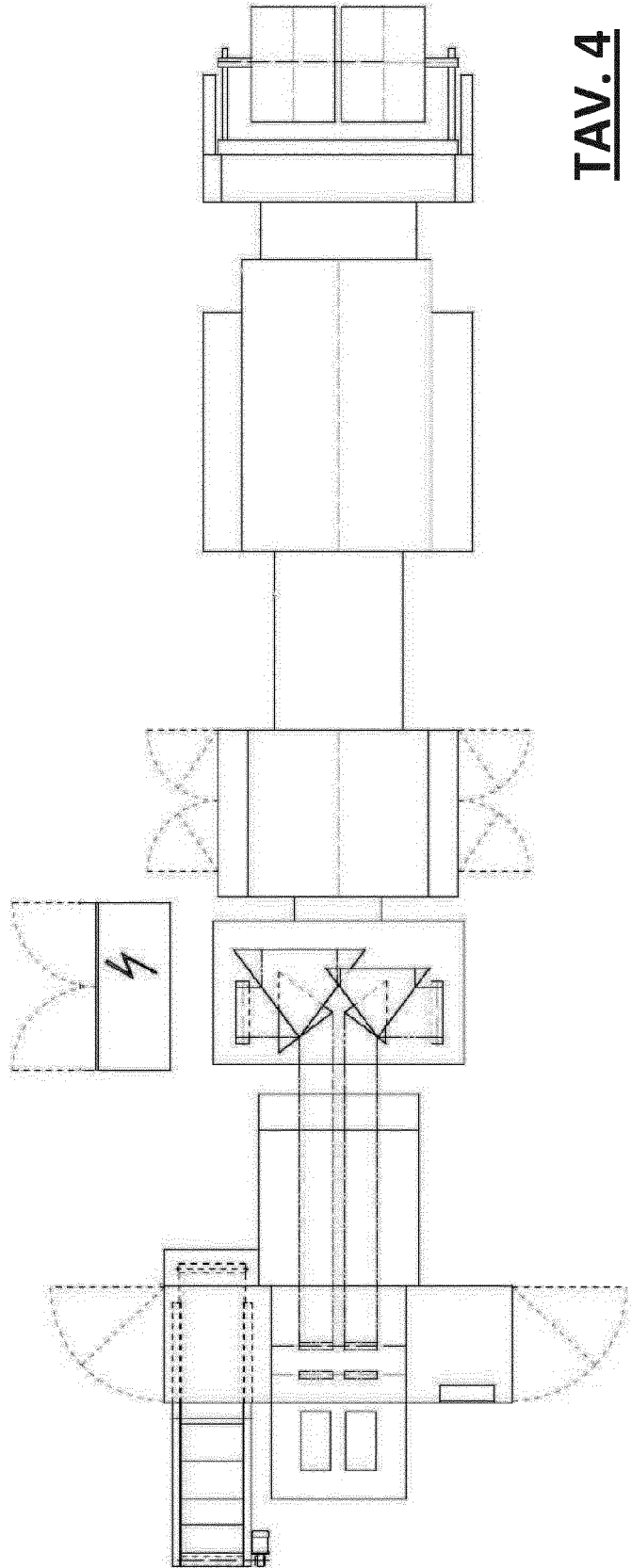
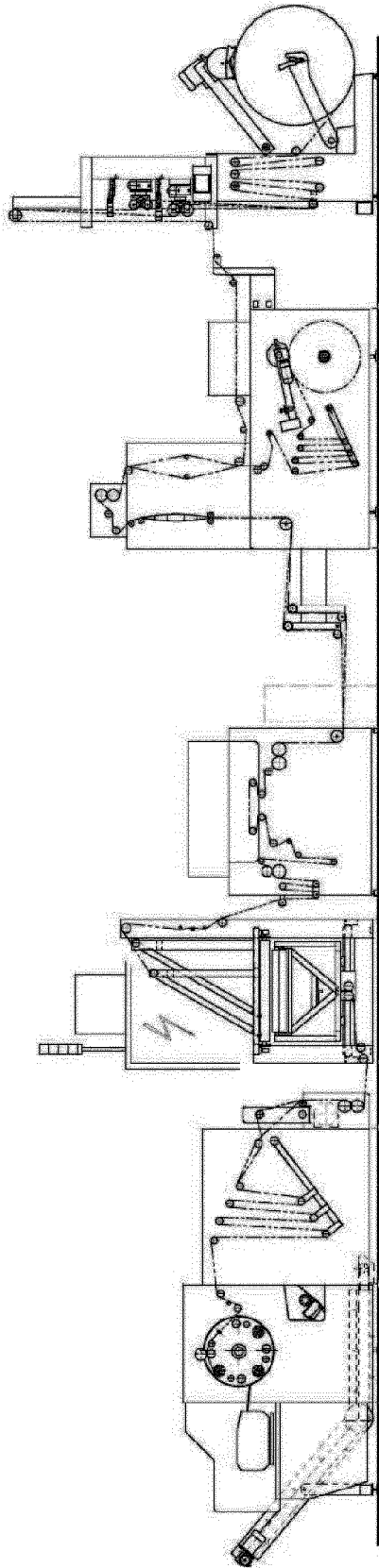
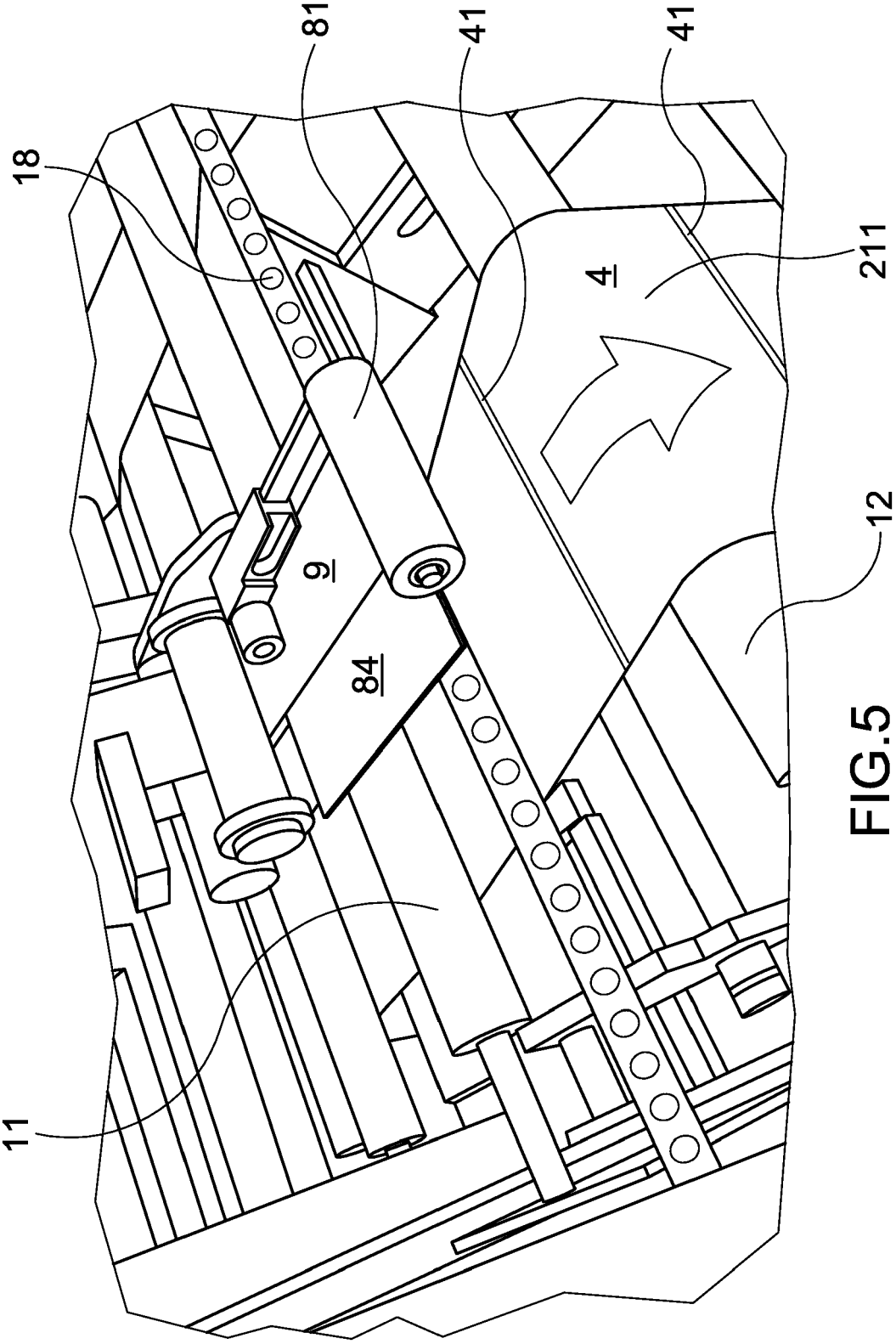


FIG. 3



**TAV. 4**



**FIG. 5**

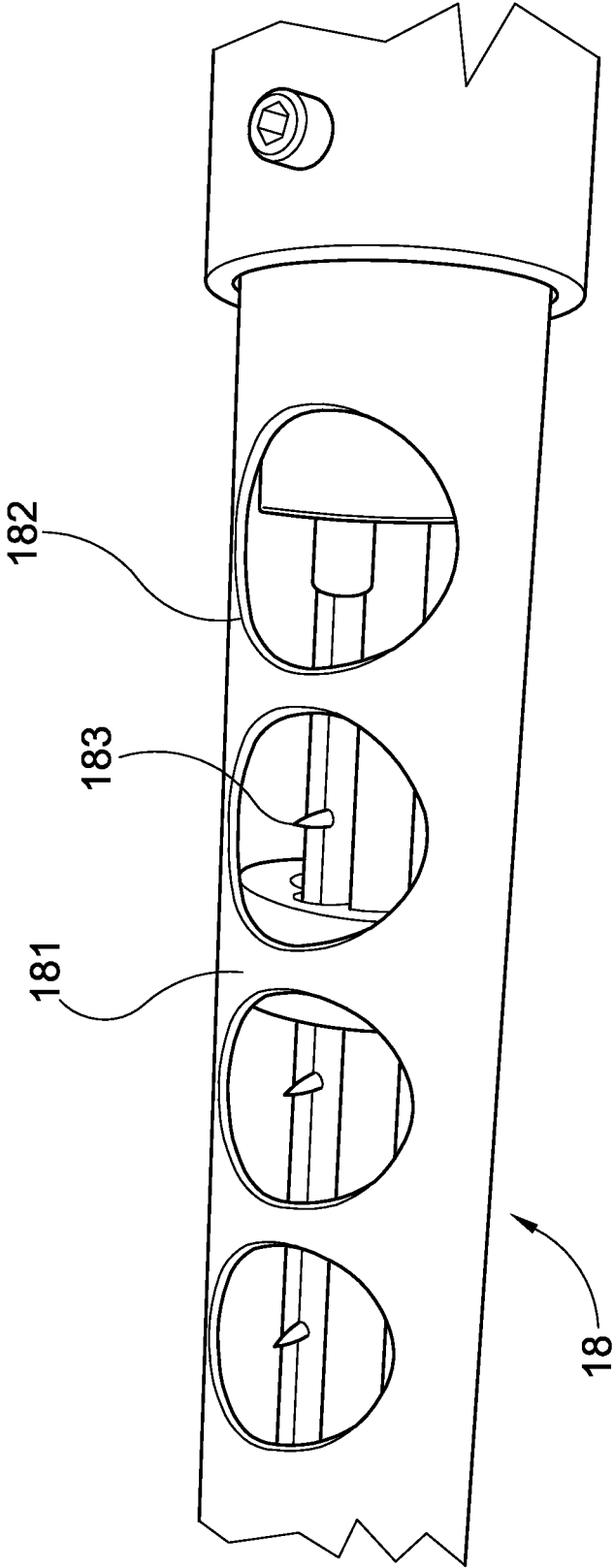


FIG. 6

**PARTIAL EUROPEAN SEARCH REPORT**

Application Number

under Rule 62a and/or 63 of the European Patent Convention.  
This report shall be considered, for the purposes of  
subsequent proceedings, as the European search report

EP 12 16 6915

| DOCUMENTS CONSIDERED TO BE RELEVANT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                              |                                                             |                                         |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------|-----------------------------------------|
| Category                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Citation of document with indication, where appropriate, of relevant passages                                | Relevant to claim                                           | CLASSIFICATION OF THE APPLICATION (IPC) |
| Y                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | CN 101 462 603 A (TAIWAN LAMINATION IND INC [CN]) 24 June 2009 (2009-06-24)<br>* figures 5,6 *               | 1,4-6                                                       | INV.<br>B65F1/14<br>B31B19/74           |
| Y                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | US 4 027 577 A (THOMPSON JOHN A ET AL) 7 June 1977 (1977-06-07)<br>* column 4, line 29 - column 4, line 41 * | 1,4-6                                                       |                                         |
| Y                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | US 2006/084559 A1 (SELLE PAUL [US] ET AL) 20 April 2006 (2006-04-20)<br>* paragraph [0035] *                 | 4-6                                                         |                                         |
| A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | US 3 578 528 A (WEISSHUHN PETER) 11 May 1971 (1971-05-11)<br>* claim 5 *                                     | 1,4-6                                                       |                                         |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                              |                                                             | TECHNICAL FIELDS SEARCHED (IPC)         |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                              |                                                             | B65F<br>B31B                            |
| <b>INCOMPLETE SEARCH</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                              |                                                             |                                         |
| <p>The Search Division considers that the present application, or one or more of its claims, does/do not comply with the EPC so that only a partial search (R.62a, 63) has been carried out.</p> <p>Claims searched completely :</p> <p>Claims searched incompletely :</p> <p>Claims not searched :</p> <p>Reason for the limitation of the search:<br/>see sheet C</p>                                                                                                                                                                                                  |                                                                                                              |                                                             |                                         |
| Place of search<br><b>Munich</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                              | Date of completion of the search<br><b>18 February 2013</b> | Examiner<br><b>Bevilacqua, Vincenzo</b> |
| <p><b>CATEGORY OF CITED DOCUMENTS</b></p> <p>X : particularly relevant if taken alone<br/>Y : particularly relevant if combined with another document of the same category<br/>A : technological background<br/>O : non-written disclosure<br/>P : intermediate document</p> <p>T : theory or principle underlying the invention<br/>E : earlier patent document, but published on, or after the filing date<br/>D : document cited in the application<br/>L : document cited for other reasons<br/>&amp; : member of the same patent family, corresponding document</p> |                                                                                                              |                                                             |                                         |

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**INCOMPLETE SEARCH  
SHEET C**

Application Number  
EP 12 16 6915

Claim(s) completely searchable:  
1, 4-6

Claim(s) not searched:  
2, 3

Reason for the limitation of the search:

In reply to the invitation to file a statement indicating the subject-matter to be searched (Rule 62A(1) EPC), the applicant failed to provide the requested information in due time.  
As a consequence of that only claims 1,4-6 have been searched.  
The applicant's attention is drawn to the fact that the application will be further prosecuted on the basis of subject-matter for which a search has been carried out(Rule 62(a)1 EPC).

**ANNEX TO THE EUROPEAN SEARCH REPORT  
ON EUROPEAN PATENT APPLICATION NO.**

EP 12 16 6915

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.  
The members are as contained in the European Patent Office EDP file on  
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18-02-2013

| Patent document<br>cited in search report | Publication<br>date | Patent family<br>member(s) | Publication<br>date |
|-------------------------------------------|---------------------|----------------------------|---------------------|
| CN 101462603 A                            | 24-06-2009          | NONE                       |                     |
| US 4027577 A                              | 07-06-1977          | AU 1489176 A               | 22-12-1977          |
|                                           |                     | BR 7604138 A               | 26-07-1977          |
|                                           |                     | CA 1045436 A1              | 02-01-1979          |
|                                           |                     | DE 2633341 A1              | 24-02-1977          |
|                                           |                     | GB 1553244 A               | 26-09-1979          |
|                                           |                     | JP 52015783 A              | 05-02-1977          |
|                                           |                     | MX 3398 E                  | 28-10-1980          |
|                                           |                     | US 4027577 A               | 07-06-1977          |
| US 2006084559 A1                          | 20-04-2006          | AU 2005310286 A1           | 08-06-2006          |
|                                           |                     | CA 2583566 A1              | 08-06-2006          |
|                                           |                     | CA 2748613 A1              | 08-06-2006          |
|                                           |                     | CN 101080315 A             | 28-11-2007          |
|                                           |                     | DK 2177347 T3              | 11-02-2013          |
|                                           |                     | EP 1802450 A2              | 04-07-2007          |
|                                           |                     | EP 2177347 A2              | 21-04-2010          |
|                                           |                     | US 2006084559 A1           | 20-04-2006          |
|                                           |                     | US 2008119340 A1           | 22-05-2008          |
|                                           |                     | WO 2006060064 A2           | 08-06-2006          |
| US 3578528 A                              | 11-05-1971          | NONE                       |                     |

**REFERENCES CITED IN THE DESCRIPTION**

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**Patent documents cited in the description**

- CN 101462603 [0007]