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(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM,

(54) Title: ANTISLIP, HEAT SEALABLE PLASTIC FLEXIBLE PACKAGING BAG AND METHOD AND APPARATUS FOR ITS PRODUCTION

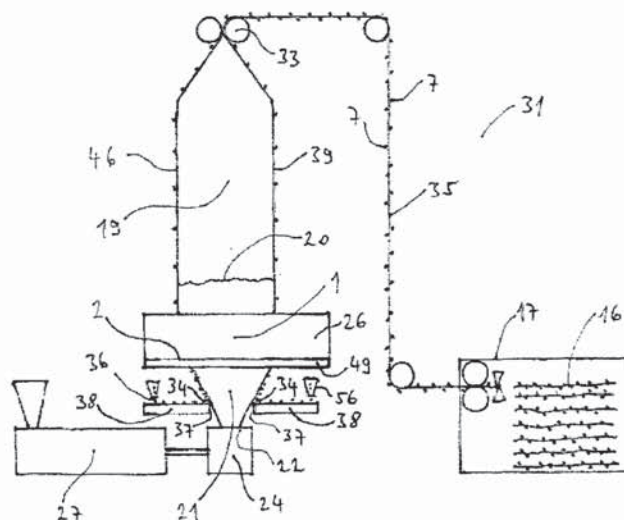


FIG. 1.

(57) Abstract: Antislip, heat sealable plastic packaging bag (16), formed from an antislip flexible packaging material (35) whose wall (45) has an average surface weight of at most 500 g/m². The packaging material (35) comprises a multiplicity of randomly distributed, separate antislip protrusions (7) of a first substance. The protrusion height (11) is between 50 micrometres and 10000 micrometres, with an average of top-plan-view aspect ratios of the antislip protrusions (7) being at most 5.0. Some antislip protrusions (7) have a hidden surface portion (12) being a portion of a free surface of the antislip protrusion (7) which the antislip protrusion (7) covers from a viewer in a top plan view of the wall (45). The first substance is a thermoplastic polymer, and the wall's outer surface (46) is of a substance at least somewhat different from the first substance. It is an important feature that the first substance has a melt mass flow rate of at least 0.6 g/10 min.. An apparatus, for producing the packaging material (35), includes a film blowing die head (24), a cooling air ring (1), and a particle dispersing unit (38) therebetween, for dispersing polymer particles (36) on the bubble neck (21) at a place in, or closely under, an expanding area (25) where the bubble (19) has a divergent shape.

AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

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Declarations under Rule 4.17:

- *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))*
- *as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))*
- *of inventorship (Rule 4.17(iv))*

Published:

- *with international search report (Art. 21(3))*

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 716452/ZSO	FOR FURTHER ACTION		See Form PCT/IPEA/416
International application No. PCT/HU2017/000028	International filing date (<i>day/month/year</i>) 20.04.2017	Priority date (<i>day/month/year</i>) 26.05.2016	
International Patent Classification (IPC) or national classification and IPC INV. B65D33/00			
Applicant Flexinnova Kft			
1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36. 2. This REPORT consists of a total of <u>7</u> sheets, including this cover sheet. 3. This report is also accompanied by ANNEXES, comprising: a. ☒ (<i>sent to the applicant and to the International Bureau</i>) a total of <u>8</u> sheets, as follows: ☒ sheets of the description, claims and/or drawings which have been amended and/or sheets containing rectifications authorized by this Authority, unless those sheets were superseded or cancelled, and any accompanying letters (see Rules 46.5, 66.8, 70.16, 91.2, and Section 607 of the Administrative Instructions). ☐ sheets containing rectifications, where the decision was made by this Authority not to take them into account because they were not authorized by or notified to this Authority at the time when this Authority began to draw up this report, and any accompanying letters (Rules 66.4bis, 70.2(e), 70.16 and 91.2). ☐ superseded sheets and any accompanying letters, where this Authority either considers that the superseding sheets contain an amendment that goes beyond the disclosure in the international application as filed, or the superseding sheets were not accompanied by a letter indicating the basis for the amendments in the application as filed, as indicated in item 4 of Box No. I and the Supplemental Box (see Rule 70.16(b)). b. ☐ (<i>sent to the International Bureau only</i>) a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing, in the form of an Annex C/ST.25 text file, as indicated in the Supplemental Box Relating to Sequence Listing (see paragraph 3ter of Annex C of the Administrative Instructions).			
4. This report contains indications relating to the following items: ☒ Box No. I Basis of the report ☐ Box No. II Priority ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability ☐ Box No. IV Lack of unity of invention ☒ Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement ☐ Box No. VI Certain documents cited ☐ Box No. VII Certain defects in the international application ☐ Box No. VIII Certain observations on the international application			
Date of submission of the demand 19.12.2017		Date of completion of this report 15.05.2018	
Name and mailing address of the international preliminary examining authority:  European Patent Office P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Fax: +31 70 340 - 3016		Authorized officer Fageot, Philippe Telephone No. +31 70 340-2092	



Box No. I Basis of the report

1. With regard to the **language**, this report is based on
- ☒ the international application in the language in which it was filed
 - ☐ a translation of the international application into , which is the language of a translation furnished for the purposes of:
 - ☐ international search (under Rules 12.3(a) and 23.1(b))
 - ☐ publication of the international application (under Rule 12.4(a))
 - ☐ international preliminary examination (under Rules 55.2(a) and/or 55.3(a) and (b))
2. With regard to the **elements*** of the international application, this report is based on (*replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report*):

Description, Pages

1-47 as originally filed

Claims, Numbers

1-30 filed with telefax on 01-02-2018

Drawings, Sheets

1/7-7/7 as originally filed

- ☐ a sequence listing - see Supplemental Box Relating to Sequence Listing.
3. ☐ The amendments have resulted in the cancellation of:
- ☐ the description, pages
 - ☐ the claims, Nos.
 - ☐ the drawings, sheets/figs
 - ☐ the sequence listing (*specify*):
4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since either they are considered to go beyond the disclosure as filed, or they were not accompanied by a letter indicating the basis for the amendments in the application as filed, as indicated in the Supplemental Box (Rules 70.2(c) and (c-bis)):
- ☐ the description, pages
 - ☐ the claims, Nos.
 - ☐ the drawings, sheets/figs
 - ☐ the sequence listing (*specify*):
5. ☐ This report has been established:
- ☐ taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rules 66.1(d-bis) and 70.2(e)).
 - ☐ without taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91(Rules 66.4bis and 70.2(e)).

**INTERNATIONAL PRELIMINARY REPORT
ON PATENTABILITY**

International application No.
PCT/HU2017/000028

6. ☒ With regard to top-up searches (Rules 66.1 *ter* and 70.2(f)):
- ☒ A top-up search was carried out by this Authority on 18.04.2018 (all discovered documents are listed in the Supplemental Box Relating to Top-up Search).
 - ☐ Additional relevant documents have been discovered during the top-up search.
 - ☐ No top-up search was carried out by this Authority because it would serve no useful purpose.
7. ☐ Supplementary international search report(s) from Authority(ies) has/have been received and taken into account in establishing this report (Rule 45bis.8(b) and (c)).

* If item 4 applies, some or all of those sheets may be marked "superseded".

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	<u>1-30</u>
	No: Claims	
Inventive step (IS)	Yes: Claims	<u>1-30</u>
	No: Claims	
Industrial applicability (IA)	Yes: Claims	<u>1-30</u>
	No: Claims	

2. Citations and explanations (Rule 70.7):

see separate sheet

Re Item V.

1 The following documents are referred to in this communication:

D1 US 6 444 080 B1 (MANDZSU SEN JOZSEF [HU] ET AL) 3 September 2002 (2002-09-03) cited in the application

D2 HU 220 997 B1 (ID MANDZSU JOZSEF [HU]; IFJ MANDZSU JOZSEF [HU]; MANDZSU ZOLTAN [HU]) 29 July 2002 (2002-07-29) cited in the application

2 The following statements are made taking into account item VIII.

2.1 Independent claim 1

2.1.1 Document D1, which is considered to represent the most relevant state of the art, discloses (the references in parenthesis applying to this document) :

Antislip, heat sealable plastic packaging bag (*col. 1, lines 38-60*), the packaging bag formed from an antislip flexible packaging material (*col. 1, lines 6-15*), the packaging material comprising a heat sealable plastic flexible wall having an outer surface, the wall having an average surface weight of at most 500 g/m² (*Example 3*), in at least a part, the roughened part, of the wall the packaging material comprising a multiplicity of separate antislip protrusions, of a first substance, randomly distributed on the outer surface and projecting from the outer surface to a protrusion height of between 50 micrometres and 10000 micrometres (*col. 5, lines 9-45, Example 3*), with an average of top-plan-view aspect ratios of the multiplicity of the antislip protrusions being at least 1.0 and at most 5.0 (*Example 3*), at least some of the antislip protrusions having a hidden surface portion being a portion of a free surface of the antislip protrusion which the antislip protrusion covers from a viewer in a top plan view of the wall taken from above the antislip protrusions, the multiplicity of the antislip protrusions looking toward an outside of the packaging bag (*col. 5, lines 9-45*), the first substance being a thermoplastic polymer, and the outer surface being of a second substance different in some property from the first substance (*col. 3, line 63 - col. 4, line 12*).

- 2.1.2 The subject-matter of independent claim **1** differs therefrom in that the first substance has a melt mass flow rate of at least 0.6 g/10 min. determined at 190 °C under a load of 2.16 kg in accordance with ISO 1133-1.

The subject-matter of claim **1** is therefore novel (Article 33(2) PCT).

- 2.1.3 The objective problem underlying claim **1** is to propose an antislip, heat sealable plastic packaging bag having good antislip properties while at the same time maintaining the optimum welding parameters of the flexible packaging parameters, cf description, page 8, line 5 - page 9, line 18.

- 2.1.4 The solution to this problem proposed in claim **1** of the present application is neither known nor is it suggested from the cited prior art documents.

The demand for a good abrasion resistance of the particles (taught in D1) leads the skilled person toward a particle-substance of a low fractional melt mass flow rate since a very low melt mass flow rate is known to mean greater product abrasion-resistance and strength.

There is not any teaching or suggestion prompting (explicitly or implicitly) the skilled person to use in a roughened packaging film, as disclosed in D1, thermoplastic antislip protrusions of a substance of a melt mass flow rate as high as, or higher than, 0.6 g/10 min while there are definite suggestions on the contrary.

Consequently the subject-matter of claim **1** meets the requirements of Article 33(3) PCT.

- 2.2 Independent claim **13**

The reasoning of independent product claim **1** applies, mutatis mutandis, to the subject-matter of the corresponding independent method claim **13**, which therefore is also considered novel and inventive (Articles 33(2) and 33(3) PCT).

- 2.3 Independent claim **23**

- 2.3.1 Document D2, which is considered to represent the most relevant state of the art, discloses (the references in parenthesis applying to this document) :

an apparatus for roughening a blown film (*abstract*), the apparatus constituting a sub-unit for a film blowing machine, the film blowing machine for producing a blown film plastic wall for a packaging material (*abstract, figure 2*), the apparatus including a film blowing die head with an annular die gap (*figure 1*), and an external cooling air ring above the die head, the die gap having an outer diameter, and the air ring having a bottom, the die gap and the air ring together suitable to define a path of an outer surface of the plastic wall, the path having a shape of a bubble extending from the die gap up through the air ring (*figure 2*), and at least above the air ring bottom the bubble having one or more expanding areas in which the wall is exposed to a horizontal expansion and planes tangent to the path close angles, the angles of expansion, of at least 2.5 degrees with the vertical (*page 3, col. 2 - page 4, col. 2, figure 2*), the sub-unit further including a particle dispersing unit defining a landing area of the path by being suitable for dispersing in the landing area, with a random distribution, thermoplastic polymer particles on the outer surface between the die gap and the air ring (*page 4, col. 1 and 2, figure 2*).

- 2.3.2 The subject-matter of independent claim **23** differs therefrom in that said apparatus is characterised in any one or both of a.) a second vertical distance, in a side view of the apparatus, between the landing area and the air ring bottom being either zero or at most 2.0 times the die gap outer diameter, and b.) at least one of the one or more expanding areas including at least a part of the landing area.

The subject-matter of claim **23** is therefore novel (Article 33(2) PCT).

- 2.3.3 The objective problem underlying claim **23** is to propose an apparatus for roughening a blown film, the apparatus constituting a sub-unit for a film blowing machine, the film blowing machine for producing a blown film plastic wall for a packaging material having good antislip properties while at the same time maintaining the optimum welding parameters of the flexible packaging parameters, cf description, page 8, line 5 - page 9, line 18. Independent claim **23** aims also at solving the technical problem of particles sticking together during their re-collection after bouncing from the hot bubble.

- 2.3.4 The solution to this problem proposed in claim **23** of the present application is neither known nor is it suggested from the cited prior art documents.

The demand for a good abrasion resistance of the particles (taught in D1) leads the skilled person toward a particle-substance of a low fractional melt mass flow rate since a very low melt mass flow rate is known to mean greater product abrasion-resistance and strength.

There is not any teaching or suggestion prompting (explicitly or implicitly) the skilled person to use in a roughened packaging film, as disclosed in D1, thermoplastic antislip protrusions of a substance of a melt mass flow rate as high as, or higher than, 0.6 g/10 min while there are definite suggestions on the contrary.

Consequently the subject-matter of claim **23** meets the requirements of Article 33(3) PCT.

- 2.4 Dependent claims **2 - 12, 14 - 22** and **24 - 30**

Claims **2 - 12, 14 - 22** and **24 - 30** are dependent on claims **1, 13** and **23** and fulfill as a result the requirements of Articles 33(2) and (3) PCT.

S B G K

EST. 1969

Budapest, 31 January 2018

Your ref.: PCT/HU2017/000028

Our ref.: 716452/PCT/ZSO

VIA TELEFAX**49-89/2399-4465****Total pages: 8****Messrs.****EUROPEAN PATENT OFFICE**

International Preliminary

Examining Authority (IPEA)

Munich

Demand for International Preliminary Examination

in case PCT/HU2017/000028

Applicants: Flexinnova Kft.

Starlinger & Co. Gesellschaft m.b.H

"ANTISLIP, HEAT SEALABLE PLASTIC FLEXIBLE PACKAGING BAG AND METHOD AND APPARATUS FOR ITS PRODUCTION"

Dear Sirs,

With reference to your communication of 10 January, 2018 please find enclosed the complete set of claims with the amended claim 1.

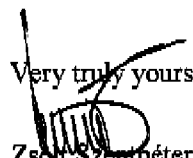
With regard to Item VIII of the Written Opinion of the International Searching authority sent to us together with the International Search Report on August 3, 2017 we wish to make the following comments and amendments.

The expression "the roughened part (47)" in claim 1 caused lack of clarity, because in claim 1 no earlier mention is made of a roughened part. Therefore, we amended said part to read "a roughened part (47)".

We hereby file a new amended page 48 including said amendment to claim 1.

The applicant expressly wishes the international preliminary examination to start earlier than at the expiration of the applicable time limit under Rule 54bis.1(a).

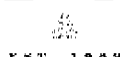
Please confirm receipt of the documents.

Very truly yours,

Zsolt Szentpéteri
Patent Attorney

Encl.

Set of claims with amended page no. 48.

Applicant's comments regarding the WO

S B G K

APPLICANT'S COMMENTS
regarding the statements of the International Searching Authority
in the Written Opinion mailed on August 03, 2017

With regard to Item VIII of the Written Opinion of the International Searching authority sent to us together with the International Search Report on August 3, 2017 we wish to make the following comments and amendments.

The expression "the roughened part (47)" in claim 1 caused lack of clarity, because in claim 1 no earlier mention is made of a roughened part. Therefore, we amended said part to read "a roughened part (47)".

We hereby file a new amended page 48 including said amendment to claim 1.

CLAIMS

1. Antislip, heat sealable plastic **packaging bag** (16),
the packaging bag (16) formed from an antislip flexible packaging material (35),
5 the packaging material (35) comprising a heat sealable plastic flexible wall (45) having an
outer surface (46), the wall (45) having an average surface weight of at most 500 g/m^2 ,
in at least a part, a roughened part (47), of the wall (45) the packaging material (35)
comprising a multiplicity of separate antislip protrusions (7), of a first substance, randomly
distributed on the outer surface (46) and projecting from the outer surface (46) to a protrusion
10 height (11) of between 50 micrometres and 10000 micrometres, with an average of top-plan-
view aspect ratios of the multiplicity of the antislip protrusions (7) being at least 1.0 and at
most 5.0,
at least some of the antislip protrusions (7) having a hidden surface portion (12) being a
portion of a free surface of the antislip protrusion (7) which the antislip protrusion (7) covers
15 from a viewer in a top plan view of the wall (45) taken from above the antislip protrusions
(7),
the multiplicity of the antislip protrusions (7) looking toward an outside (18) of the packaging
bag (16),
the first substance being a thermoplastic polymer, and the outer surface (46) being of a second
20 substance different in some property from the first substance,
characterised in that
the first substance has a melt mass flow rate of at least 0.6 g/10 min. determined at 190°C
under a load of 2.16 kg in accordance with ISO 1133-1.
- 25 2. The packaging bag (16) according to claim 1, wherein the first substance has a melt mass
flow rate of at least 0.7 g/10 min. (preferably at least 0.8 g/10 min. , more preferably at least
 0.9 g/10 min. , even more preferably at least 1.0 g/10 min.) determined at 190°C under a load
of 2.16 kg in accordance with ISO 1133-1.
- 30 3. The packaging bag (16) according to any of claims 1-2, wherein the first substance has a
melt mass flow rate of at most 300 g/10 min. determined at 190°C under a load of 2.16 kg in
accordance with ISO 1133-1.

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**Amended sheet
19 December 2017**

4. The packaging bag (16) according to any of claims 1-3, wherein the antislip protrusions (7) occupy at most 60% of an area of the antislip packaging material (35) in a top plan view of the wall roughened part (47) taken from above the antislip protrusions (7).

5 5. The packaging bag (16) according to any of claims 1-4, wherein the antislip protrusions (7) are of random top-plan-view sizes (14).

6. The packaging bag (16) according to any of claims 1-5, wherein the antislip protrusions (7) are fixed to the wall (45).

10

7. The packaging bag (16) according to claim 6, wherein the antislip protrusions (7) are formed of particles (36) fixed to the wall (45).

8. The packaging bag (16) according to claim 7, wherein the antislip protrusions (7) are formed of granules (36) fused to the wall (45).

15

9. The packaging bag (16) according to any of claims 1-8, wherein at least some antislip protrusions (7) each have a volume of from 0.0000335 mm^3 to 524 mm^3 .

10. The packaging bag (16) according to any of claims 1-9, wherein the antislip protrusions (7) having the hidden surface portion have at least one undercut (15) and include at least one area (8) immediately above the undercut (15), the antislip protrusion (7) being so dimensioned as to form a separation (42) between the at least one area (8) and the wall outer surface (46) which is greater than 12 micrometres.

25

11. The packaging bag (16) according to any of claims 1-10, wherein the packaging material (35) includes plastic woven fabric (55).

12. The packaging bag (16) according to any of claims 1-11, wherein the packaging bag (16) is large enough to accommodate at least 4.5 kilograms of contents in it.

30

13. A method for providing an antislip, heat sealable plastic packaging bag according to any of claims 1-12, the method including

AMENDED SHEET

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**Amended sheet
19 December 2017**

- providing particles of a first substance and of a suitable size and shape, the first substance being a thermoplastic polymer,
- providing a film blowing machine having an annular die gap and an external bubble-cooling unit above the die gap and a haul-off unit above the external bubble-cooling unit,
- 5 providing a blown film bubble consisting of a plastic wall emerging from the die gap and proceeding toward the haul-off unit,
- the plastic wall having an outer surface of a second substance, the second substance different in some property from the first substance and suitable to fuse with the first substance,
- providing a neck of the bubble, in which the wall is suitably hot and plastic-state, between the
- 10 die gap and a freezing line of the bubble, the freezing line being a part of the bubble where the wall is made to reach a final thickness of the wall,
- selecting an area, the landing area, of the neck between the die gap and the external bubble-cooling unit, where the outer surface is tacky,
- in the landing area bringing and sticking, with a random distribution, the particles to the outer
- 15 surface of at least a part, the roughened part, of the wall,
- using a heat content of the suitably hot wall for starting a fusing process in the proceeding wall for fusing the stuck particles to the outer surface,
- ending the fusing process, by cooling, at a desired extent of the fusing for forming a suitably strong fixation between the outer surface and the particles fused to it,
- 20 freezing the wall by cooling, for providing a heat sealable, plastic, flexible frozen wall,
- providing in the frozen wall an average surface weight of at most 500 g/m²,
- thereby forming, from the particles fused to the wall, a multiplicity of separate antislip protrusions of the first substance randomly distributed on the outer surface of the frozen wall and projecting from the outer surface to a protrusion height of between 50 micrometres and
- 25 10000 micrometres with an average of top-plan-view aspect ratios of the multiplicity of the antislip protrusions being at least 1.0 and at most 5.0,
- providing at least some of the antislip protrusions with a hidden surface portion being a portion of a free surface of the antislip protrusion which the antislip protrusion covers from a viewer in a top plan view of the wall taken from above the antislip protrusions,
- 30 the frozen wall together with the antislip protrusions projecting from its outer surface constituting an antislip flexible packaging material,
- forming from the antislip flexible packaging material a packaging bag with the multiplicity of the antislip protrusions looking toward an outside of the packaging bag,

AMENDED SHEET

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**Amended sheet
19 December 2017****characterised in**

selecting the first substance to have a melt mass flow rate of at least 0.6 g/10 min. determined at 190 °C under a load of 2.16 kg in accordance with ISO 1133-1.

5 14. The method according to claim 13, including selecting the first substance to have a melt mass flow rate of at least 0.7 g/10 min. (preferably at least 0.8 g/10 min., more preferably at least 0.9 g/10 min., even more preferably at least 1.0 g/10 min.) determined at 190 °C under a load of 2.16 kg in accordance with ISO 1133-1.

10 15. The method according to any of claims 13-14, including selecting the first substance to have a melt mass flow rate of at most 300 g/10 min. determined at 190 °C under a load of 2.16 kg in accordance with ISO 1133-1.

15 16. The method according to any of claims 13-15, including forming the antislip protrusions occupying at most 60% of an area of the antislip packaging material in a top plan view of the wall roughened part taken from above the antislip protrusions.

17. The method according to any of claims 13-16, including forming the antislip protrusions of random top-plan-view sizes.

20 18. The method according to any of claims 13-17, including forming at least some antislip protrusions each having a volume of from 0.0000335 mm³ to 524 mm³.

25 19. The method according to any of claims 13-18, including the antislip protrusions having the hidden surface portion having at least one undercut and including at least one area immediately above the undercut, the antislip protrusion being so dimensioned as to form a separation between the at least one area and the wall outer surface which is greater than 12 micrometres.

30 20. The method according to any of claims 13-19, including forming the packaging bag large enough to accommodate at least 4.5 kilograms of contents in it.

21. The method according to any of claims 13-20, including

AMENDED SHEET

providing an outer diameter of the die gap,

providing an expanding area of the neck in which the proceeding wall, carrying the particles stuck thereto, is exposed to a horizontal expansion, the expanding area provided with a shape in which planes tangent to the outer surface close angles, the angles of expansion, of at least
5 2.5 degrees with the vertical, and

providing a first vertical distance, in a side view of the bubble, between the landing area and the expanding area which first vertical distance is either zero or at most equals 2.0 times the die gap outer diameter.

10 22. The method according to any of claims 13-21, wherein each of at least some of the multiplicity of separate antislip protrusions is formed from a single particle.

23. An apparatus for roughening a blown film, the apparatus constituting a sub-unit for a film blowing machine (31), the film blowing machine (31) for producing a blown film plastic wall (45) for a packaging material (35), the apparatus including
15 a film blowing die head (24) with an annular die gap (22), and an external cooling air ring (1) above the die head (24), the die gap (22) having an outer diameter (23), and the air ring (1) having a bottom (2),

the die gap (22) and the air ring (1) together suitable to define a path (39) of an outer surface
20 (46) of the plastic wall (45), the path (39) having a shape of a bubble (19) extending from the die gap (22) up through the air ring (1), and

at least above the air ring bottom (2) the bubble (19) having one or more expanding areas (25) in which the wall (45) is exposed to a horizontal expansion and planes (40) tangent to the path (39) close angles, the angles of expansion (6), of at least 2.5 degrees with the vertical,

25 the sub-unit further including a particle dispersing unit (38) defining a landing area (34) of the path (39) by being suitable for dispersing in the landing area (34), with a random distribution, thermoplastic polymer particles (36) on the outer surface (46) between the die gap (22) and the air ring (1),

characterised in any one or both of

30 a.) a second vertical distance (41), in a side view of the apparatus, between the landing area (34) and the air ring bottom (2) being either zero or at most 2.0 times the die gap outer diameter (23),

and

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b.) at least one of the one or more expanding areas (25) including at least a part of the landing area (34).

24. The apparatus according to claim 23, wherein an end (37), proximate to the outer surface (46), of the particle dispersing unit (38) is suitable to be closer to the outer surface (46) than 1.0 mm.

25. The apparatus according to claim 24, wherein the particle dispersing unit proximate end (37) is suitable to be cooled and to have a contact with the outer surface (46).

26. The apparatus according to claim 25, wherein the particle dispersing unit (38) includes a feeder (28) for conveying the particles (36) toward the outer surface (46) and the particle dispersing unit proximate end (37) is constituted by an end (30), proximate to the outer surface (46), of the feeder (28).

27. The apparatus according to any of claims 23-26, wherein the air ring (1) is either a dual-lip type air ring (1) or an air ring (1) having more than two cooling-air-orifices (62).

28. The apparatus according to any of claims 23-27, wherein the apparatus further includes a wind shield (49) between a level (3) of the air ring bottom (2) and a top level (44) of at least a part of the landing area (34) for an at least partial protecting of the at least a part of the landing area (34) from a wind (48) of the air ring (1).

29. The apparatus according to claim 28, wherein the wind shield (49) is an active wind shield (49) including a wind shield chamber (50) having a top (54) and a bottom (51) and an opening (53) proximate and toward the wall outer surface (46), for conducting the wind (48) at least partly through the proximate opening (53) and through the wind shield chamber (50) for at least partly protecting the landing area (34) under the wind shield chamber bottom (15) from the wind (48).

30. The apparatus according to any of claims 23-29, wherein a third vertical distance (43), in a side view of the apparatus, between the landing area (34) and the die gap (22) is either zero or at most 70 mm.

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