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(54) **WEFT BRAKING DEVICE FOR ACCUMULATOR YARN FEEDERS**

(57) A weft braking device comprises an axially symmetrical concave body (16) which is pushed with its internal surface against the delivery edge (12a) of the drum (12) of an accumulator yarn feeder. A wear-resistant lamina (20), which has a concave annular profile delimited between an internal annular edge (20a) and an external annular edge (20b), covers an internal annular surface (S) of the concave body (16) in the region in which it abuts against the drum (12). The concave body (16) has a series of slits (22) which are arranged along a circumference thereof, and the wear-resistant lamina (20) has a series of fins (24) which project from the external annular edge (20b) thereof and can be inserted into the slits (22). The wear-resistant lamina (20) is made of a flexible material having a thickness such that it can be initially applied to the concave body (16) with an opposite concavity with respect thereto, and then turned inside out with matching concavity.

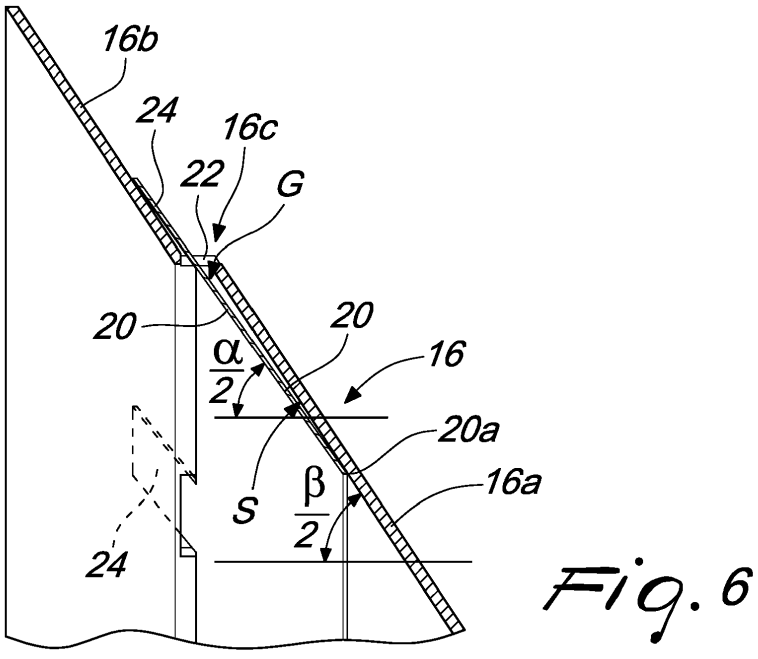

Fig. 6

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Description

[0001] The present invention relates to a weft braking device for accumulator yarn feeders.

[0002] As is known, a generic accumulator yarn feeder can comprise a drum that supports, wound thereon, a reserve of yarn which is adapted to be unwound on demand by a generic textile machine downstream. Before entering the textile machine, the yarn being unwound from the drum passes through a weft braking device which controls its mechanical tension.

[0003] The weft braking device can comprise a thin-walled, axially symmetrical concave body - typically a hollow frustum-shaped body - which is pushed by elastic means against the delivery edge of the drum.

[0004] The internal surface of the frustum-shaped body, in the annular region where it is in abutment against the drum, can be covered by a wear-resistant lamina which, conventionally, has a frustum-shaped annular profile with the same apex angle as the frustum-shaped body.

[0005] The yarn being unwound from the feeder slides while being pressed between the delivery edge of the drum and the wear-resistant lamina, in so doing receiving a braking action by friction.

[0006] In EP 0957058, the wear-resistant lamina is fixed to the hollow frustum-shaped body by double-sided adhesive tape.

[0007] Such solution has the advantage of being very simple to carry out, but it also has the drawback that the oils released by some yarns during feeding can easily cause the double-sided adhesive tape to become detached.

[0008] US6322016 shows some alternative solutions for fixing the wear-resistant lamina to the frustum-shaped body. In particular, in one of these solutions the outer edge of the wear-resistant lamina is pinched by tabs with a U-shaped profile which are cut directly into the frustum-shaped body.

[0009] Such solution has the drawback that the tabs, by protruding towards the inside of the wear-resistant lamina, can interfere with the unwinding of the yarn, thus compromising the correct feed.

[0010] Furthermore, the wear-resistant lamina can become slightly deformed in the vicinity of the zones pinched by the tabs. Such localized deformations can compromise the uniformity of contact between the wear-resistant lamina and the drum and, as a consequence, the fluidity of the braking action.

[0011] Moreover, the rotation of the wear-resistant lamina with respect to the frustum-shaped body is not stopped with any certainty, but is opposed only by the friction between the materials of the two elements. Therefore - especially in oily environments - over time slippages may occur between the wear-resistant lamina and the frustum-shaped body, which can compromise the precision of the braking action.

[0012] Also, with this solution the installation of the wear-resistant lamina in the frustum-shaped body is not straightforward, in that the tabs need to be lifted one by one while the wear-resistant lamina is inserted a little at a time, with the risk moreover that the wear-resistant lamina may be permanently deformed during handling.

[0013] Therefore, the aim of the present invention is to provide a weft braking device for accumulator yarn feeders, wherein the fixing of the wear-resistant lamina to the concave body is stable even in oily environments, does not interfere with the yarn being unwound, does not influence the uniformity of the braking action, and allows a rapid and straightforward assembly/disassembly of the two elements.

[0014] The above aims and other objects, which will become clearer from the description that follows, are achieved by a weft braking device having the characteristics recited in the appended claim 1, while the appended dependent claims define other characteristics of the invention.

[0015] Now the invention will be described in more detail, with reference to some preferred, but not exclusive, embodiments thereof, which are illustrated for the purposes of non-limiting example in the accompanying drawings, wherein:

- Figure 1 is a partially cross-sectional elevation side view of a portion of an accumulator yarn feeder on which a weft braking device according to the invention is installed;
- Figure 2 is a perspective view of two elements of the weft braking device according to the invention in a disassembled configuration;
- Figure 3 is a perspective view of the two elements of Figure 2 during assembly;
- Figure 4 is an axial cross-sectional view of an enlarged-scale detail of Figure 3;
- Figure 5 is a view similar to Figure 3, showing the two elements in the assembled configuration;
- Figure 6 is an axial cross-sectional view of an enlarged-scale detail of Figure 5;
- Figure 7 is a view similar to Figure 6, showing a first alternative embodiment of the invention;
- Figure 8 is a view similar to Figure 6, showing a second alternative embodiment of the invention.

[0016] With reference to the figures, a generic accumulator yarn feeder 10 can comprise a drum 12 that supports, wound thereon, a yarn Y that is adapted to be unwound on demand by a generic textile machine M downstream (shown only schematically in Figure 1). Before entering the textile machine M, the yarn Y being unwound from the drum 12 passes through a weft braking device 14 which controls its mechanical tension, and a yarn guiding bush 15.

[0017] The weft braking device 14 comprises an axially symmetrical concave body 16 which is pushed with its internal surface against the delivery edge 12a of the drum 12, for example, by elastic means 18 which are shown

only schematically in Figure 1.

[0018] With particular reference now to Figures 2-6, the internal surface S of the concave body 16, in the annular region where it is in abutment against the drum 12, is covered by a wear-resistant lamina 20 which has a concave annular profile delimited between an internal annular edge 20a and an external annular edge 20b.

[0019] According to the invention, in order to fix the wear-resistant lamina 20 to the concave body 16, the concave body is provided with a series of slits 22 which are arranged along a circumference thereof, while the wear-resistant lamina 20 has a series of fins 24 which project from the external annular edge 20b thereof and are aligned with the slits 22 in order to be inserted into them; the wear-resistant lamina 20 being made of a flexible material having a thickness such that it can be initially applied to the concave body 16 with an opposite concavity with respect thereto (as shown in Figures 3 and 4), by inserting the fins 24 into the slits 22, and then turned inside out so as to have a concavity that matches the concave body 16 (as shown in Figures 5 and 6).

[0020] Advantageously, when the wear-resistant lamina 20 is turned inside out, its internal annular edge 20a comes into contact with the internal surface of the concave body 16, while an annular gap G is defined between the external annular edge 20b of the wear-resistant lamina 20 and the internal surface of the concave body 16, for purposes that will be made clear below.

[0021] In the embodiment described herein by way of example, the wear-resistant lamina 20 has a substantially frustum-shaped profile and the internal annular surface S of the concave body 16 covered by the wear-resistant lamina 20 is also substantially frustum-shaped.

[0022] Therefore, with particular reference to Figure 6, in order to define the aforementioned annular gap G, the wear-resistant lamina 20 has an apex angle α that is slightly smaller than the apex angle β of the internal annular surface S. In particular, the difference between the apex angle β of the concave body 16 and the apex angle α of the wear-resistant lamina 20 is advantageously comprised between 1° and 3°, preferably 2°.

[0023] The wear-resistant lamina 20 is preferably made of a sheet of metallic material of a thickness comprised between 0.05 and 0.2 mm, more preferably 0.1 mm.

[0024] Advantageously a sheet of chromium-plated copper-beryllium can be used. However, other metallic materials can be suitable for the purpose, e.g., steel, aluminum, and others, all preferably chromium-plated.

[0025] In the embodiment shown in Figures 1-6, the concave body 16 is a thin-walled element, preferably made in a single piece, that has an innermost frustum-shaped portion 16a and an outermost frustum-shaped portion 16b which are interconnected by an intermediate cylindrical portion 16c, on which the slits 22 are provided.

[0026] The slits 22 advantageously have a thin elongated profile.

[0027] The fins 24 have a substantially rectangular profile with rounded corners, in order to facilitate insertion into the slits 22.

[0028] Advantageously, the fins 24 extend entirely along the directrices of the frustum-shaped profile of the wear-resistant lamina 20.

[0029] In this embodiment, there are twelve slits 22 and twelve fins 24, equally spaced apart angularly about the axis of the concave body 16 and of the wear-resistant lamina 20.

[0030] In use, as mentioned previously, the weft braking device 14 is assembled by simply inserting the fins 24 of the wear-resistant lamina 20 into the slits 22 of the concave body 16, with the concave side of the wear-resistant lamina 20, at this stage, facing the concave side of the concave body 16 (Figures 3 and 4). After this, by pressing manually on the internal annular edge 20a of the wear-resistant lamina 20, as indicated by the arrow F in Figure 4, the concavity of the wear-resistant lamina 20 is inverted (Figures 5 and 6). At this point, the internal annular edge 20a of the wear-resistant lamina 20 comes into contact with the internal surface of the innermost frustum-shaped portion 16a of the concave body 16 (Figure 6).

[0031] During feeding, as illustrated in Figure 1, the yarn Y slides while being pressed between the delivery edge 12a of the drum 12 and the wear-resistant lamina 20, in so doing receiving a braking action by friction.

[0032] The engagement of the fins 24 in the slits 22 definitively prevents the rotation of the wear-resistant lamina 20 with respect to the concave body 16, and provides a stable and enduring fixing even in the presence of oils in the yarn.

[0033] Another advantage of the system according to the invention is that the fins 24, by protruding outside the hollow body 16, according to the set aims, cannot interfere with the unwinding of the yarn Y from the drum 12.

[0034] Furthermore, anchoring the wear-resistant lamina 20 to the concave body 16 does not lead to deformations in the wear-resistant lamina 20 and, therefore, does not compromise the uniformity of the braking action in any way.

[0035] Also, as is known, during feeding the yarn Y can release processing dust due to the friction against the drum 12 and the wear-resistant lamina 20. Such dust can work its way between the wear-resistant lamina 20 and the concave body 16. However, according to an important characteristic of the invention, the different conicity of the wear-resistant lamina 20 with respect to the concave body 16 makes it possible to prevent the formation of pockets of dust in the lower region of the weft braking device 10, which could compromise the uniformity of the braking action.

[0036] As the person skilled in the art will be able to appreciate, any dust that is generated during the feeding process is discharged through the annular gap G defined between the external annular edge 20b of the wear-resistant lamina 20 and the internal surface of the concave body 16.

[0037] Figure 7 shows an alternative embodiment of the invention, which differs from the previous embodiment in that the concave body 116 has a continuous frustum-shaped profile, the slits 122 being provided in a circumference of such frustum-shaped profile, while the fins 124 have a bent profile.

[0038] In more detail, the fins 124 have:

- an innermost portion 124a which, when the wear-resistant lamina 120 is separated from the concave body 116, extends along the directrices of the frustum-shaped profile of the wear-resistant lamina 120; when the wear-resistant lamina 120 is inserted into the concave body 116 and turned inside out, it flexes due to the engagement with the respective slit 122, and
- an outermost portion 124b which is stably bent so as to rest against the external surface of the concave body 116 when the wear-resistant lamina 120 inserted into the concave body 116 is turned inside out.

[0039] Figure 8 shows a further embodiment of the invention, in which the concave body 216 has a continuous frustum-shaped profile and the slits 222 are provided on a circumference of such frustum-shaped profile, exactly as in the previous embodiment. In this embodiment, however, the fins 224 extend completely in continuity with the surface of the wear-resistant lamina 220 along the directrices of the frustum-shaped profile of the latter. Therefore, when the wear-resistant lamina 220 is inserted into the concave body 216 and turned inside out, the fins 224 are bent so as to pass through the slit 222 and protrude with their ends from the outer surface of the concave body 216.

[0040] Some preferred embodiments of the invention have been described, but obviously the person skilled in the art may make various modifications and variations within the scope of protection of the claims.

[0041] For example, the number of slits and of fins can be increased or reduced according to requirements.

[0042] Furthermore, the profile of the concave body and/or of the wear-resistant lamina can differ from those illustrated. For example, instead of having profiles that are perfectly frustum-shaped, these elements could be slightly cambered or hollowed.

[0043] Also, although in the embodiment described herein the concave body is pushed against the delivery edge of the drum by separate elastic means, in other cases the elasticity of the material of the concave body could be used.

[0044] It should furthermore be noted that the material of the wear-resistant lamina can differ from those indicated. In particular, although use of a metallic material should be understood to be preferred, the possibility is not ruled out that materials of a different nature, particularly synthetic materials, may be suitable for the purpose.

[0045] The disclosures in Italian Patent Application No. 102019000023889 from which this application claims priority are incorporated herein by reference.

[0046] Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly, such reference signs do not have any limiting effect on the interpretation of each element identified by way of example by such reference signs.

Claims

1. A weft braking device for an accumulator yarn feeder that is provided with a drum (12) on which a reserve of yarn (Y) is wound which is adapted to be unwound on demand by a downstream textile machine (M), which comprises:

   - an axially symmetrical concave body (16; 116) adapted to be pushed with its internal surface against the delivery edge (12a) of the drum (12),
   - a wear-resistant lamina (20; 120), which has a concave annular profile delimited between an internal annular edge (20a) and an external annular edge (20b) and covers an internal annular surface (S) of said concave body (16; 116) in the region in which it abuts against the drum (12),

   characterized in that said concave body (16) is provided with a series of slits (22; 122) which are arranged along a circumference thereof, and said wear-resistant lamina (20; 120) has a series of fins (24; 124) which project from the external annular edge (20b) thereof and are aligned with said slits (22; 122) in order to be inserted into them, said wear-resistant lamina (20; 120) being made of a flexible material having a thickness such that it can be initially applied to said concave body (16; 116) with an opposite concavity with respect thereto by inserting said fins (24; 124) into said slits (22; 122), and then turned inside out so as to have a concavity that matches the concave body (16; 116).

2. The weft braking device according to claim 1, **characterized in that** said wear-resistant lamina (20), in its inside-out configuration, has its internal annular edge (20a) in contact with the internal surface of the concave body (16), while an annular gap (G) is defined between the external annular edge (20b) of the wear-resistant lamina (20) and the internal surface of the concave body (16) for the discharge of any processing dust.

3. The weft braking device according to claim 1 , **characterized in that** said concave annular profile of the wear-resistant lamina (20) is substantially frustum-shaped and said internal annular surface (S) of the concave body (16) is also substantially frustum-

shaped.

4. The weft braking device according to claim 3, **characterized in that** said wear-resistant lamina (20) has an apex angle (α) that is smaller than the apex angle (β) of said internal annular surface (S).

5. The weft braking device according to claim 4, **characterized in that** the difference between the apex angle (β) of said internal annular surface (S) and the apex angle (α) of said wear-resistant lamina (20) is comprised between 1° and 3°.

6. The weft braking device according to claim 5, **characterized in that** the difference between the apex angle (β) of said internal annular surface (S) and the apex angle (α) of said wear-resistant lamina (20) is 2°.

7. The weft braking device according to one of claims 1-6, **characterized in that** said wear-resistant lamina (20) is made of a sheet of metallic material with a thickness comprised between 0.05 and 0.2 mm.

8. The weft braking device according to claim 7, **characterized in that** said sheet of metallic material has a thickness of 0.1 mm.

9. The weft braking device according to claim 7 or 8, **characterized in that** said metallic material is chromium-plated copper-beryllium.

10. The weft braking device according to claim 1, **characterized in that** said concave body (16) is formed in a single piece.

11. The weft braking device according to claim 1, **characterized in that** said concave body (116) has a continuous frustum-shaped profile.

12. The weft braking device according to claim 1, **characterized in that** said concave body (16) has an innermost frustum-shaped portion (16a) and an outermost frustum-shaped portion (16b) which are interconnected by an intermediate cylindrical portion (16c), on which said slits (22) are formed.

13. The weft braking device according to claim 1, **characterized in that** said fins (24) extend entirely along the directrices of the frustum-shaped profile of said wear-resistant lamina (20).

14. The weft braking device according to claim 1, **characterized in that** said fins (124) have:

- an innermost portion (124a) which, when the wear-resistant lamina (120) is separated from the concave body (116), extends along the directrices of the frustum-shaped profile of the wear-resistant lamina (120); when the wear-resistant lamina (120) is inserted into the concave body (116) and turned inside out, it flexes due to the engagement with the respective slit (122), and
- an outermost portion (124b) which is stably bent so as to rest against the external surface of the concave body (116) when the wear-resistant lamina (120) inserted into the concave body (116) is turned inside out.

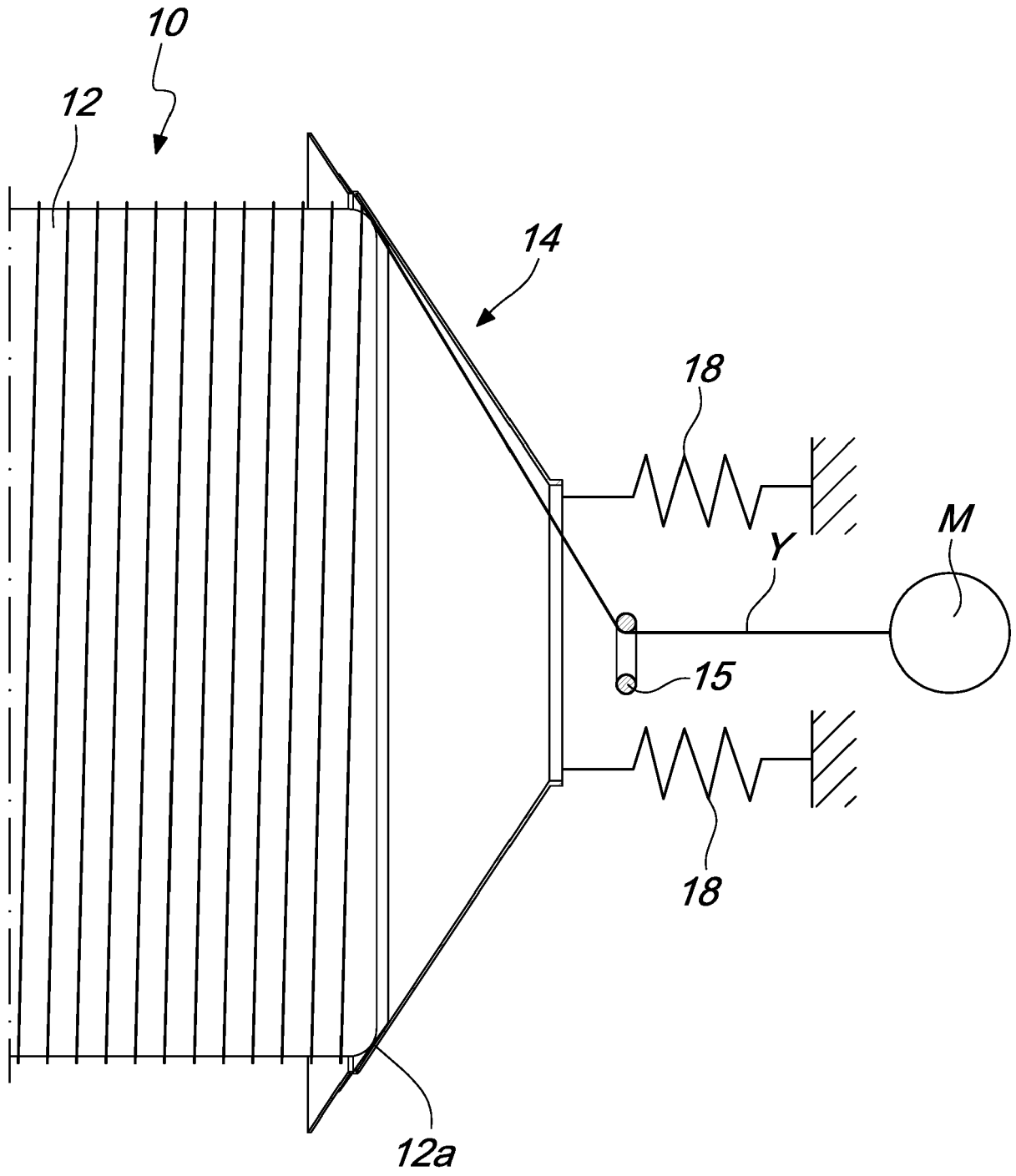

Fig. 1

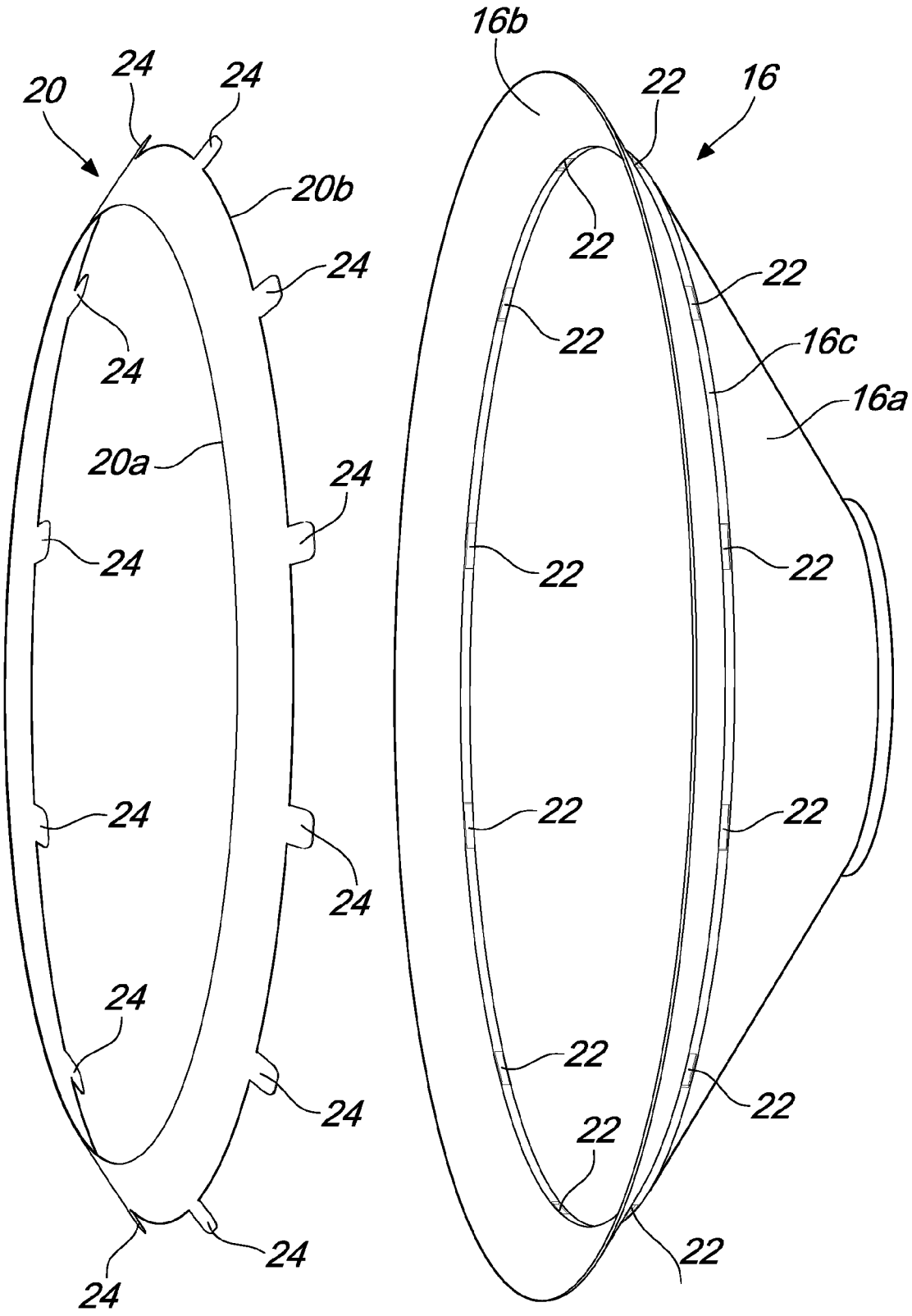
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Fig. 2

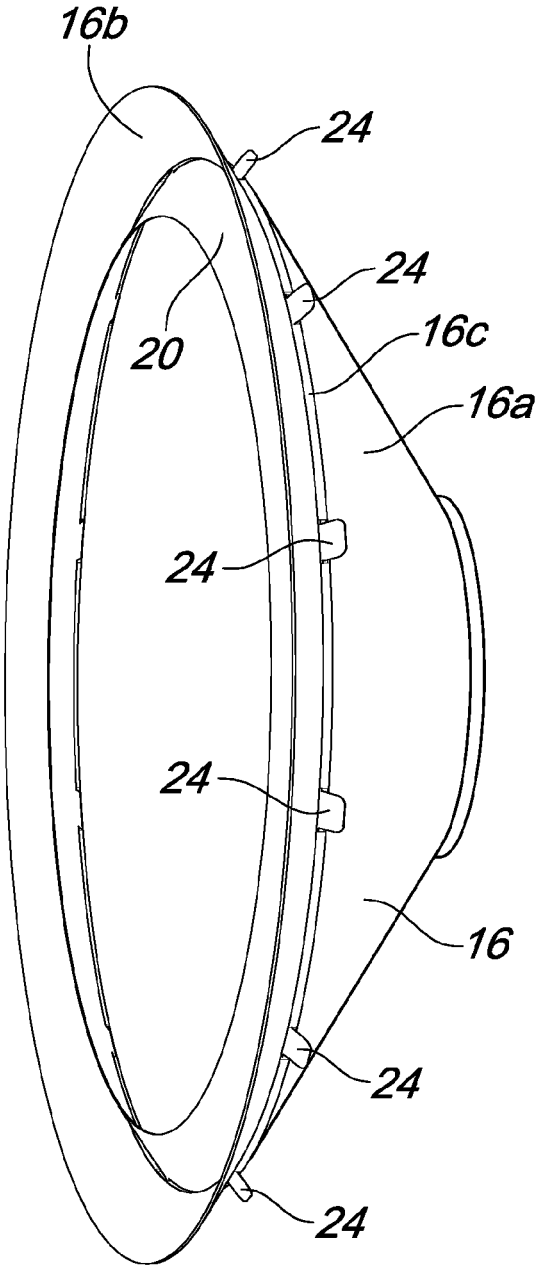

Fig. 3

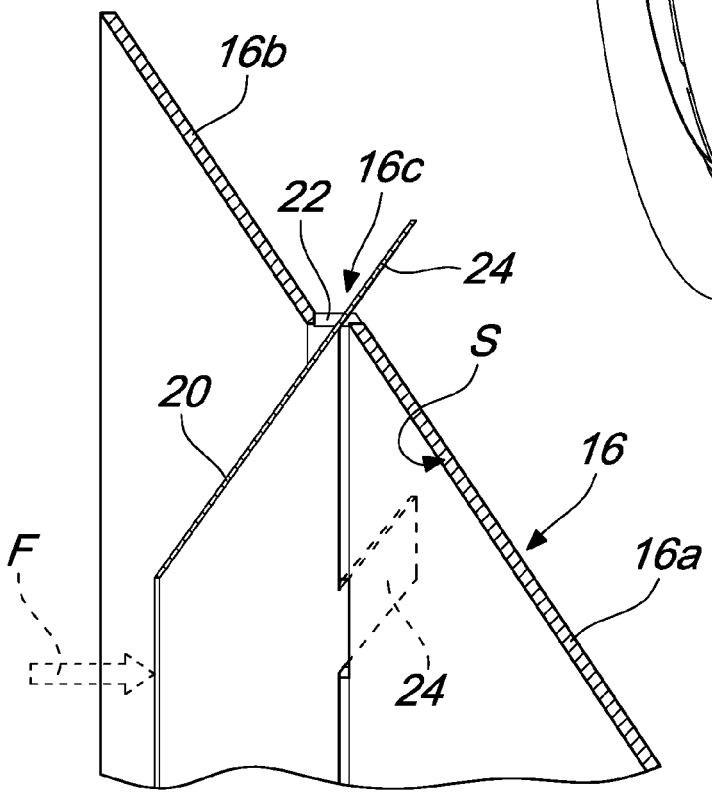

Fig. 4

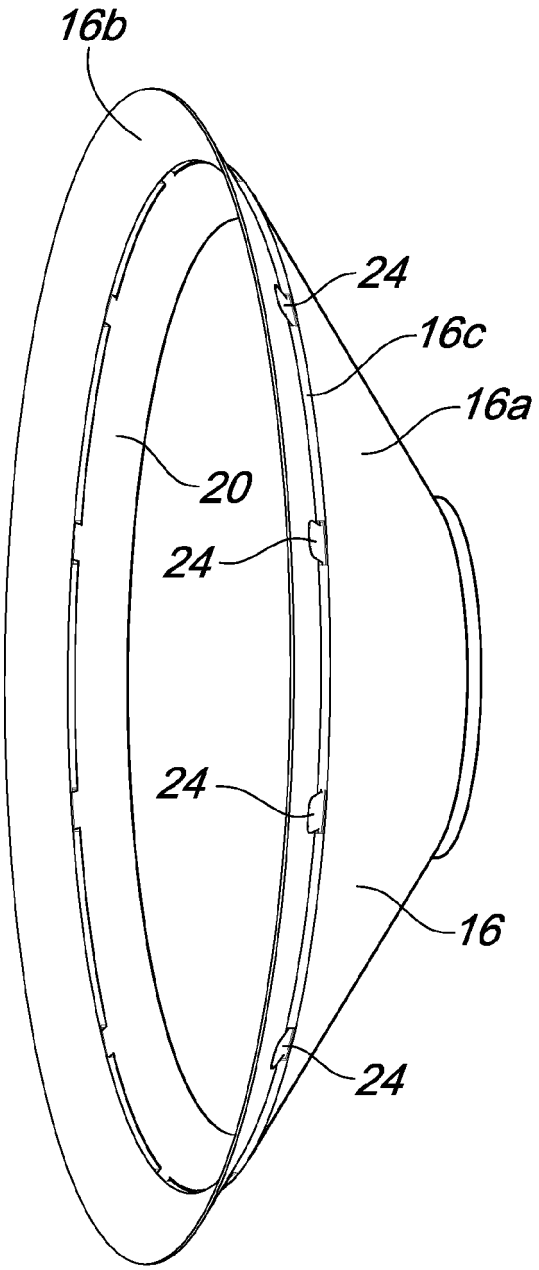
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Fig. 5

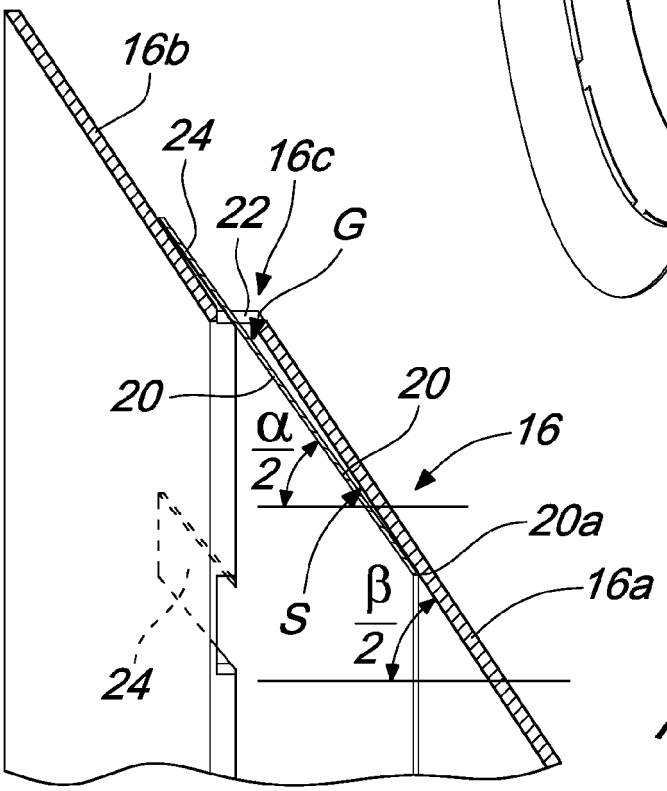
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Fig. 6

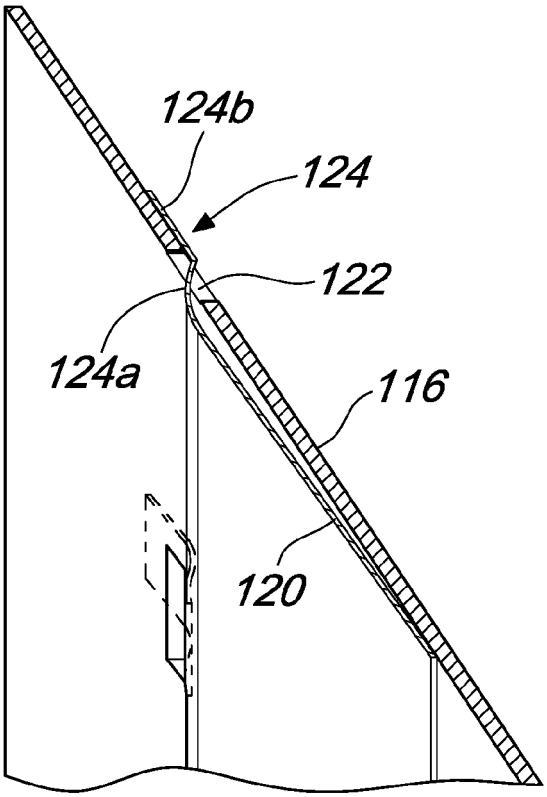

Fig. 7

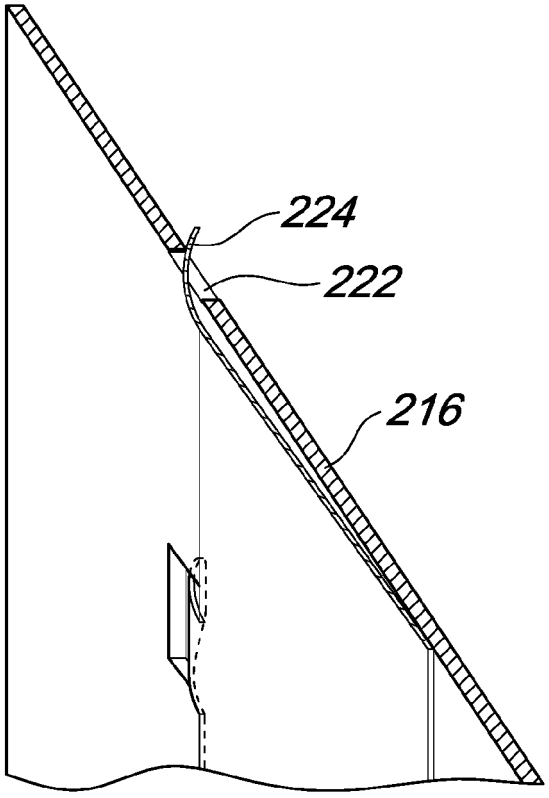

Fig. 8

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EUROPEAN SEARCH REPORT

Application Number
EP 20 20 7001

DOCUMENTS CONSIDERED TO BE RELEVANT

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A,D	US 6 322 016 B1 (JACOBSSON KURT ARNE GUNNAR [SE] ET AL) 27 November 2001 (2001-11-27) * figure 18 * * column 10, line 6 - line 20 *	1-14	INV. D03D47/36
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TECHNICAL FIELDS SEARCHED (IPC)

D03D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	20 April 2021	Hausding, Jan

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- IT 102019000023889 **[0045]**