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(54) An anti-dazzle screen and a method of assembling the same

(57) The invention relates to an anti-dazzle screen (26) for a lighting fitting, which comprises two reflector sides (2) opposite each other and lamellas (1), which are compressible per Se, connect said reflector sides with each other and are made of double sheet material. The reflector sides (2) have recesses (6), into which the gable ends (13) of the lamellas will be inserted, and there are means (24, 25) designed to fasten the lamellas to said recesses. According to the invention said gable ends (13) are fastened in an expanded condition at the reflector sides (2) and will fill said recesses (6) in a non-compressible condition. The gable ends have tongues (15) outside the reflector sides, which are directed against each other in order to secure the expanded position of the lamellas in the recesses in the reflector sides (2). The invention also relates to a method of assembling an anti-dazzle screen according to claim 1, which is characterized in that said gable ends (13) are fastened in an expanded condition at the reflector sides (2) and consequently will fill said recesses (6) in a non-compressible way.

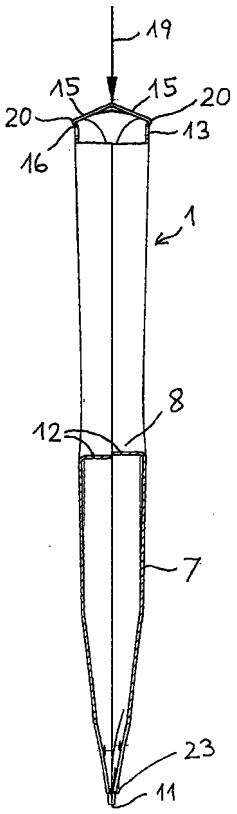

FIG. 5

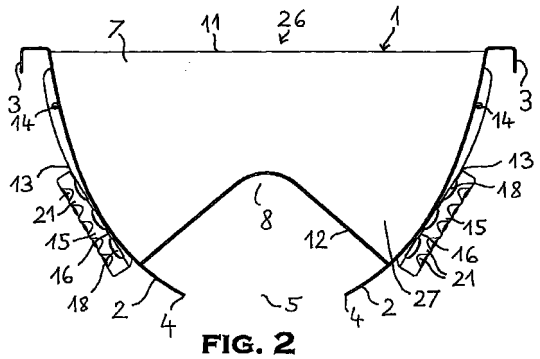

FIG. 2

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Description

[0001] The present invention relates to an anti-dazzle screen of the type set forth in more detail in the preamble of claim 1. The invention also relates to a method of assembling such an anti-dazzle screen according to the preamble of the first method claim.

[0002] Regarding lighting fittings, particularly fluorescent tube fittings, two loose reflector sides are used in a typical case, which are held in place in a fixture , while transverse lamellas are inserted into openings in said sides and are fastened there by means of fixing pins, which project from the opening sides and penetrate into recesses in the lamella sides. Alternatively the lamellas can be fastened in a certain position and the reflector sides can then be moved towards and up to the lamellas, after which said mutual fastening is done.

[0003] These mounting operations have so far been carried out manually, which is a monotonous and time- and cost-consuming procedure. Also, the result has not been satisfactory , since the obtained reflector construction is weak and easily is subjected to torsion forces, why it often is necessary to use an outer reinforcing shell. Another problem with this construction may arise, when the reflector is to be installed and disassembled respectively, e.g. when fluorescent tubes are to be replaced. Then a few lamellas are often seized and pressed together, when they are to be connected to the reflector. The lamellas may then leave their fastening position and not return to it later, a certain deformation of the lamellas and a change in their reflection properties also taking place.

[0004] EP-A-0 446 317 relates to a lamp or lighting grating, which comprises bent outer reflectors having recesses, into which transverse lamellas are to be inserted, having transverse stop elements and designed to, subsequent to the inserting, bear on the outer side of said reflectors and in this way stop or make difficult a return movement. The inserting into and through said recesses is facilitated by means of wedge surfaces at the lamella ends. The wedge surfaces cause a resilient compression of the lamella sides, when an impact occurs against the recess sides and after the passage of the latter an automatic resilient transition to a locking position, in which said stop element contacts the exterior of the recess edges. Since the lamellas are inserted in the longitudinal direction, it is not sufficient with this one insertion movement to obtain a completed reflector, but after the insertion of one of the lamella ends into one of the reflector side the other reflector side must be moved towards the other lamella ends, which may lead to problems, particularly since the lamella ends according to this construction have transversal bends (stop elements), which already per se may be difficult to push through a narrow recess provided with notches. In order to make this useful in practice at all, quite large tolerances are required, which in their turn increase the construction-conditioned ubiquitous play, which play cause rattle and a general weakness. If the mounted lamellas are seized by hand, this rather loose locking may easily disappear and the stop element bends may stay on the inner side of the reflector rather than on the outer side , resulting in at least changed reflection properties.

[0005] Also, DE 3815418 C2 relates to an anti-dazzle screen according to the preamble of claim 1. Lamellas are fastened by lower end-positioned recesses on lower opening edges to reflector sides, which are swung towards their upper longitudinal edges and which then are swung towards each other with their longitudinal sides, which are turned away from the lamellas, said fastening areas functioning as pivoting centers. The gable ends of the lamellas are rounded and beveled in order to , during this pivoting movement, penetrate through said openings in the reflector sides, on the outer sides of which the lamellas snap in by means of upper tongues, which with elastic deformation slide past the upper, downwardly rounded edges of the openings. The lamellas are stopped or it will be difficult for them to slide back in this way and out of engagement with the reflector sides. For the rest there is in such a connection a substantial play in all the connection points and the lamella legs may be compressed to a larger or less extent. In a reflector having many lamellas all the play is added up and the result will be an exceedingly weak and instable reflector.

[0006] The object of the present invention is to counteract and as far as possible eliminate the above-mentioned drawbacks. A particular object of the invention is to make it possible to produce/assemble anti-dazzle screens in a simple, reliable and semi- or fully automatic way and in this way reduce the costs and improve the properties of such products. Also, one object of the invention is to generally further develop the art in this technical field.

[0007] These objects are achieved according to the invention by further developing an anti-dazzle screen of the type described in the introduction mainly in such a way, as is set forth in the characterizing clause of claim 1. Said objects are achieved according to the invention also by performing a method of the type described in the introduction mainly in such a way, as is set forth in the characterizing clause of the first method claim.

[0008] Additional characterizing features and advantages of the present invention are set forth in the following description, reference being made to the enclosed drawings, which show a few preferred but not limiting embodiments. The drawings show in detail in

Fig. 1 a perspective view from above and from one end of a lamella according to the invention which constitutes a part of an anti-dazzle screen according to the invention and is ready to be inserted into reflector sides according to Fig, 2;

Fig. 2 an end view of two fastened reflector sides, turned upside-down, into which lamellas according

to Fig. 1 have been inserted but not yet fastened;

Fig. 3 a sectional view along section line A-A in Fig. 1 of a lamella according to Figs. 1 and 2 ;

Fig. 4 a view corresponding to Fig. 2 after a fastening of the lamellas ;

Fig. 5 a sectional view of a fastened lamella according to sectional line B-B in Fig. 4 ;

Fig. 6 a partial lateral view of a reflector side with a lamella, fastened in the reflector side ; and

Fig. 7 a completely punched flat blank to a lamella according to the invention.

[0009] An anti-dazzle screen 26 according to the present invention comprises lamellas 1 and reflector sides 2, connected to each other by means of said lamellas , which reflector sides suitably are arc-shaped or partly parabola-shaped in profile and preferably consist, like the lamellas, of polished light metal sheet or such sheet material provided with a reflecting surface coating. The longitudinal edges of the reflector sides, which are turned downwards when used, can consist of bent covering profiles 3, whereas the edges 4, which are turned upwards when used, have an opening 5 between them designed to receive e.g. a fluorescent tube, not shown. Also, the reflector sides have recesses 6, evenly distributed along the reflector sides and designed to receive the lamella ends. In the shown typical example the recesses extend along the main portion of the width of the reflector sides and suitably roughly have a rectangular shape, but they suitably converge somewhat downwards in the upper part of the reflector sides and roughly are triangular, to some extent, in a concave way, in the lower part of the reflector sides.

[0010] According to Figs. 1 and 7 a lamella consists of a double, mainly symmetrical sheet, in which the lower lamella half 7, which is arrow-head-shaped in profile and fills the triangular recess portion, is continuous along the length of the lamella, whereas the upper lamella half 27, which mainly is rectangular in profile, has a concaveness 8, which surrounds opening 5 at a distance, which is designed to receive a fluorescent tube or the like and which is obtained by lamella edges 9 within this area, which extend roughly perpendicular from the reflector sides to the center of the reflector in profile, where the edges meet in the shape of a soft bend 10. Whereas the lower longitudinal lamella side is a sharp or almost sharp edge 11, the upper longitudinal lamella side, which thus is L-shaped, consists of flanges 12, which are bent towards each other at roughly 90° and constitute the two free longitudinal areas of the lamella, which suitably meet in the shape of overlappings or potential overlappings (see Figs. 3 and 5) in order to allow a compression of the lamella within this area, but the lamella can expand again thanks to its inherent elasticity due to its structure.

[0011] As is evident from Figs. 2 and 4, the gable ends 13 of the lamellas pierce recesses 6 and the suitably somewhat rounded gable ends of the arrow-head-parts within the parts, which project in this way, are provided with through transversal holes 14, used to fasten anchor means , known per se and designed to hold the reflector in an opening in the ceiling, an outer reflector shell or the like (not shown). The upper half of the lamella projects with oblong blocking tongues 15 through said recesses 6, The existence of these tongues or possibly only an imaginary base line 16 along each symmetry half 17 of the lamella runs approximately tangentially to the convex outer reflector side and suitably is not homogenous but disrupted by a line of notches 18, which are used as material weakenings in order to facilitate the bending into a small acute angle to the symmetry plane of the lamella of e.g. 30° of two tongues , positioned opposite each other, towards each other (see Figs. 1-3).

[0012] The lamellas, having the shape shown in Figs. 1-3, are inserted in recesses 6 of reflector sides 2, which can be done without having to move the reflector sides, change their position or the like. It is fully sufficient to utilize the structure-conditioned elasticity of the reflector sides and/or of a fixture, not shown, in order to temporarily hold the reflector sides in the same position during the assembling of the anti-dazzle screen. The inserting of the lamellas into two reflector sides suitably is done in a fully or partially automatic way, some type of a robot (not shown) being used to hold one or several or all of the lamellas, designed for an anti-dazzle screen. The lamellas are compressed in this way and their thickness is reduced, which facilitates the inserting of the lamellas into the recesses. Subsequent to the inserting the lamellas expand automatically and fill the recesses due to their inherent elasticity. A pressure is then applied in the direction indicated by arrows 19 against the initially angled tongues, the tongues taking up a steeper angle of e.g. 60° - 90° relative to the symmetry plane of the lamella and actually physically hitting each other, preferably with a certain pressure, which is propagated to the weakened area around the base line 16, the material within this area partially being squeezed out in the shape of bosses 20, which will be positioned outside the plane of the lamella sides and consequently outside the edges of the recesses. In this way a durably functioning lock is obtained, designed to stop a compression of the lamellas and avoid the risk, that such a fastened lamella and the reflector side respectively drift apart and the joint be loosened. Also, the lamella sides are all the time pressed against the sides of the recesses, an efficient friction blocking between the lamellas and the reflector sides being achieved, which blocking stabilizes the entire anti-dazzle screen, which consequently generally will be much more stable and particularly resistant to torsion forces, even if the entire anti-dazzle screen or parts thereof are made of a relatively thin material.

[0013] In order to guarantee, that tongues 15 during the secondary bending will not slip past each other but

will hit each other edge to edge, these edge areas preferably will be provided with some type of profiling, deformation or the like 21, which is not shown in Fig. 7 but can be used there also. It is shown in Fig. 1 a wave-shaped deformation, the wave design of which is displaced with half a division between two tongues, placed opposite each other.

[0014] In order to securely block the lower lamella half in the reflector sides at least one of the lamella sides adjacent the arrow-head is provided with a cut 22, which coincides with the exterior side of the reflector and marks off a tongue 23, which can be bent laterally to a position on the outside of the respective reflector side (see Fig. 6).

[0015] The outermost/lowermost arrow-head is at the lamella ends somewhat withdrawn in the longitudinal direction of the lamella in order to form a notch 24, which is used as an insertion restriction, designed to prevent, that said arrow-head penetrates all the way through the respective recess.

[0016] For the same reason the upper corner area of the lamella can be withdrawn in a similar way by means of a notch 25 in order to also prevent, that the lamella within this area can penetrate further outwards through the respective reflector side.

[0017] The invention is not limited to the embodiments described above and shown on the enclosed drawings, which are to be viewed only as not limiting examples, which can be modified and supplemented in an arbitrary way within the scope of the inventive idea and the following claims. Thus, it is possible to replace said tongues by some other form of expansion or fixation means, which will hold the lamella sides at a distance from each other and in this way will guarantee the position in use shown in Figs. 4-6. It is of course not necessary to use flanges 12, but the lamellas can be open outwards . Said notch can be replaced by other forms of fixation means and other areas can also be selected . A blocking tongue 15 may also be sufficient and will in that case act against the other lamella side 17 or shorter tongues may be used at each lamella side, which will act against the other lamella side, which in this areas is tongue-free. The tongues may also be designed with fingers, which comb into and interlock with each other like folded hands. The reflector sides may of course be designed in any suitable way, but in certain cases it may be necessary to mount the second reflector side, subsequent to the insertion of the lamellas, in the first one. In addition to the expansion fixation according to the invention alternative fastening and fixation techniques for the lamellas in the reflector sides may be used, i.e. the lamellas may be inserted deeper into the reflector sides and/or the reflector sides may lean at other angles than those shown in the drawings, e.g. to give opening 5 different widths, e.g. to receive two fluorescent tubes rather than one

Claims

1. An anti-dazzle screen (26) for a lighting fitting, which comprises two opposite reflector sides (2) and lamellas (1), which are compressible per se and connect said reflector sides with each other and are made of a double metal sheet material and/or a plastic material, two legs (7, 27) being formed, which resiliently can be pressed against each other, the reflector sides having recesses (6), into which the gable ends (13) of the lamella can be inserted, the gable ends being provided with means (24, 25) for an insertion limitation and/or for a mutual fixation of the reflector sides (2) and the lamellas (1), **characterized in that** said gable ends (13) are designed to be fastened and durably blocked in an expanded condition at the reflector sides and in relation to each other, said recesses (6) being filled , because at least one side (17) of each gable end (13) outside the reflector sides (2) has one or several blocking tongues (15), which are designed to be directed towards the opposite lamella side (17) or the locking tongue and tongues respectively (15) and in this way guarantee the expanded position of the lamella in the recesses (6) in the reflector sides (2) or by means of other expansion or fixation elements, which keep the lamella sides at a distance from each other.

2. An anti-dazzle screen according to claim 1, **characterized in that** each lamella (1) is made of a double, mainly symmetrical sheet, in which a lower lamella half (7), which is arrow-head-like in profile and fills a triangular recess portion, is continuous in the longitudinal direction of the lamella, whereas an upper lamella half (27), which is mainly rectangular in profile has a concaveness (8), which surrounds at a distance an opening (5) between two opposite reflector side edges (4), designed to receive a fluorescent tube or the like, and which is formed, because the lamella edges (9) within this area extend roughly in a perpendicular direction from the reflector sides and to the center of the reflector in profile, where the edges meet in the form of a soft rounding (10).

3. An anti-dazzle screen according to claim 1, **characterized in that** whereas the lower longitudinal side of the lamella is a sharp or almost sharp edge (11), the upper longitudinal side of the lamella, which thus has an L-shape, is formed of flanges (12), which are bent towards each other with an angle of roughly 90° and constitute the two free longitudinal edge areas of the lamella, which edge areas meet each other suitably in the form of overlappings or potential overlappings, the lamella being compressible within this areas, but it can be expanded again due to its inherent structure-conditioned resiliency.

4. An anti-dazzle screen according to claim 1, **characterized in that** the blocking tongues (15) preferably are oblong and in that their existence or possibly only their imaginary base line (16) at each symmetry half (17) of the lamella (1) approximately runs longitudinally to the outer reflector side, which particularly is convex, and suitably is not homogenous but disrupted by a line of notches (18), designed to function as material weakenings and to facilitate a bending to an angle, which is less acute, from the symmetry plane of the lamella of e.g. 30° , of two tongues (15), positioned opposite each other, in a direction towards each other.

5. An anti-dazzle screen according to claim 4, **characterized in that** the lamellas (1) are designed to be inserted into the recesses (6) with tongues (15), which are initially only slightly bent/angled in a direction towards each other and in a compressed condition in order to reduce their thickness and in this way facilitate the insertion of the lamellas, after which the lamellas are designed to expand automatically in order to fill the recesses due to inherent resiliency , after which a pressure (arrows 19) will be applied against the initially angled tongues (15), which have been inserted through the recesses (6), in order to through a secondary bending/angling make them take up a steeper angle of preferably 60°-90° to the symmetry plane of the lamella and physically hit each other, preferably with a certain pressure, which will be propagated to the preferably weakened area around the base line (16), the material within this areas at least partially being squeezed out in the form of bosses or the like (20) outside the plane of the lamella sides and consequently outside the edges of the recesses, in order to obtain a durably functioning barrier against a later compression of the lamellas and against a drifting apart of such a fastened lamella and a reflector side respectively and a loosening of the connection and to keep the lamella sides continuously pressed against the sides of the recesses in order to obtain an efficient friction blocking between lamellas and reflector sides, which blocking is designed to stabilize the entire anti-dazzle screen, particularly against torsion forces, also if the entire anti-dazzle screen or only parts thereof are made of a relatively thin material.

6. An anti-dazzle screen according to claim 5, **characterized in that** in order to guarantee, that the tongues (15) during the secondary bending will not glide past each other but hit each other with edge against edge, said edge areas are provided with some form of profiling, deformation or the like (21), e.g. having a wave-shape with a displacement of half a division between two tongues, positioned opposite each other.

7. An anti-dazzle screen according to any of claims 1-6, **characterized in that** only one blocking tongue (15) is provided at each gable end (13) at one of the lamella sides (17) in order to act on the other lamella side (17) or that there are at each lamella side shorter tongues, which act on the other lamella side, which in this area is tongue-free and/or in that the tongues are provided with fingers, which are combing into or engaging with each other, and/or in that there are several fastening and fixation elements on the lamellas opposite the reflector sides, the lamellas being movable further into the reflector sides and/or in that the reflector sides are inclined at arbitrary angles, e.g. in order to give the opening (5) different widths, e.g. in order to receive two fluorescent tubes instead of one.

8. A method of assembling an anti-dazzle screen (26) according to claim 1, two opposite reflector sides (2), provided with recesses (6), being connected to each other by means of lamellas (1), compressible per se and made of double metal sheet and/or a plastic material, two legs (7,27) being formed, which in a resilient way can be pressed against each other, which lamellas with their gable ends (13) are inserted into said recesses (6) and are fastened in their position in the reflector sides by means of elements (24, 25) for an insertion limitation and /or a mutual position fixation, **characterized in that** said gable ends (13) are durably fastened and blocked in an expanded condition mutually and at the reflector sides (2), said recesses (6) being filled, by providing at least one side (17) of each gable end (13) outside the reflector sides (2) with one or several blocking tongues (15), which are directed towards the opposite lamella sides (17) or the lamella tongue and tongues respectively (15) in order to in this way guarantee the expanded position of the lamella in the recesses (6) in the reflector sides (2), or by means of other expansion or fixation elements, which keep the lamella sides at a distance from each other.

9. A method according to claim 8, **characterized in that** the free longitudinal edge areas of the two lamella sides before the fixation of the gable ends are bent again, now at 90°, in a direction against each other in order to obtain flanges (12), which suitably meet each other in the form of overlappings or potential overlappings, the lamella being compressible within this area, but that it again will be expanded due to its inherent structure-conditioned resiliency.

10. A method according to claim 8, **characterized in that** the lamellas (1) are inserted into recesses (6) with tongues (15), which are initially slightly

bent/angled in a direction towards each other, and in a compressed condition in order to reduce their thickness and in this way facilitate the inserting of the lamellas, after which the lamellas are allowed to expand automatically in order to fill the recesses due to their inherent resiliency, after which a pressure (arrows 19) is applied against the initially angled tongues (15), inserted through the recesses (6), in order to, through a secondary bending/angling, make them take up a steeper angle of preferably 60° - 90° to the symmetry plane of the lamella and physically hit each other, preferably with a certain pressure, which is propagated to the preferably weakened area around the base line (16) of the tongues (15), the material within this area at least partially being squeezed out in the form of bosses or the like (20) outside the plane of the lamella sides and consequently outside the edges of the recesses, in order to obtain a durably functioning blocking against a later compression of the lamellas and against the drifting apart of such a fastened lamella end and a reflector side respectively and to continuously keep the lamella sides pressed against the sides of the recesses in order to achieve an efficient friction blocking between the lamellas and the reflector sides, which blocking is designed to stabilize the entire anti-dazzle screen, particularly against torsion forces, also if the entire anti-dazzle screen or only parts thereof has been made of a relatively thin material.

11. A method according to claim 9, **characterized in that** in order to guarantee , that the tongues (15) during the secondary bending will not slide past each other but hit each other, edge against edge, these edge areas are provided with some type of profiling, deformation or the like (21), e.g. wave-shaped with displacement of half a division between two tongues, positioned opposite each other and/or in that only one blocking tongue (15) is used at each gable end (13) at one of the lamella sides (17) in order to act on the other lamella side (17) or shorter tongues are used at each lamella side, which act on the other lamella side, which in this area is tongue-free, and/or in that the tongues are made with fingers, which are combing into and engaging each other, and/or in that more fastening and fixation means are used on the lamellas in relation to the reflector sides, the lamellas being pushed deeper through the reflector sides, and/or in that the reflector sides are inclined at arbitrary angles, e.g. in order to give the opening (5) different widths, e.g. to receive two fluorescent tubes rather than one.

FIG. 1

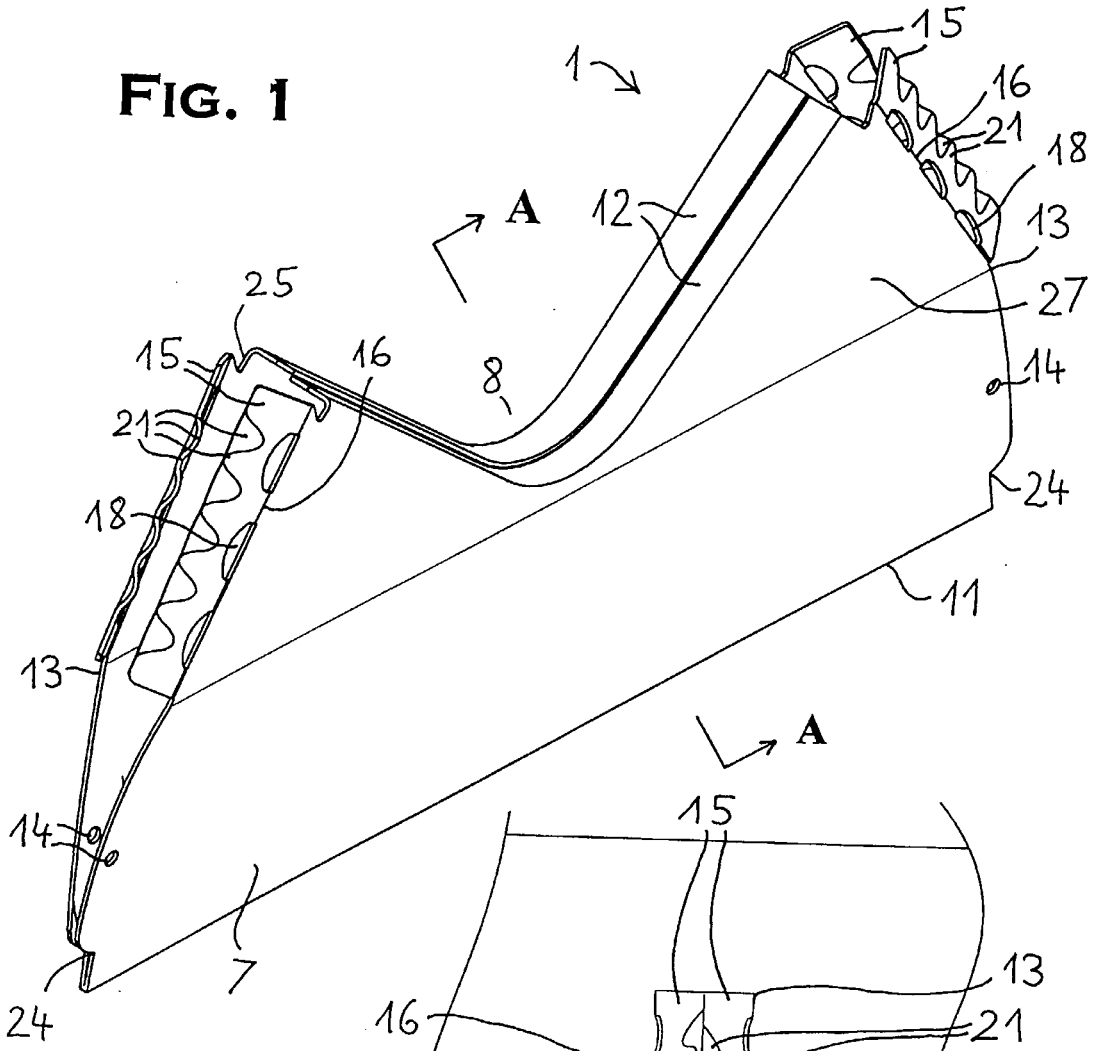
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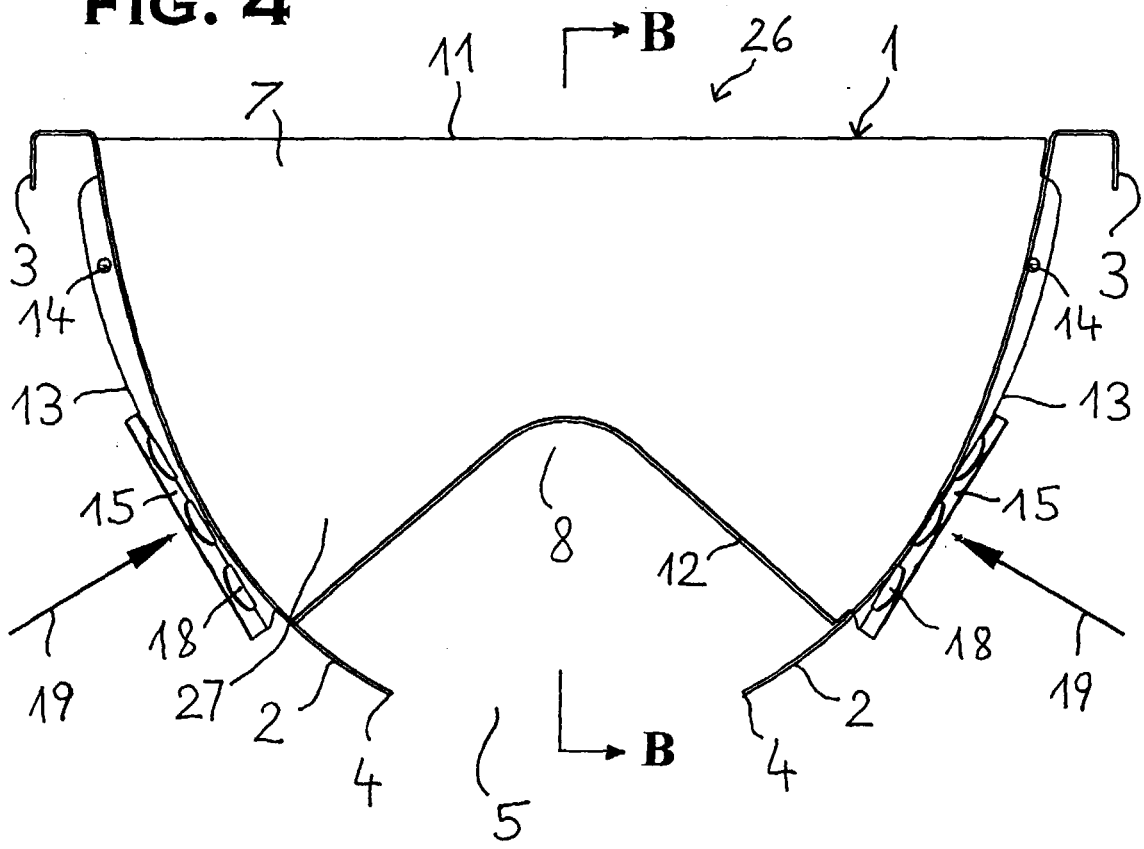
FIG. 6

FIG. 4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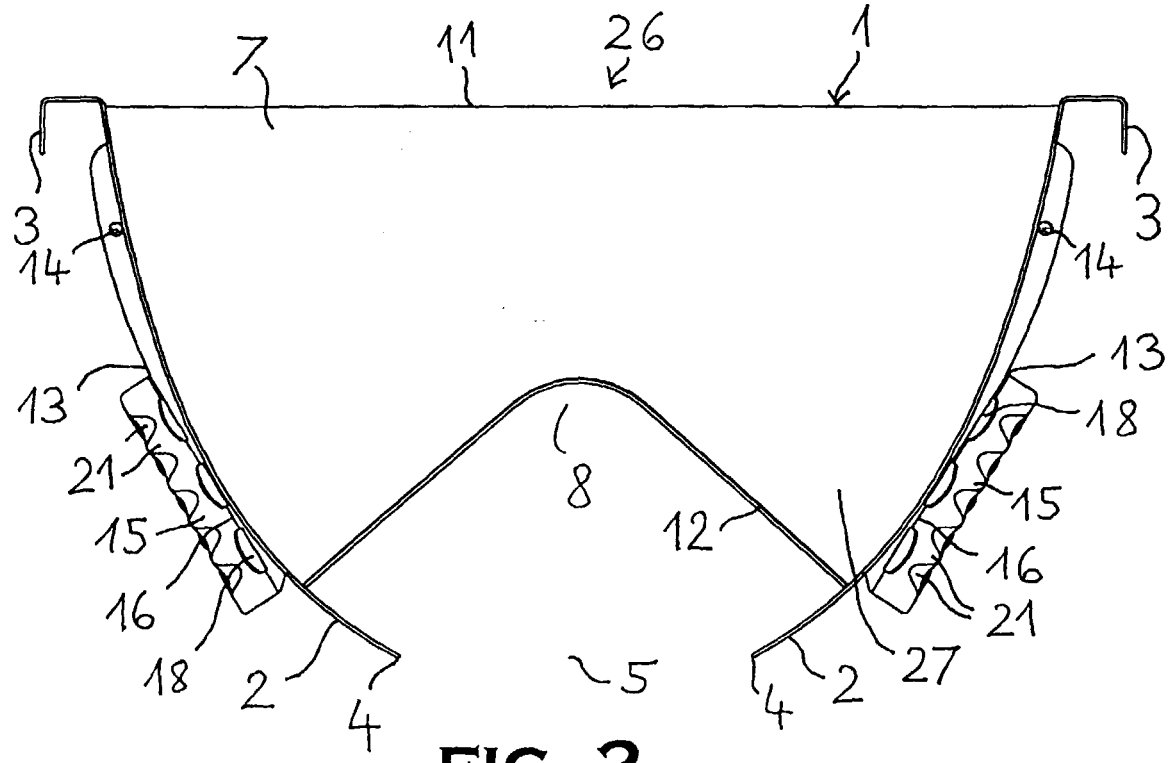
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FIG. 2

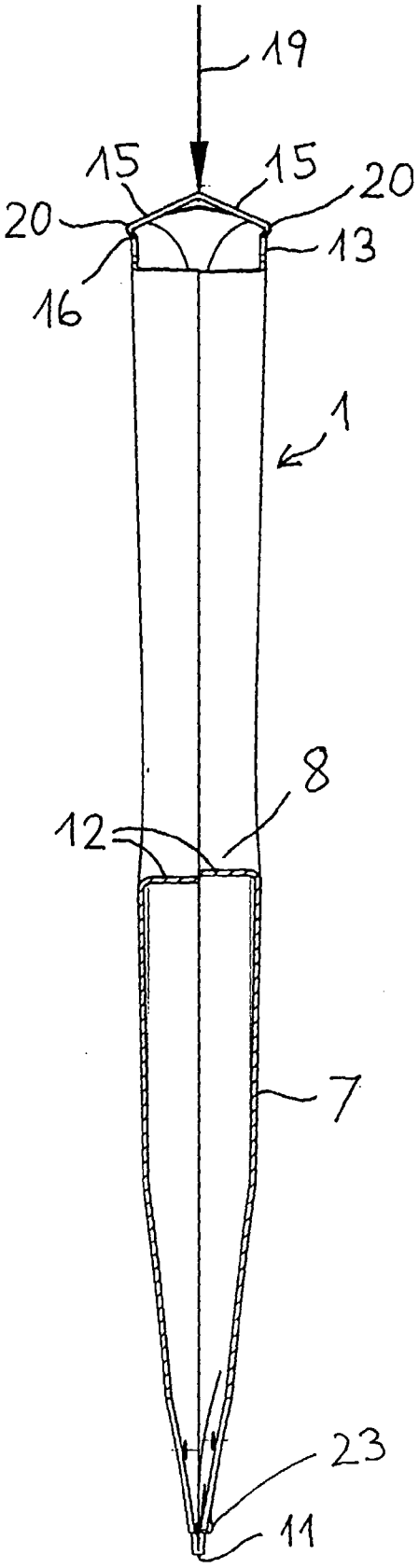


FIG. 5

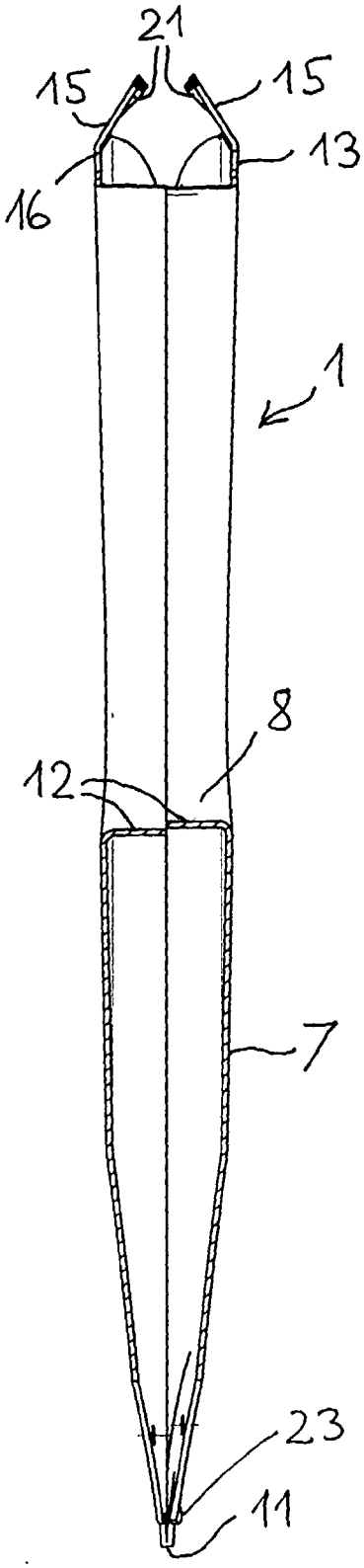
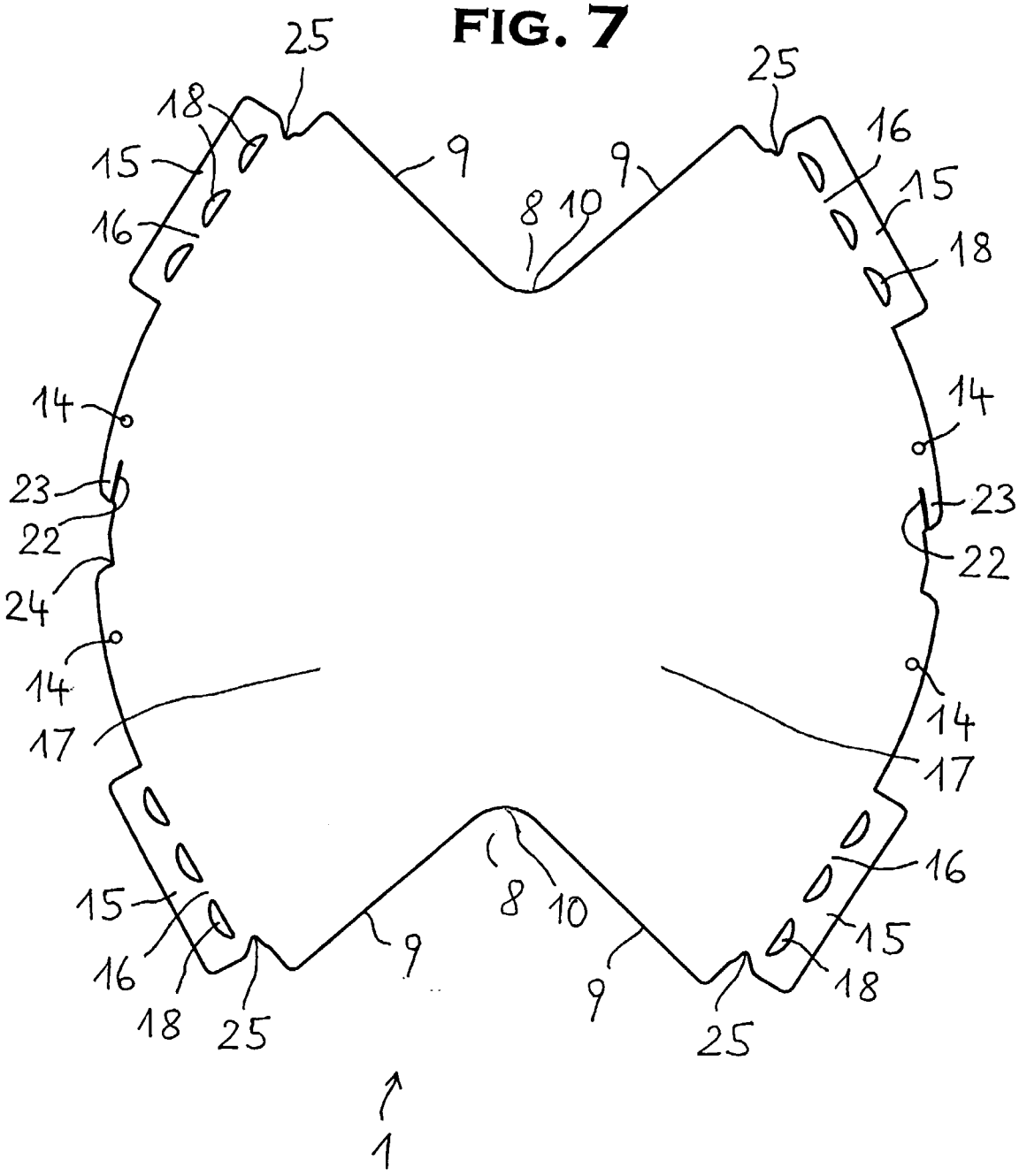


FIG. 3

FIG. 7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