(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 2 103 772 A2

(12) **EUROPEAN PATENT APPLICATION**
published in accordance with Art. 153(4) EPC

(43) Date of publication:
23.09.2009 Bulletin 2009/39

(21) Application number: **08718409.9**

(22) Date of filing: **10.01.2008**

(51) Int Cl.:
E06B 9/00 *(2006.01)* ***E04C 2/32*** *(2006.01)*
E04C 2/08 *(2006.01)* ***B21D 13/04*** *(2006.01)*
B21D 5/08 *(2006.01)*

(86) International application number:
PCT/ES2008/000008

(87) International publication number:
WO 2008/084129 (17.07.2008 Gazette 2008/29)

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MT NL NO PL PT RO SE SI SK TR

(30) Priority: **11.01.2007 ES 200700117**

(71) Applicant: **Fernández Iglesias, Francisco**
33211 Gijón - Asturias (ES)

(72) Inventor: **Fernández Iglesias, Francisco**
33211 Gijón - Asturias (ES)

(74) Representative: **Carvajal y Urquijo, Isabel et al**
Clarke, Modet & Co.
Goya 11
28001 Madrid (ES)

(54) **METHOD AND MACHINE FOR MANUFACTURING CLOSURES FOR DOOR LEAVES, WINDOWS AND WALL COVERINGS AND RESULTING CLOSURE**

(57) Enclosure, procedure for manufacturing an enclosure and machine for manufacturing an enclosure for door leaves, windows and wall coatings, the enclosure being a Majorcan style enclosure, constituted by one or more metallic panels (1) featuring alternate longitudinal grooves (2), each one of which comprises a first wall (3), a second wall (4) and a bottom (5) joining the first and second walls (3-4) being parallel to the panel plane, said bottom (5) forming an acute angle α with the first wall (3) and an obtuse angle Υ with the second wall (4). In the second roller (11-11'-11"... 11^m) stations (10-10'-10"... 10^n), the angle β formed between the axes (14-14'-14"... 14^m) of revolution of each one of the rollers (11-11'-11"... 11^m) and the spin axis (15-15'-15"... 15^n) of each one of the second stations (10-10'-10"... 10^n) equals 90 - α.

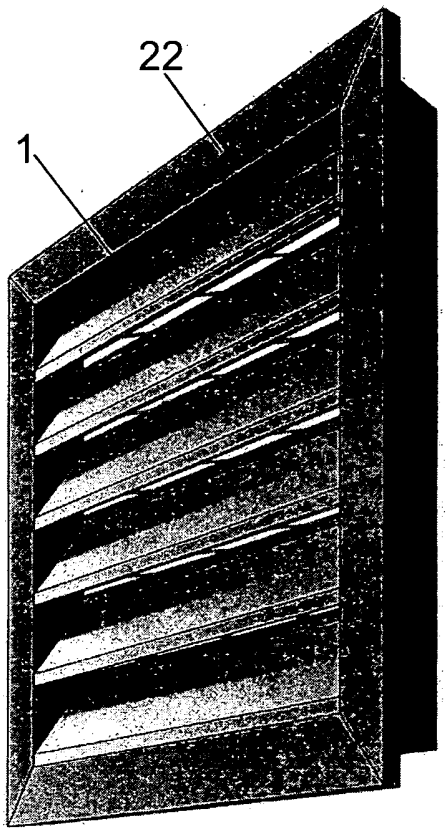

FIG. 8

EP 2 103 772 A2

Description

FIELD OF THE INVENTION

[0001] The present invention refers to a procedure and machine to manufacture Majorcan style enclosures, manufactured by a continuous process, which is destined to the formation of door leaves and windows and to wall surface coatings, and it also refers to the enclosure produced by said procedure and said machine.

BACKGROUND OF THE INVENTION

[0002] Majorcan style enclosures, regardless of their application, comprise independent slats, which are mounted between the vertical sides of a frame. The slats are arranged with certain cross-sectional inclination and separated a certain distance, to define ventilation openings between them.

[0003] The aforementioned constitution requires the formation and mounting of the slats one by one. If the slats are made of aluminum, they are usually fixed to the frame by screwing, while if they are made of steel and so is the frame, they are fixed by welding. In both cases, the mounting can also be realized by back stopes or die-cast tubes. In any case, the mounting and fixing of the slats must be performed one by one, which demands a lengthy labor.

[0004] On the other hand, traditional Majorcan style enclosures offer relatively little closing security, since the dismount of one or two slats is possible total or partially, although by means of using violent methods and thus allowing access through the hole produced.

[0005] Another possible manufacturing process for an equally useful enclosure could be through consecutive steps of sheet folding, but in no case would any kind of significant saving or advantage be attained with respect to the current procedure.

DESCRIPTION OF THE INVENTION

[0006] The object of the present invention is to eliminate the aforementioned problems through a special constitution of the Majorcan style enclosure, enabling a considerable reduction of mounting time and offering more closing security.

[0007] According to the present invention, the procedure for the manufacturing of a Majorcan style enclosure, for door leaves, windows and wall coatings, whose enclosures are constituted based on one or more metal panels featuring alternate longitudinal grooves, each one of them having a first wall, a second wall and a bottom which joins the first and second walls being parallel to the panel plane, forming said bottom an acute angle α with the first wall and an obtuse angle Υ with the second wall, whose procedure starting from a sheet coil arranged on a reel, comprises the following stages:

a) flattening the sheet coming from the reel by deformation through a first roller station,

b) die-casting the sheet resulting from stage a) through a mechanic press to which a plurality of press tools are associated to drill a plurality of openings on the sheet which are grouped together to define strips of perforated sheet alternating with non-perforated sheet strips,

c) profiling the sheet resulting from stage c) through a plurality of consecutive second roller stations to define the grooves on the sheet,

d) straightening the sheet obtained at stage c) through a third mobile roller station,

e) cutting the sheet in sections by means of a shear to determine a plurality of panels.

[0008] Particularly, the procedure object of the present invention is characterized in that the stage c) of profiling is divided into sub-stages of profiling defined by each one of the second roller stations, being the total number of these second stations equal to n and having each one of them a number of rollers equal to m. In each one of said sub-stages the angle α of the grooves is progressively formed, which varies in width from the first to the last of the second roller stations, from a value between 180° and 90° until a final value of α between 90° and 0°, and being said angle α determined according to the angle β formed between the axes of revolution of each one of the rollers and the spin axis of each one of the second stations, there existing a relation between both of them of $\beta=90 - \alpha$ and also because from an intermediate roller station n-k until the last n station the angle α of the grooves is acute.

[0009] Therefore, the present process of enclosure manufacturing has the special feature of starting from sheet coils, to later perform the flattening, die-casting (microdrilling or windows), profiling, straightening and cutting in a continuous process, that is to say, it does not start from slats already individually profiled and later welded or screwed, nor from any kind of successive folding but it starts from a sheet coil, and the different mechanical operations on said sheet are produced sequential and continually during the manufacturing process of the Majorcan style enclosure.

[0010] Besides, through a continuous process object of the present invention it is attained through a profiling with progressive rollers and angle α, defined by the bottom and the first wall of each one of the grooves defined in each panel, acute with respect to the panel plane, ranging its value between 0 and 90°.

[0011] The k number could be between 1 and 6.

[0012] As regards the n number of second stations, it could be between 5 and 100, being the optimum number of second stations 30.

[0013] As regards the m number of rollers of each one of the n second stations, it could be between 1 and 20, wherein the number of rollers can vary according to the station.

[0014] For the second stations from n-k to the n station, the m number of rollers of each station can be the same and it can also be equal to or higher than the m number of rollers in the stations previous to the second station n-k.

[0015] A second aspect of the invention refers to a machine to manufacture enclosures according to the procedure detailed above. Said machine is characterized in that in the n second stations of m rollers the angle β formed between the axes of revolution of each one of the rollers and the spin axis of each one of the n second stations equals 90- α, α being the angle formed between the first wall and the bottom of the grooves defended in the panels which constitute the enclosure. Besides, in said machine, from an n-k intermediate roller station to the last n station, the angle α of the grooves is acute.

[0016] The k number could be between 1 and 6.

[0017] As regards the n number of second stations, it could be between 5 and 100, the optimum number of second station being 30.

[0018] As regards the m number of rollers of each one of the n second stations, it could be between 1 and 20, wherein the number of rollers can vary according to the station.

[0019] For the second stations from n-k to the n station, the m number of rollers of each station could be the same and it could also be equal to or higher than the m number of rollers of the stations previous to the second station n-k.

[0020] A third aspect of the invention refers to an enclosure constituted based on one or more metallic panels featuring alternate, consecutive and equal grooves. Each one of these grooves is longitudinally limited by a first wall, a second wall and a bottom joining the first and second walls being parallel to the panel plane, forming said bottom an acute angle α with the first wall and an obtuse angle Υ with the second wall.

[0021] The fact that the first wall forms an acute angle with respect to the bottom, and the second wall forms an obtuse angle with respect to said bottom of the grooves is extremely important since it causes the walls defining the grooves to be tilted in such a way with respect to the vertical line that they act as shield or protection for the surface on which the panel or Majorcan style enclosure is installed (either on a wall or on a window, door, etc), against the rain, snow, etc. always guaranteeing an optimum ventilation.

[0022] The panels are finished off, along the edges parallel to the grooves, in plane strips which can be overlapped on the adjacent edges of consecutive panels, to jointly form the bottom of a groove.

[0023] Depending on the surface to enclose and on the size of the panels, the enclosure will be attained with only one panel or with more than one.

[0024] The enclosures with the constitution mentioned can serve to form leaves of doors and windows, in which case the panels will be mounted in the frame limiting the leaf contour. The enclosure can also serve to cover surfaces of walls, preferably of exterior walls.

[0025] Preferably, the panels forming the enclosure of the invention will be made of metal, such as steel, in which case the overlapped panel strips, in the enclosures where more than one panel is reused, will be joined by welding. The union of these panels to the sides of the wall, which will be constituted by steel sections, will also be made by welding.

[0026] The panels can also be made of aluminum, in which case the union between consecutive panels and between these and frame borders will be made by screwing or riveting.

[0027] The panels can be completely blind or they can have openings in the first wall of the panel. In the first case, when the panels are blind, without ventilation openings, they will be destined to cover decorative facades, which do not need ventilation, but only a coating plate and protection. When the panels have ventilation openings, they will be preferably destined to forming enclosures for doors and windows. The openings can have any configuration, being preferably equal in each panel, aligned to the aforementioned wall with grooves, in equidistant positions. The openings can have a rectangular, oval, circular, microdrilled, etc. contour. Even the panels can have a net or mesh configuration, with rectangular, rhomboid, square, etc. contours, with aligned openings or staggered distributed.

[0028] With the aforementioned constitution it is attained a considerable saving in labor, since the enclosure will comprise only one panel or a reduced number thereof, thus being unnecessary the high number of fixing elements and operations needed in traditional Majorcan style enclosures, based on independent slats.

[0029] With the enclosure of the invention, it is possible to attain up to 80% savings in labor, with respect to traditional Majorcan style enclosures.

[0030] On the other hand, the enclosure of the invention, based on the panels described, offers complete closing security, since the enclosure being formed by only one panel or several panels joined together, it prevents its dismount, as it occurs with the independent slats forming the traditional Majorcan style enclosures.

[0031] When the panels forming the enclosures are made of aluminum, besides the savings in labor, high savings in auxiliary elements such as screws, gaskets, drills, cuts and tips of materials are also attained. When the panels are made of steel, the savings are attained mainly in labor, since instead of having to mount and join the slats one by one, the closing is performed by placing one or more panels, that is to say, placing only one part or certain number thereof, which will be welded on the sides of the frame.

[0032] The panels forming the closure of the invention are preferably rectangular, with two of their opposite sides parallel to the grooves. These panels can have any dimension, to adapt to the traditional measures of door and window frames, and also to form wall coatings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0033] The characteristics and advantages of the enclosure of the invention will be understood better with the following description, relating to the attached drawings which show a non-limiting example of an embodiment.

[0034] In the drawings:

Figure 1 shows a perspective view of an enclosure constituted according to the invention.

Figure 2 shows a profile view of one of the panels which forms part of the enclosure of figure 1.

Figure 3 corresponds to the A detail of figure 1, at a larger scale.

Figures 4 to 6 are similar view to figure 2, showing execution variants of the panel.

Figure 7 shows a perspective view of the mounting phase of the enclosure of the invention in a frame.

Figure 8 shows a view of the frame completely mounted.

Figure 9 shows a perspective view of the frame in mounting phase, with the enclosure of the invention.

Figures 10 to 16 show different forms and distributions of the panel openings.

Figure 17 shows a scheme of the different components which are part of the machine and which participate in the manufacturing procedure, object of the present invention.

Figure 18 shows a scheme of one of the final roller stations in the profiling stage of the manufacturing procedure object of the present invention.

BRIEF DETAILED DESCRIPTION OF THE DRAWINGS

[0035] Figure 1 shows an enclosure comprising a series of panels indicated by numbers 1, 1' and 1 ", all of which have the same width but different length, having the central panel 1 larger dimensions than the other two panels 1' and 1", forming together an enclosure, the dimensions of which corresponding to those of the surface to be covered, which can correspond to the leaf of a door, window or surface coating.

[0036] Figure 2 shows a profile of the central panel 1, which, as it can be verified, has longitudinal grooves 2, the mouths of which alternate and are arranged consecutively to determine a corrugated profile. It can also be seen how each groove 2 comprises a first wall 3, a second wall 4 and a bottom 5 joining the first and second walls 3-4 being parallel to the panel plane, forming said bottom 5 an acute angle α with the first wall 3 and an obtuse angle Υ with the second wall 4.

[0037] Preferably the panels will have a square or rectangular contour, with two of the opposite sides parallel to the grooves 2-2', and in the edges parallel to said grooves they finish off in strips 16 and 16', one of which can have a slight longitudinal shaping or bend 20 which determines an external section 21 which allows the overlapping of adjacent strips 16, 16', corresponding to consecutive panels, as it can be seen with greater detail in figure 3, where thanks to the aforementioned bend the strips 16 and 16' of the panels 1 and 1" are perfectly overlapped along their entire length. If the panels are made of steel the strips 16 and 16' can also be joined by welding. If the panels are made of aluminum they can also be joined by screws or riveting.

[0038] The panels which form the enclosure of figure 1, as it can be seen better in figure 2, have equal and equidistant ventilation openings 17 along the first wall 3. These openings can have a rectangular contour, or an oval contour, as shown in figure 4. The panel can also have microdrillings 17', as shown in figure 5.

[0039] The panels with the ventilation openings described are destined to form coatings for facades, large surfaces, shopping centres, schools and hospitals, sport centres, industrial ventilation, canopies and sunshades, light enclosures, laundry rooms and airer areas, gates and doors, shutters, protection bars, etc.

[0040] Figure 6 shows a similar panel to the one in figures 2 and 4 but lacking openings, being specially destined to the closing of wall surfaces, since in this case ventilation will not be necessary. The panel of figure 5 is the same as the panel in figures 2 and 4, as regards its structure and general configuration. The openings can have a different shape to that described with reference to figures 2 and 3, such as circular, polygonal with a larger or smaller number of sides than that of figures 2 and 4, etc.

[0041] By contrast, figures 10 to 16 show different opening 17 configurations that, as netting, the panels can have.

[0042] In figure 10 the netting can be a mesh with rhomboid openings 17, in figure 11 the openings 17 are staggered distributed, while in figure 12 the openings 17 are aligned in lines and columns. In figure 13 the openings 17 are square, obliquely aligned, while in figure 14 such openings 17 are aligned in parallel directions to the bands of the panel.

[0043] Figures 15 and 16 show fanciful shapes for the openings 17, thus giving an idea of the different shapes and arrangements that the openings can adopt, within the general characteristics of the panel of the invention.

[0044] Figure 7 shows the formation of a leaf of a window, which is shown completed in figure 8, in which the enclosure is constituted by only one panel like the one described with reference to figures 1 and 4.

[0045] The sides 22 of the frame of the window or door

leaf can have different profiles and each fitter will use their own marking. In the example of figure 7 the sides of the frame have a profile that determines an internal groove 23 with the right dimensions to receive the panel edges, both the ones parallel to the grooves 2 and the edges which are perpendicular to said grooves. In case panel 1 and the sides 22 of the frame are made of steel, said panel can be joined to the profiles 22 by welding. In case they are made of aluminum, the union can be made by screwing or riveting.

[0046] Figure 9 shows a final mounting phase, with the panel 1 arranged between three of the sides 224 of the frame and a fourth side 22' to be fixed.

[0047] Figure 8 shows the leaf already completely mounted with the complete frame, the edges of the panel 1 being hidden and protected by the channel 23 (not shown) of the sides 22 of the frame.

[0048] With the arrangement described the formation of the leaf will require only the mounting of one or more panels between the sides 22 of the frame, in only one operation, and the fixing by welding or screwing, depending on the nature of the panel and profiles 22 of the frame.

[0049] As it can be seen, the mounting operations are considerably reduced, since it is not necessary to mount the slats one by one, like in traditional Majorcan style enclosures, instead, placing only one panel or a certain number of them, the enclosure of the frame or the surface to be covered is attained.

[0050] As it can be seen in figure 3, the overlapping of the strips 16 and 16' in the union of consecutive panels 1 and 1" determines the bottom of one of the grooves, which will enable to maintain the uniformity in all grooves of the enclosure, even if it is formed by two or more panels.

[0051] Figure 17 shows a schematic view of the machine used to manufacture the enclosure detailed above, which is the object of the present invention, as well as the procedure used to manufacture the enclosure whose novelty lies in the profiling phase and in the constitution of the roller stations of said stage.

[0052] Normally, to obtain panels 1 with grooves 2 which determine a series of corrugations in the panel plane, there are used procedures comprising the following stages:

a) flattening the sheet coming from the reel 6 by deformation through a first roller station 8,

b) die-casting the sheet resulting from stage a) through a mechanic press 9 to which a plurality of press tools are associated to drill a plurality of openings on the sheet which are grouped together to define strips of perforated sheet alternating with non-perforated sheet strips,

c) profiling the sheet resulting from stage b) through a plurality of consecutive second roller 11-11'-11"... 11^m stations 10-10'-10"...10^n to define the grooves on the sheet,

d) straightening the sheet obtained at stage c) through a third mobile roller station 12,

e) cutting the sheet in sections through a shear 13 to determine a plurality of panels 1.

[0053] The procedure object of the present invention has an important novelty which lies mainly in that the stage c) of profiling is divided into sub-stages c1), c2)... cn) of profiling defined by each one of the second roller 11-11'-11"... 11^m stations 10-10'-10"... 10^n (see figure 18), the angle α of the grooves being progressively formed in each one of said sub-stages c1), c2)... cn), said angle varying in width from the first 10 to the last 10^n of the second roller stations, from a value ranging from 180° to 90° up to the final value of α between 90° and 0°, and being said angle α determined according to the angle β formed between the axes 14-14'-14"... 14^m of revolution of each one of the rollers 11-11'-11"... 11^m and the spin axis 15-15'-15"... 15^n of each one of the second stations 10-10'-10"... 10^n, there existing a relation between both of them of $\beta=90 - \alpha$ and also because from an intermediate roller station 10^{n-k}, until the last second station 10^n the angle α of the grooves is acute.

[0054] Figure 18 shows one of the last second roller stations of 10^n, which is constituted by an m number of rollers. As it can be seen in said figure, the axis 15^n of said second station is arranged in horizontal direction. As for the rollers 11-11'-11"... 11^m which are part of the aforementioned second station, each one of them has a free turning with respect to the axis 15 thanks to the bearings, being the axes 14-14'-14"... 14^m of revolution of said rollers tilted with respect to the axis 15^n.

[0055] In a preferred embodiment of the invention, the k number ranges between 1 and 6, $1 \leq k \leq 6$. The n number of second stations (10-10'-10"... 10^n) will range between 5 and 100, $5 \leq n \leq 100$, the optimum n number of second stations being 30. As regards the number of rollers for each second station, it will vary according to the station following the conditions bellow:

[0056] In the first place, the number of rollers will never be higher than 20, the optimum number of rollers being 11.

[0057] In the second place, for the second stations being between the 10^{n-k} and the 10^n the m number of rollers of each second station is the same and it is equal or higher than the m number of rollers in the second stations 10 to 10^{n-k}.

[0058] Like the procedure, the machine used to manufacture the enclosure object of the present invention is original, its novelty being based on the fact that incorporating the number and shape of second profiling stations and the number and characteristics of the rollers comprising them, according to what has been detailed above with reference to the procedure.

Claims

1. Procedure for manufacturing a Majorcan style en-

closure, for door leaves, windows and wall coatings, constituted by one or more metallic panels (1) featuring alternate longitudinal grooves (2), each one of which comprises a first wall (3), a second wall (4) and a bottom (5) joining the first and second walls (3-4) being parallel to the panel plane, said bottom (5) forming an acute angle α with the first wall (3) and an obtuse angle Y with the second wall (4), whose procedure starts from a sheet coil arranged in a reel (6) comprising the following states:

a) flattening the sheet coming from the reel (6) by deformation through a first roller station (8),
b) die-casting the sheet resulting from stage a) through a mechanic press (9) to which a plurality of press tools are associated to drill a plurality of openings on the sheet which are grouped together to define strips of perforated sheet alternating with non-perforated sheet strips,
c) profiling the sheet resulting from stage b) through a plurality of consecutive second roller (11-11'-11"... 11^m) stations (10-10'-10"... 10^n) to define the grooves (2) on the sheet,
d) straightening the sheet obtained at stage c) through a third mobile roller station (12),
e) cutting the sheet in sections through a shear (13) to determine a plurality of panels (1)

characterized in that the stage c) of profiling is divided into sub-stages c1), c2)... cn) of profiling defined by each one of the second roller (11-11'-11"... 11^m) stations (10-10'-10"... 10^n), the angle α of the grooves being progressively formed in each one of said sub-stages c1), c2)... cn), said angle varying in width from the first (10) to the last (10^n) of the second roller stations, from a value ranging from 180° to 90° up to the final value of α between 90° and 0°, and being said angle α determined according to the angle β formed between the axes (14-14'-14"... 14^m) of revolution of each one of the rollers (11-11'-11"-... 11^m) and the spin axis (15-15'-15"... 15^n) of each one of the second stations (10-10'-10"... 10^n), there existing a relation between both of them of β=90 - α and also because from an intermediate roller station (10^{n-k}), until the last second station (10^n) the angle α of the grooves is acute.

2. Procedure for manufacturing an enclosure according to claim 1, **characterized in that** the k number ranges between 1 and 6, $1 \leq k \leq 6$.

3. Procedure for manufacturing an enclosure according to claims 1 and 2, **characterized in that** the n number of second stations (10-10'-10"... 10^n) ranges between 5 and 100, $5 \leq n \leq 100$.

4. Procedure for manufacturing an enclosure according to claim 3, **characterized in that** the n number of second stations (10-10'-10"... 10^n) is 30, n = 30.

5. Procedure for manufacturing an enclosure according to claims 1 to 4, **characterized in that** the m number of rollers (11-11'-11"... 11^m) ranges between 1 and 20, $1 \leq m \leq 20$.

6. Procedure for manufacturing an enclosure according to claim 5, **characterized in that** the m number of rollers (11-11'-11"... 11^m) is from 1 to 11, wherein the number of rollers varies according to the station.

7. Procedure for manufacturing an enclosure according to claims 5-6, **characterized in that** for the second stations being between the 10^{n-k} and the 10^n, the m number of rollers of each second station is the same and it is equal or higher than the m number of rollers of the second stations 10 to 10^{n-k}.

8. Machine for manufacturing an enclosure according to the procedure of claims 1 to 5, **characterized in that** in the second roller (11-11'-11"... 11^m) stations (10-10'-10"... 10^n) the angle β formed between the axes (14-14'-14"... 14^m) of revolution of each one of the rollers (11-11'-11"... 11^m) and the spin axis (15-15'-15"... 15^n) of each one of the second stations (10-10'-10"... 10^n) is equal to 90 - α, α being the angle formed between the first wall (3) and the bottom (5) of the grooves (2) and **in that** from an intermediate roller station (10^{n-k}) until the last second station (10^n) the angle α of the grooves is acute.

9. Machine for manufacturing an enclosure according to claim 8, **characterized in that** the k number ranges between 1 and 6, $1 \leq k \leq 6$.

10. Machine for manufacturing an enclosure according to claim 9, **characterized in that** the n number of second stations (10-10'-10"... 10^n) ranges between 5 and 100, $5 \leq n \leq 100$.

11. Machine for manufacturing an enclosure according to claim 10, **characterized in that** the n number of second stations (10-10'-10"... 10^n) is 30, n = 30.

12. Machine for manufacturing an enclosure according to claims 8 to 11, **characterized in that** the m number of rollers (11-11'-11"... 11^m) ranges between 1 and 20, $1 \leq m \leq 20$.

13. Machine for manufacturing an enclosure according to claim 12, **characterized in that** the m number of rollers (11-11'-11"... 11^m) is from 1 to 11, wherein the number of rollers varies according to the station.

14. Machine for manufacturing an enclosure according to claims 12-13, **characterized in that** for the stations being between the 10^{n-k} and the 10^n station,

the m number of rollers of each second station is the same and it is equal or higher than the m number of rollers of the second stations 10 to 10^{n-k}.

15. Enclosure for door leaves, windows and wall coatings, the enclosure being a Majorcan style enclosure, manufactured according to the procedure of claims 1 to 5, **characterized in that** it is constituted by one or more metallic panels (1) featuring alternate longitudinal grooves (2), each one of which comprises a first wall (3), a second wall (4) and a bottom (5) joining the first and second walls (3-4) being parallel to the panel plane, said bottom (5) forming an acute angle α with the first wall (3) and an obtuse angle Y with the second wall (4), along the edges parallel to the grooves, in flat strips (16) which can be overlapped on the edges adjacent to the consecutive panels (1), forming the bottom of a groove.

16. Enclosure according to claim 15, **characterized in that** the first wall (3) has a plurality of openings (17) along it.

17. Enclosure according to claim 16, **characterized in that** the first wall (3) has a plurality of equal and equidistant openings (17) along it.

18. Enclosure according to claim 15, **characterized in that** the first wall has microdrillings (18).

19. Enclosure according to claims 15 to 18, **characterized in that** the panels (1) have a rectangular or square contour, the grooves (2) being arranged in a direction parallel to two of the opposite sides of said contour.

20. Enclosure according to claims 15 to 19, **characterized in that** the panel or panels (1) are mounted between the sides of a frame (19) which define the contour of the leaf or enclosure.

21. Enclosure according to claim 20, **characterized in that** the panels (1) are joined to the sides of the frame (19) and to each other through overlapped strips (16) thereof, by welding.

22. Enclosure according to claim 20, **characterized in that** the panels (1) are joined to the sides of the frame (19) and to each other through the overlapped strips (16), by screws or riveting.

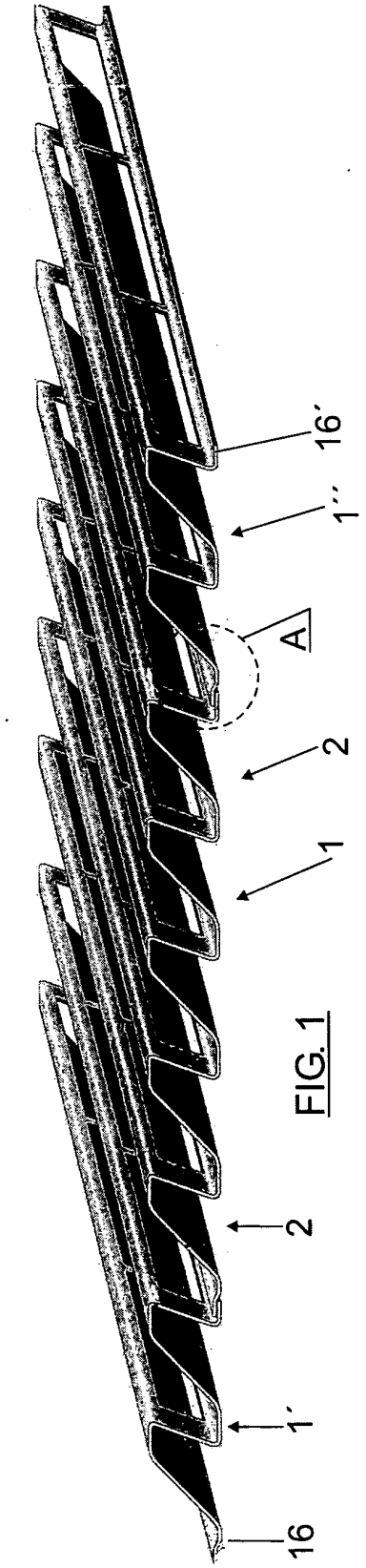

FIG. 1

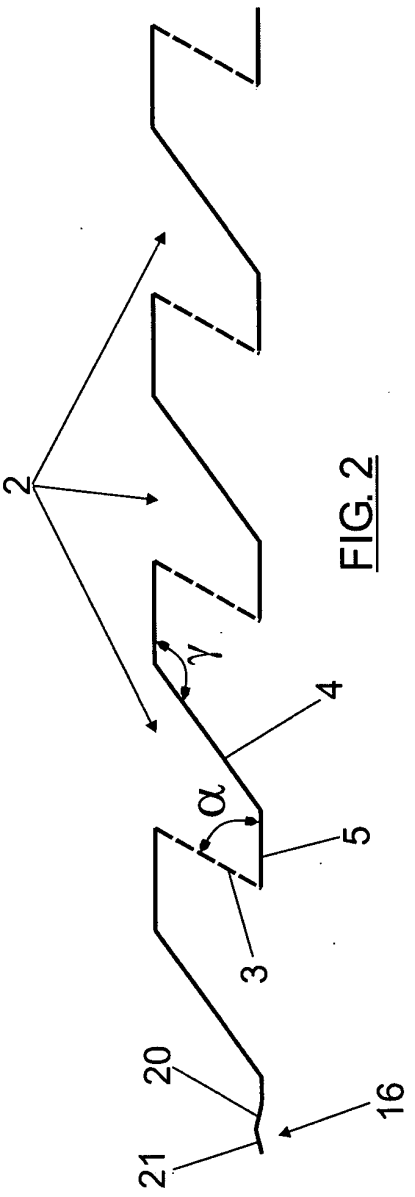

FIG. 2

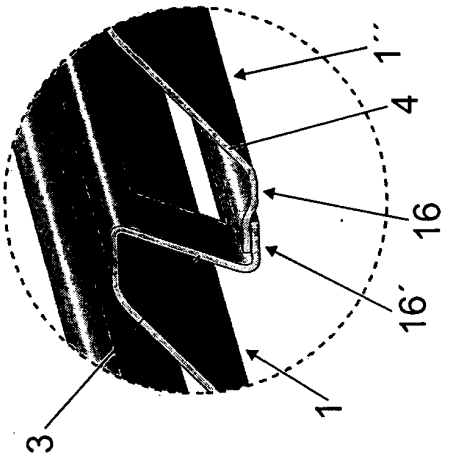

FIG. 3

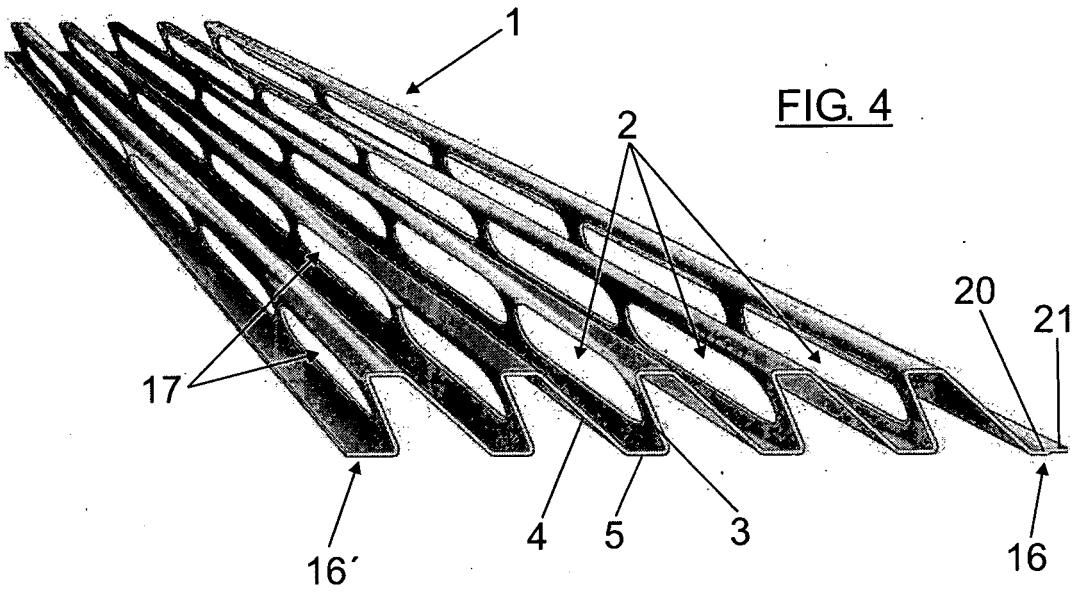

FIG. 4

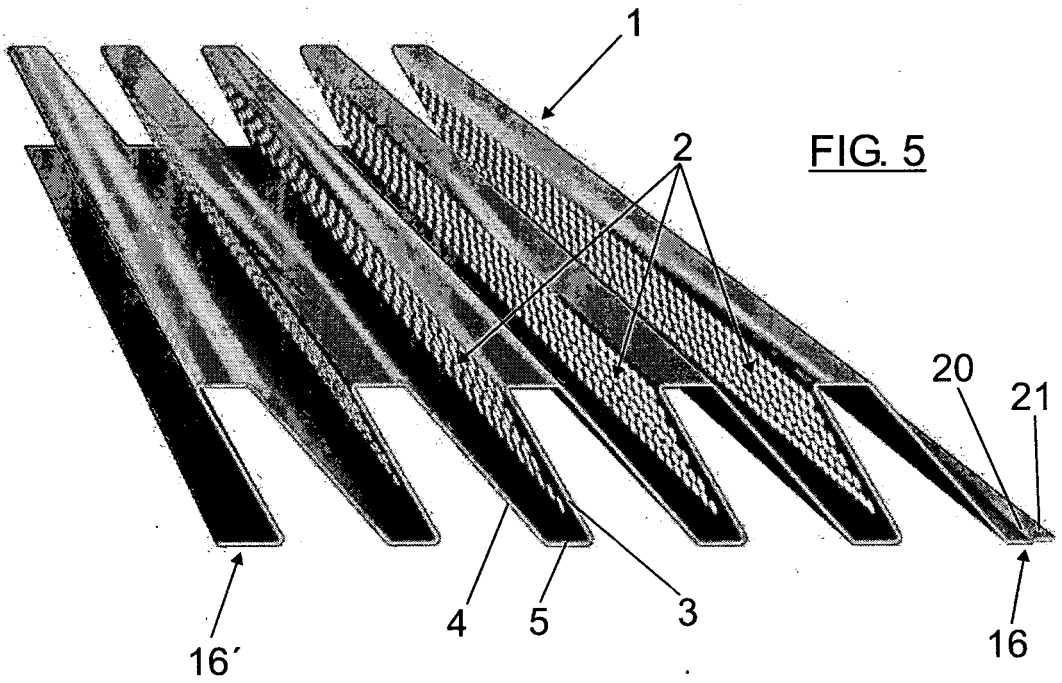

FIG. 5

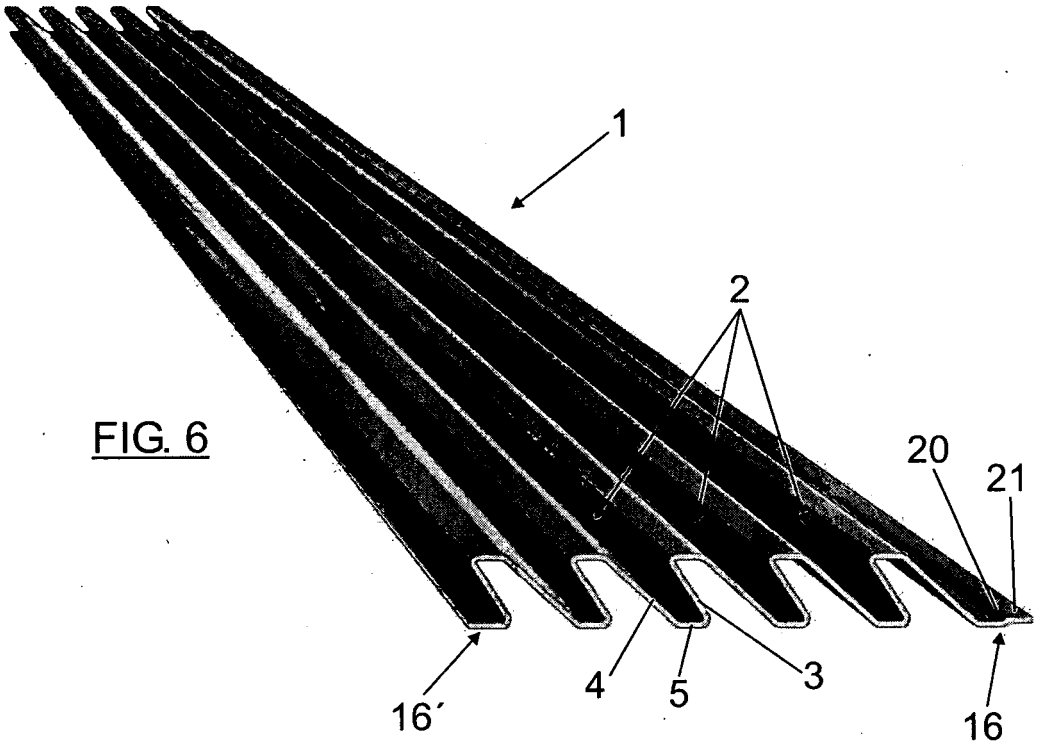

FIG. 6

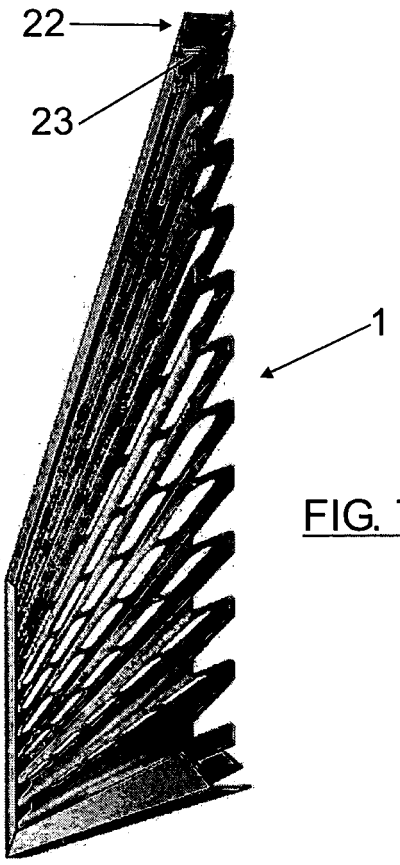

FIG. 7

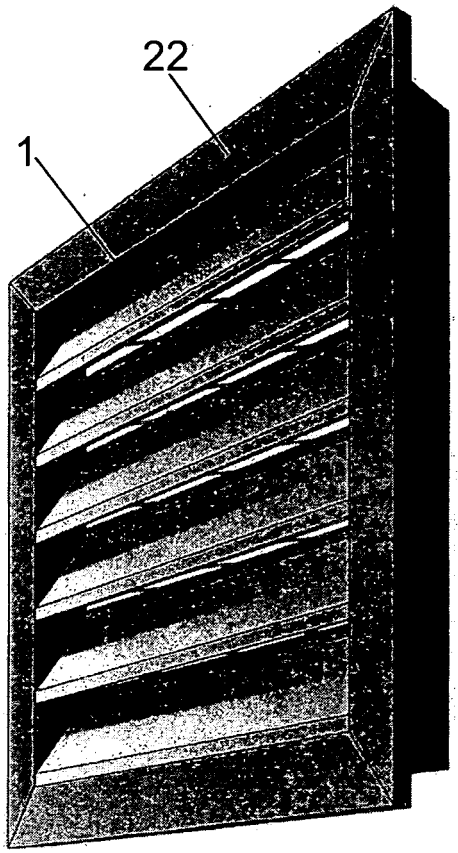

FIG. 8

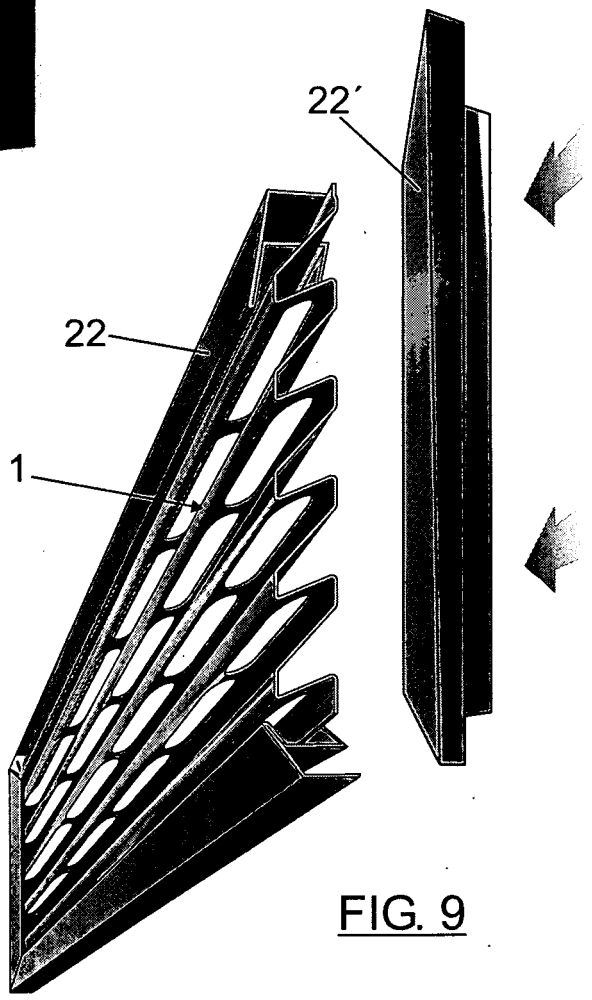

FIG. 9

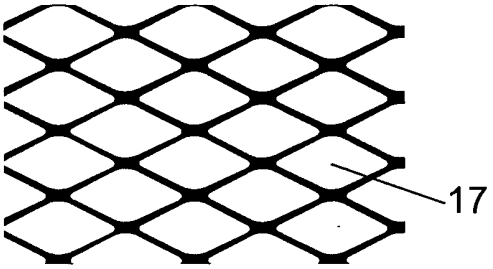

FIG. 10

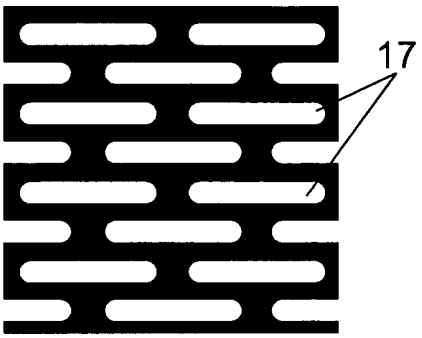

FIG. 11

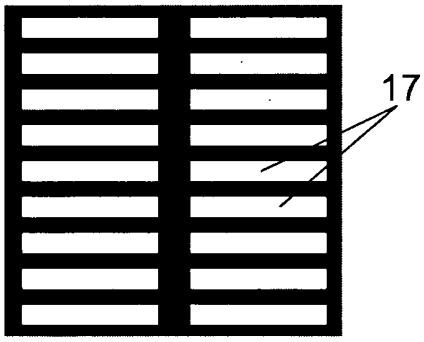

FIG. 12

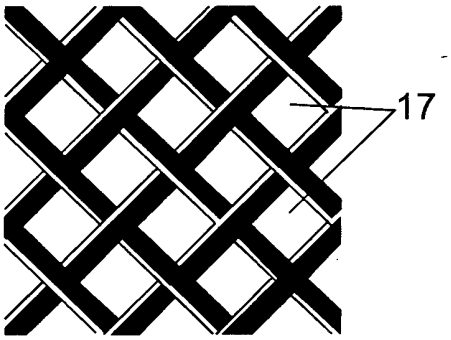

FIG. 13

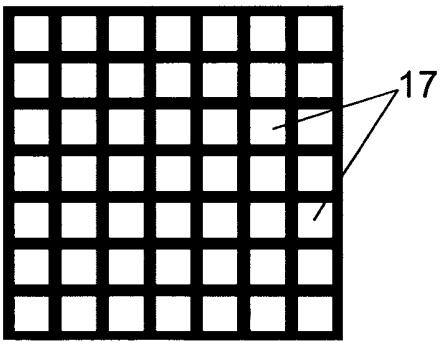

FIG. 14

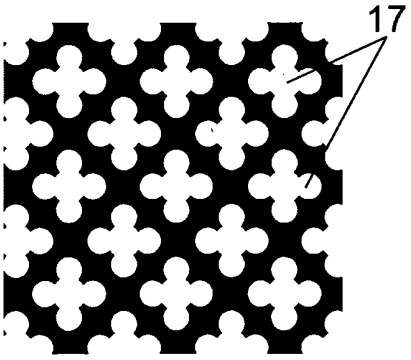

FIG. 15

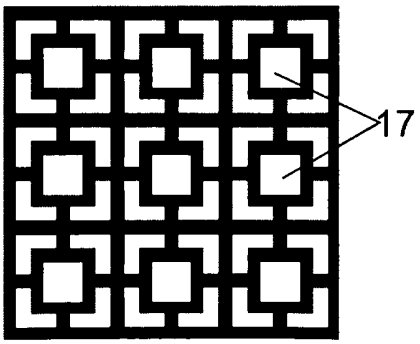

FIG. 16

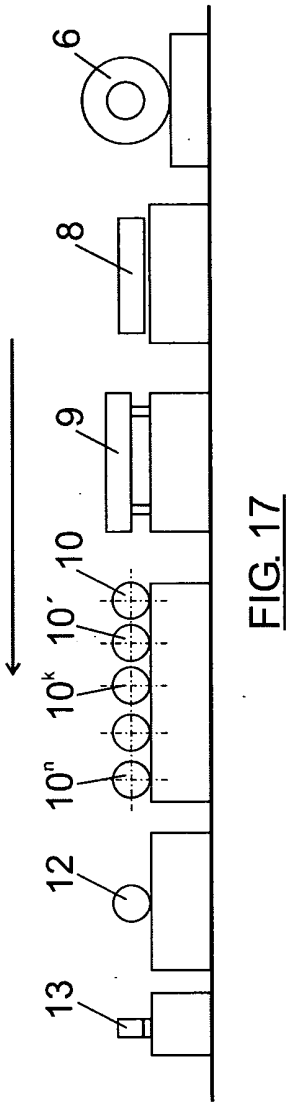
6
8
9
10
10´
10^k
10^n
12
13

FIG. 17

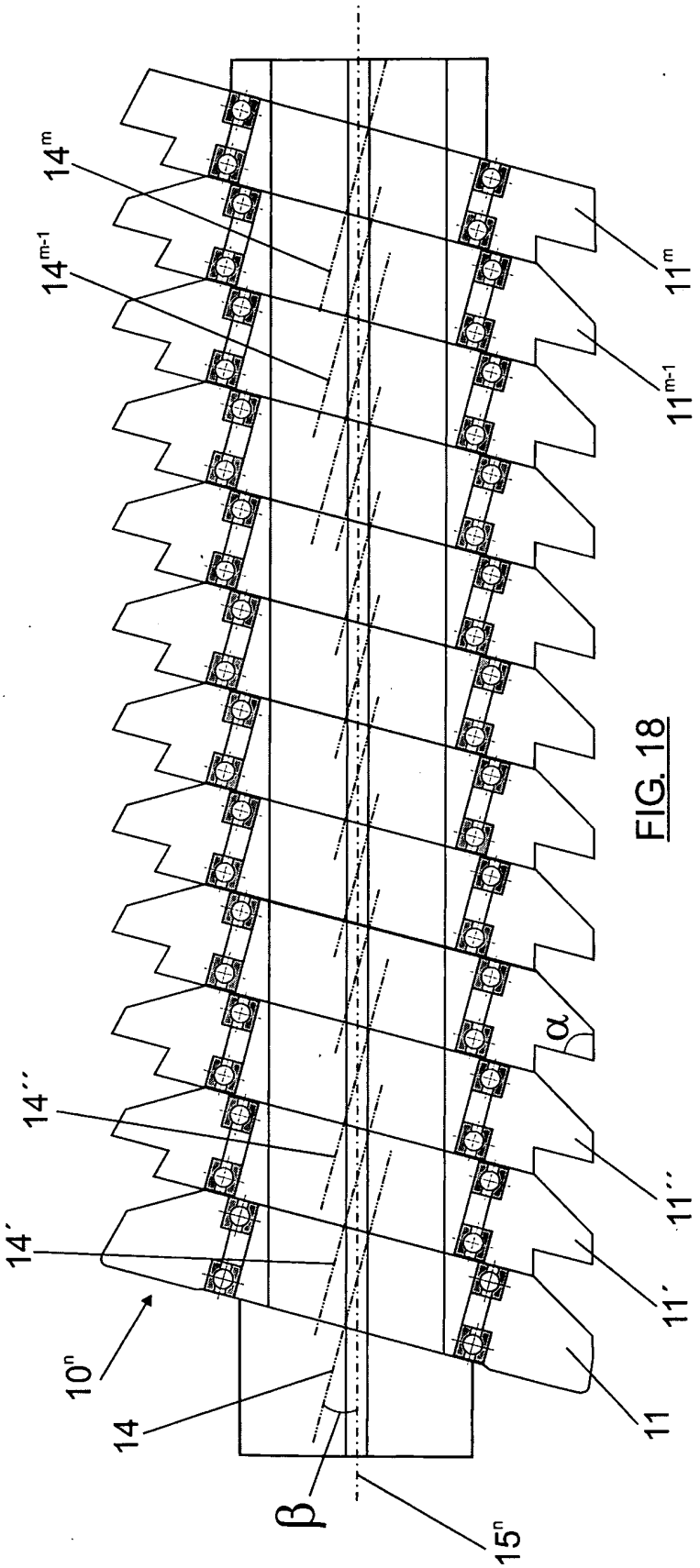
14^m
14^m-1
11^m
11^m-1
14´´
14´
11´´
11´
11
α
β
10^n
14
15^n

FIG. 18