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(54) **Screening apparatus**

(57) A screening apparatus comprises a casing (2) provided with a part (8) defining a collecting chamber (9) for receiving a screened material, said part (8) comprising seat means (17) projecting into said collecting chamber

(9) and arranged for receiving an end part (20) of motor-vibrator means (22, 23) arranged for vibrating said casing (2) with respect to a base of said apparatus (1), said seat means (17) being formed by a recess (60) obtained in said part (8).

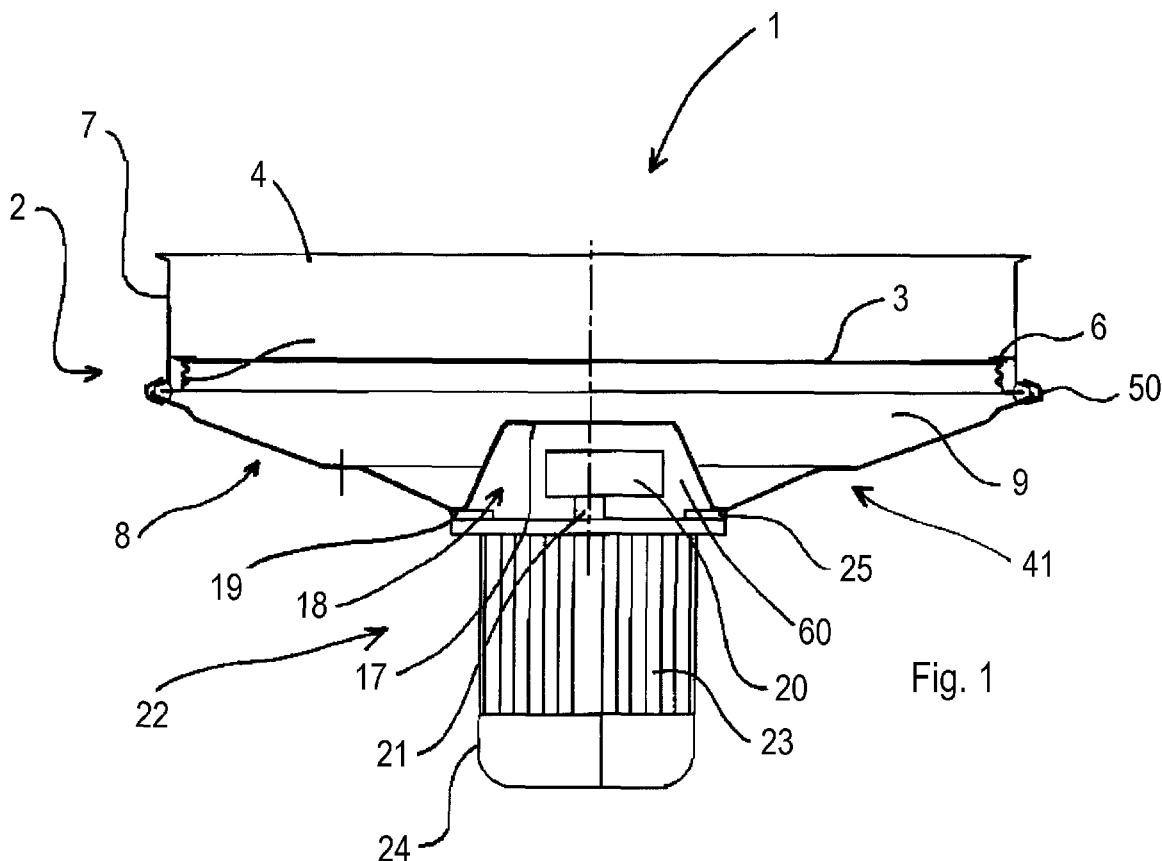


Fig. 1

Description

[0001] The invention relates to a screening apparatus and a method for making a part of said apparatus arranged for receiving a screened material.

[0002] In particular, the invention relates to a screening apparatus that is usually used in productive systems of various types, for example systems for manufacturing ceramic products, for screening materials that were produced by apparatuses or that have to supply apparatuses installed in the aforesaid systems.

[0003] Screening apparatuses are known with a casing provided with a supply opening through which a material to be screened is supplied to a screening net and with a discharge opening through which a screened material exits.

[0004] The screening net is supported and stressed by a supporting ring and is interposed between a first part of the casing arranged for receiving the material to be screened and a second part of the casing defining a collecting chamber arranged for receiving the screened material.

[0005] The second part comprises a conical side wall on which a plurality of brackets are welded and a bottom wall in which a circular opening is obtained.

[0006] The second part further comprises a cover, or cap, projecting internally into the collecting chamber and welded to an internal surface of the bottom wall facing the collecting chamber.

[0007] The cap is arranged for closing the circular opening and for defining a seat arranged for receiving an eccentric mass fixed to an end of a drive shaft of an eccentric mass motovibrator.

[0008] In this way, in use, the eccentric mass is positioned in the aforesaid seat and projects from the circular opening inside the collecting chamber.

[0009] The motovibrator is driven by an electric motor, the frame of which is provided with a flange fixed by a threaded connection to an external surface of the bottom wall opposite the aforesaid internal surface.

[0010] Known screening apparatuses further comprise a plurality of springs.

[0011] The springs connect the second part of the casing to a base of the aforesaid screening apparatuses and enable the casing to vibrate with respect to the base.

[0012] In particular, these springs are fixed on one side to the aforesaid brackets, and on an opposite side to the base.

[0013] In use, the eccentric mass motovibrator, driven by the electric motor, vibrates the casing to enable a finer fraction of the material to be screened to pass through the screening net and be subsequently expelled through the discharge opening to a collecting container.

[0014] It is known making the second part through spinning.

[0015] In spinning the second part is made from a disc-shaped plate.

[0016] A portion of the plate is pressed by an abutting

element against an abutting surface, having a substantially conical shape, of a die fixed to a spindle.

[0017] The abutting element faces the die and is free to rotate around a rotation axis thereof.

5 **[0018]** In this way, during spinning, the plate is interposed between the abutting element and the die.

[0019] Subsequently, the spindle is rotated, and a suitable tool presses a remaining portion of the sheet against the abutting surface of the die.

10 **[0020]** In this way a plate is obtained that is provided with a disc-shaped bottom wall and with a conical side wall.

[0021] Subsequently, in the bottom wall the circular opening is made and still subsequently, the brackets are welded to the side wall.

15 **[0022]** Still subsequently, the cap is made, by forming or by spinning, which is then fixed to the internal surface of the bottom wall.

[0023] A drawback of the aforesaid screening apparatuses is that they are very expensive to make.

20 **[0024]** This is due to the significant quantity of flash obtained to make the circular opening, to the cost for making the cap and to the cost for purchasing the brackets.

25 **[0025]** A further drawback are the operations that are necessary for obtaining and assembling these apparatuses, which operations are extremely slow and laborious.

[0026] In fact, it is necessary to make both the second part and the cap, after which the cap has to be welded to the internal surface of the bottom wall and the brackets have to be welded to the side wall.

[0027] A still further drawback is that such apparatuses are not very strong.

35 **[0028]** This is due to the weldings that are necessary for fixing the cap to the bottom wall and the brackets to the side wall, which weldings create stresses that may cause breakages.

[0029] An object of the invention is to improve screening apparatuses and the methods for making a part of said apparatuses arranged for receiving a screened material.

[0030] A further object is to provide screening apparatuses that are cheap and fast to make.

40 **[0031]** A still further object is to obtain screening apparatuses that are stronger than known screening apparatuses.

[0032] In a first aspect of the invention a screening apparatus is provided comprising a casing provided with a part defining a collecting chamber for receiving a screened material, said part comprising seat means projecting into said collecting chamber and arranged for receiving an end part of motovibrator means arranged for vibrating said casing with respect to a base of said apparatus, characterised in that said seat means is formed by a recess obtained in said part. In an embodiment of the invention said part comprises a flat annular portion to which first springs ends can be fixed that are arranged

for connecting said part to a base of said apparatus.

[0033] In a second aspect of the invention a method is provided for making a part of a casing of a screening apparatus, said part defining a collecting chamber for receiving a screened material and being provided with seat means for receiving an end part of motovibrator means arranged for making said casing vibrate with respect to a base of said apparatus, said method comprising deforming plate means in such a way that said seat means projects inside said collecting chamber.

[0034] Owing to these aspects of the invention, it is possible to obtain cheap screening apparatuses.

[0035] In fact, said part and said seat means are formed by a single body.

[0036] On the one hand, this enables the costs of making a cap to be eliminated, inasmuch as the latter is replaced by said seat means, and on the other hand this enables the costs of purchasing brackets to be fixed to said part to be eliminated, inasmuch as said brackets are replaced by said annular portion, to which said springs can be fixed.

[0037] Further, owing to the aforesaid aspects of the invention it is possible to obtain screening apparatuses that are fast to make.

[0038] In fact, the slow welding operations, that are necessary for fixing said cap and said brackets to said part, are eliminated.

[0039] This further enables screening apparatuses to be obtained that are stronger than known screening apparatuses, inasmuch as they are devoid of welding.

[0040] The invention can be better understood and carried into effect with reference to the attached drawings in which an embodiment of the invention is shown by way of non-limiting example, in which:

Figure 1 is a fragmentary cross section of a screening apparatus with some details removed to better highlight other details;

Figure 2 is an enlarged detail of Figure 1;

Figure 3 and Figure 4 are schematic front views of a spinning lathe arranged for making a part of the screening apparatus in Figure 1.

[0041] With reference to Figure 1, a screening apparatus 1 is shown that is usually used in production systems of various types, which are not shown, for example systems for manufacturing ceramic products, for screening materials that were manufactured by apparatuses, or which have to supply apparatuses installed inside the aforesaid systems.

[0042] The screening apparatus 1 comprises a casing 2 provided with a supply opening 4 through which a material to be screened is conveyed to a screening net 3, and with a discharge opening, which is not shown, through which a screened material exits.

[0043] The screening net 3 is supported and stressed by a supporting ring 5 and abuts on an angular abutting ring 6 that is operationally positioned above the support-

ing ring 5 and is welded to the casing 2.

[0044] Between the screening net 3 and the angular abutting ring 6 a seal can be interposed, which is not shown, that is arranged for safeguarding the screening net 3.

[0045] The screening net 3 is interposed between a first part 7 of the casing 2 arranged for receiving the material to be screened and a second part 8 of the casing 2 defining a collecting chamber 9 arranged for receiving the screened material.

[0046] The second part 8 comprises side wall means 10, arranged for conveying the screened material to the discharge opening (Figure 2).

[0047] The side wall means 10 comprises a first tilted side wall 11, a second tilted side wall 12, a third tilted side wall 13 and a fourth tilted side wall 14 having increasing diameters.

[0048] In particular, the fourth side wall 14 acts as a rest for fixing means 50 which are arranged for fixing the first part 7 to the second part 8.

[0049] The side wall means 10 further comprises a substantially flat annular wall 15 interposed between the first tilted side wall 11 and the second tilted side wall 12 and provided with a plurality of holes 16.

[0050] The second part 8 further comprises a bottom wall 18 in which a recess 60 is obtained which is internally positioned in a substantially coaxial manner with respect to the annular wall 15 of the side wall means 10, between the recess 60 and the side wall means 10 a substantially flat connecting wall 19 being provided.

[0051] The recess 60 has a substantially conical shape and projects inside the collecting chamber 9.

[0052] In an embodiment of the invention, which is not shown, the recess 60 has any concave shape with the concavity facing downwards.

[0053] The recess 60 defines seat means 17 arranged for receiving an eccentric mass 20 fixed to an end of a motor shaft 21 of an eccentric mass motovibrator 22.

[0054] In this way, in use, the eccentric mass 20 is positioned in the seat means 17, inside the collecting chamber 9.

[0055] The motovibrator 22 is driven by an electric motor 23, which is inserted into a frame 24 provided with a flange 25 fixed by a threaded connection to the connecting wall 19.

[0056] The screening apparatus 1 further comprises a plurality of springs, which is not shown, arranged for connecting the second part 8 to a base, which is not shown, of the screening apparatus 1 and for enabling the casing 2 to vibrate with respect to the aforesaid base.

[0057] In particular, the springs are fixed, by a threaded connection, to the annular wall 15 on the one side and to the base on the opposite side.

[0058] In use, the motovibrator 22, driven by the electric motor 23, vibrates the casing 2 to enable a finer fraction of the material to be screened to pass through the screening net 3 and to be subsequently expelled through the discharge opening to a collecting container, which is

not shown.

[0059] With reference to Figure 3 a spinning lathe 26 is shown in a first operating configuration A in which the spinning lathe 26 is arranged for forming the seat means 17.

[0060] In the first operating configuration A, the spinning lathe 26 comprises a spindle 27 on which there is fixed a first die 28 defining a first abutting surface 29.

[0061] The first abutting surface 29 comprises a flat surface 32 and, substantially at a central portion 31 thereof, a protrusion 30 having a substantially conical shape.

[0062] In particular, the protrusion 30 is shaped in such a way as to reproduce a profile 39 of the recess 60 (Figure 2).

[0063] The spinning lathe 26 further comprises an abutting element 33, having a substantially conical shape and facing the first die 28.

[0064] The abutting element 33 is free to rotate around a first rotation axis X and is movable towards and away from the first die 28.

[0065] The spinning lathe 26 further comprises a forming roller 34 that is free to rotate around a second rotation axis Y thereof, the forming roller 34 being movable towards and away from the first die 28.

[0066] With reference to Figure 4 the spinning lathe 26 is shown in a second operating configuration B in which the spinning lathe 26 is arranged for forming the side wall means 10.

[0067] The second operating configuration B differs from the first operating configuration A inasmuch as on the spindle 27 a second die 37 is fixed defining a second abutting surface 38.

[0068] The second abutting surface 38 is shaped in such a way as to reproduce a further profile 41 of the second part 8 (Figure 1).

[0069] In particular, the second die surface 38 comprises, substantially at a second central portion 51 thereof, an indentation 40 that reproduces the profile 39 of the recess 60.

[0070] The operation of the spinning lathe 26 is hereinafter disclosed, with reference to Figures 3 and 4.

[0071] Initially, a disc-shape plate 35, which is represented by the broken line in Figure 3, is positioned on the spinning lathe 26.

[0072] The plate 35 is interposed between the first die 28 and the abutting element 33 and is pressed by the latter against the protrusion 30 of the first abutting surface 29.

[0073] Subsequently, the spindle 27 is rotated and the forming roller 34 is advanced.

[0074] The forming roller 34 contacts the plate 35 and presses the plate 35 against the first abutting surface 29, deforming the plate 35.

[0075] In this way, the seat means 17 is formed in the plate 35.

[0076] Subsequently, the partially formed plate 35 is removed from the spinning lathe 26, the first die 28 is removed from the spindle 27 and the second die 37 is

mounted.

[0077] Subsequently, the partially formed plate 35 is positioned again on the spinning lathe 26.

[0078] The plate 35 is interposed between the second die 37 and the abutting element 33 and is pressed by the latter against the indentation 40 of the second abutting surface 38.

[0079] In other words, the plate 35 is positioned in such a way that the previously formed seat means 17 abuts on the indentation 40.

[0080] Subsequently, the spindle 27 is rotated and the forming roller 34 is advanced.

[0081] The forming roller 34 contacts the plate 35 and presses the latter against the second abutting surface 29, deforming the plate 35.

[0082] In this way, the side wall means 10 is formed in the plate 35.

[0083] It should be noted how the screening apparatus 1 requires little expenditure of money to be made.

[0084] In fact, the second part 8 and the aforesaid seat means 17 are formed by a single body obtained through spinning.

[0085] This on one hand enables the costs of making a cap to be eliminated inasmuch as the cap is replaced by the seat means 17, and on the other hand enables the costs of purchasing brackets to be fixed to said second part to be eliminated, inasmuch as the aforesaid brackets are replaced by the flat annular wall 15, to which the springs can be fixed.

[0086] It should further be noted how the screening apparatus 1 is fast to make.

[0087] In fact, the slow welding operations, that are necessary for fixing the aforesaid cap and the aforesaid brackets to the second part 8, are eliminated.

[0088] This further enables a screening apparatus 1 to be obtained that is more strong than known screening apparatuses, as it is devoid of welds.

Claims

1. Screening apparatus comprising a casing (2) provided with a part (8) defining a collecting chamber (9) for receiving a screened material, said part (8) comprising seat means (17) projecting into said collecting chamber (9) and arranged for receiving an end part (20) of motorvibrator means (22, 23) arranged for vibrating said casing (2) with respect to a base of said apparatus (1), **characterised in that** said seat means (17) is formed by a recess (60) obtained in said part (8).
2. Apparatus according to claim 1, wherein said seat means (17) has a substantially conical shape.
3. Apparatus according to claim 1, or 2, wherein said part (8) comprises an annular wall (15) that is substantially flat to which first ends of springs are fixable,

said springs being arranged for connecting said part (8) to said base.

4. Apparatus according to claim 3, wherein said annular wall (15) is positioned substantially externally in a substantially coaxial manner, with respect to said seat means (17). 5

5. Method for making a part (8) of a casing (2) of a screening apparatus (1), said part (8) defining a collecting chamber (9) for receiving a screened material and being provided with seat means (17) for receiving an end part (20) of motorvibrator means (22, 23) arranged for vibrating said casing (2) with respect to a base of said apparatus (1), said method comprising deforming plate means (35) in such a way that said seat means (17) projects inside said collecting chamber (9). 10 15

6. Method according to claim 5, wherein said deforming comprises pressing said plate means (45) against an abutting surface (29) of die means (28), said abutting surface being provided with a protrusion (30) shaped in such a way as to reproduce a profile (39) of said seat means (17). 20 25

7. Method according to claim 6, wherein after said pressing positioning said seat means (17) in an indentation (40) is provided, which indentation (40) is shaped in such a way as to reproduce said profile (39) and obtained in a further abutting surface (38) of further die means (37). 30

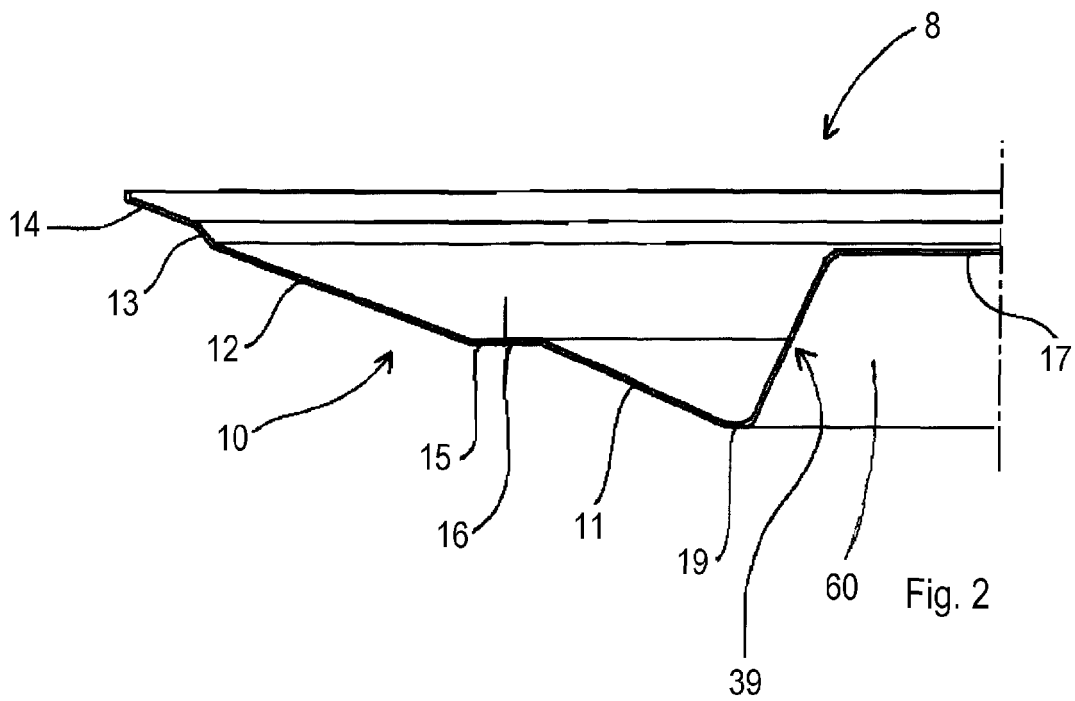
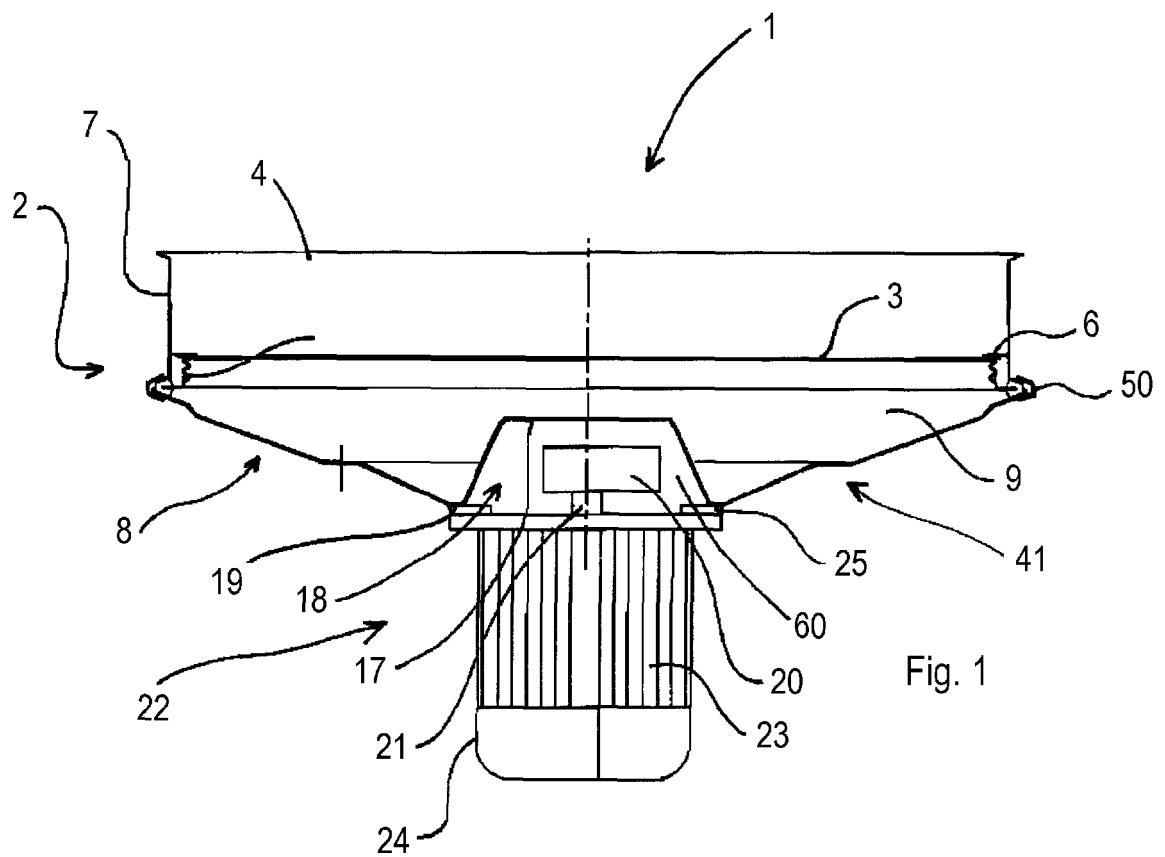
8. Method according to claim 7, wherein after said positioning there is provided still pressing said plate means (35) against said further abutting surface (38), said further abutting surface (38) being shaped in such a way as to reproduce a further profile (40) of said part (8). 35 40

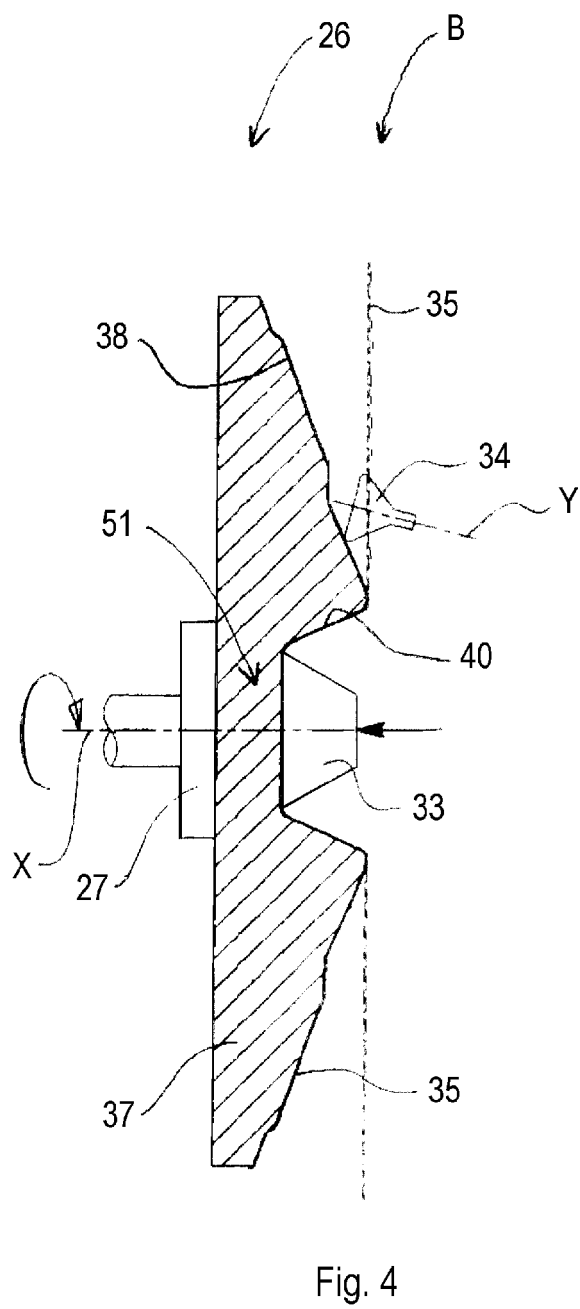
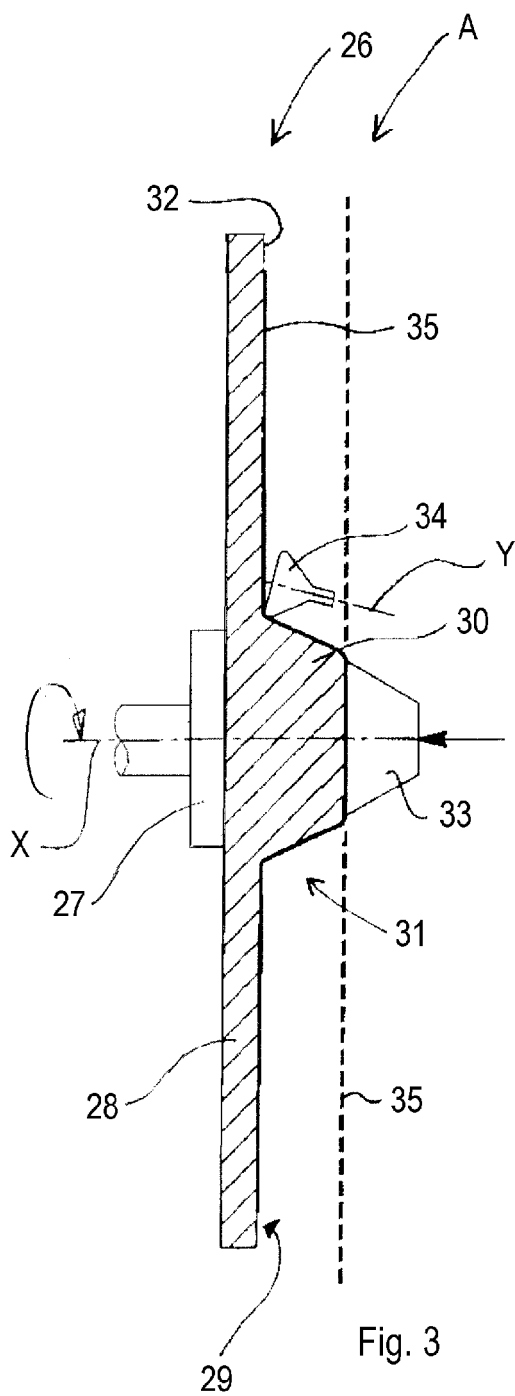
9. Method according to any one of claims 5 to 8, wherein said deforming comprises rotating said plate means (35). 45

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EUROPEAN SEARCH REPORT

Application Number
EP 07 11 8018

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The present search report has been drawn up for all claims				
Place of search Munich		Date of completion of the search 4 March 2008	Examiner Kofoed, Jakob	
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document				

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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