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(54) **Title:** A SPACER PLATE FOR A CLAMPING DISC IN AN INSULATING GLASS PANEL

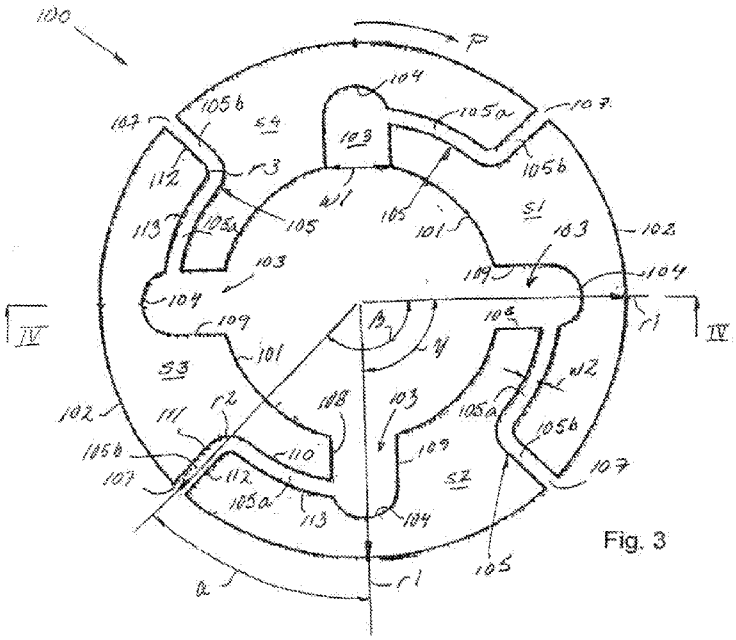

Fig. 3

(57) **Abstract:** Spacer plate (100) for a clamping disc included in an assembly for insulating glass panels, which spacer plate is formed of a resilient or elastic material and is limited by an inner periphery (101) and an outer periphery (102), further comprising a well (103) radially opening out into the inner periphery (101) with a bottom (104) located between the inner periphery (101) and the outer periphery (102), and with a channel (105) extending from the area of said bottom (104) and opening out (107) into the outer periphery (102).

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[Continued on next page]

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A spacer plate for a clamping disc in an insulating glass panel

TECHNICAL FIELD OF THE INVENTION

The present invention relates to a spacer plate for a clamping disc included in an assembly for insulating glass windows or other insulating glass panels, which spacer plate is limited by an inner periphery and an outer periphery, whereby at least one passage through the spacer plate fluidly connects its inner periphery to its outer periphery.

BACKGROUND AND PRIOR ART

Assembly of two- or multi-layer insulating glass windows using an inner clamping disc and an outer clamping disc is previously described in SE523116, from which the attached Fig. 1 and Fig. 2 are taken and which consequently show prior art. In an assembly for an insulating glass window (see Fig. 1), comprising at least a first pane 1 of glass and a second pane 2 of glass, an inner clamping disc 3 arranged inside the insulating glass window and an external clamping disc 4 arranged on the outside are included. The clamping discs 3 and 4 are interconnected by means of a coupling means 5 which extends through a hole 6 formed in one of the glass panes. This hole is usually made through the glass pane 1 of the insulating glass window which is placed closest to a supporting structure during assembly. A bushing 7 that fits in the hole 6 is pressed by means of a tool designed for the purpose (not shown in Fig. 1) into the hole against a formable sealing element 8 which thereby expands in radial directions and creates an airtight connection through the hole 6. By means of said tool the inner clamping disc 3 is thereby positioned over the hole 6 and attached to the glass pane 1 by means of an adhesive-coated tape 9 (see Fig. 2).

Fig. 2 shows a perspective view of the side of the inner clamping plate 3 that abuts the glass pane 1. On said side, which may be called the underside of the clamping disc 3, the clamping disc 3 supports a tape 9 used as a spacer, which has the form of a circular ring with radially running straight channels 10 that connect an inlet opening 11 in the inner periphery of the tape to an outlet opening 12 in its outer periphery. When attaching the inner clamping disc 3 to the glass pane, the channels 10 function as

pressure equalization channels which prevent the inclusion of air that may need to be forced out when compressing the sealing element 8. The sealing element 8 may advantageously be made of a butyl rubber band. Butyl can be compared to a highly elastic, synthetic rubber whose properties are suitable for this area of application as butyl is a material that is permanently soft, does not solidify and has a high temperature resistance and exhibits good moisture and air sealing properties.

It should be noted here that the inner clamping disc 3 is applied to the glass pane 1 before the glass panes 1 and 2 are connected to each other by means of a frame element 13 running along the periphery of the insulating glass window. The hermetically sealed space between the glass panes can then be filled with air or filled with another gas.

An insulating glass window may be exposed to strong variations and differences both in terms of outdoor temperature and indoor temperature and varying wind loads that may cause both internal and external compressive stresses and bending stresses on the insulating glass window. Over time, this may cause the permanently soft sealing compound in the sealing element to start migrating and, in the extreme case, to flow outside the periphery of the clamping disc. When this is the case, not only an aesthetic problem is created, but in the long run it may also entail a potential risk that the sealing of the hole through the glass pane is ultimately compromised.

SUMMARY OF THE INVENTION

The invention aims to eliminate the above-mentioned problems.

The object is met by the invention providing a spacer plate for a clamping disc included in an assembly for insulating glass panels, which spacer plate is formed of a resilient or elastic material and is limited by an inner periphery and an outer periphery, whereby at least one passage through the spacer plate fluidly connects its inner periphery to its outer periphery. The at least one passage comprises a well opening out into the inner periphery with a bottom located radially inside the outer periphery, and with a channel extending from the area of said bottom which opens out into the outer periphery.

The design with a well offers a form of buffer that may provide a comparatively large volume for expanding sealing compound while the sealing compound is slowed up inside the outer periphery of the spacer plate. The channel extending from the bottom area of the well ensures air outflow when installing the clamping disc and the spacer plate on the insulating glass panel.

In one embodiment, the channel extending from the well opens out into an outlet in the outer periphery that is offset in the circumferential direction of the spacer plate (counter-clockwise or clockwise) and relative to the well.

One embodiment comprises a channel extending laterally from the bottom area of the well, which has a first channel section running alongside and substantially parallel or almost parallel to the inner and outer peripheries. Said channel further comprises a second channel section connecting to the first channel section which opens out mainly radially into the outer periphery. By this embodiment, the channel may be given a maximum possible length, which further ensures sufficient volume for the sealing compound to expand without passing the outer periphery of the clamping disc.

In one embodiment, the spacer plate comprises two or more sections of a complementary shape in such a way that each section, on the one hand, forms an inner wall, radially viewed, of a first channel section and, on the other hand, forms an outer wall, radially viewed, of a subsequent first channel section, as viewed in the circumferential direction.

In one embodiment comprising two or more sections of complementary shape, each section provides, on the one hand, a downstream wall, as viewed in the circumferentially direction, of a second channel section and, on the other hand, an upstream wall, as viewed in the circumferential direction, of a subsequent second channel section, as viewed in the circumferential direction.

In one embodiment, the well may be formed of two consecutive sections in such a way that the width of the well in the direction of the inner periphery is greater than the width of the channel belonging to the well. Specifically, the width of the well may be 2 to 4 times greater than the width of the associated channel.

In one embodiment, the spacer plate comprises four sections which together form four wells and four outlets, whereby the well and the associated outlet are angularly offset from each other at an angle of 45°.

In one embodiment, both sides of the spacer plate support an adhesive. In this embodiment, the sections of the spacer plate may be mutually fixed in position by means of a removable protective film.

BRIEF DESCRIPTION OF THE DRAWINGS

Embodiments of the invention are explained in more detail below with reference to the attached schematic drawings, of which

Fig. 1 shows an assembly of insulating glass windows known from SE523116,

Fig. 2 shows a clamping disc included in the known assembly coated with a tape,

Fig. 3 shows a plan view of a spacer plate according to the invention in a first embodiment, intended for a clamping disc included in an assembly of insulating glass panels,

Fig. 4 shows a cross-section along the section line IV-IV through the spacer plate of Fig. 3,

Fig. 5 shows a first alternative embodiment of the spacer plate,

Fig. 6 shows a second alternative embodiment of the spacer plate, and

Fig. 7 shows a third alternative embodiment of the spacer plate.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

With reference to Fig. 3 and Fig. 4, a first embodiment of a spacer plate 100 according to the invention is shown comprises four uniform sections S1, S2, S3 and S4. Together, the four sections form a ring with a radius r1, the ring being limited by an inner periphery 101 and an outer periphery 102. A well 103 opens towards the inner

periphery, said well having a bottom 104 located inside the outer periphery 102. From the area of said bottom 104 there extends a channel 105 consisting of a first channel section 105a extending between the inner and outer peripheries, and substantially alongside and parallel or nearly parallel to the inner and outer peripheries. The first channel section 105a continues in a second and substantially radially running channel section 105b which opens out into the outer periphery and thus connects the well to an outlet 107 which opens out into the outer periphery 102 of the spacer plate.

In the embodiment shown in Fig. 3, the well 103 and the outlet 107 are angularly offset from each other. In a spacer plate consisting of four sections S1-S4, well 103 and associated outlet 107 are angularly offset from each other at an angle α in the order of about 45°. In alternative embodiments consisting of four sections, the angle α may be determined within a range of about 20-70°, and preferably within a narrower range of about 30-60° as a favorable balance between, on the one hand, the combined length of the channel sections 105a and 105b from the well 103 to the outlet 107, and on the other hand the dimensional stability of the spacer plate during handling and assembly.

In embodiments consisting of a different number of sections, the displacement angle α may amount to the same or to other values.

The well 103, the channel sections 105a, 105b and the outlet 107 are formed from two of the sections S1-S4 combined. This will now be explained in more detail with particular reference to section S3 in Fig. 3.

More specifically, each of the sections S1-S4 forms part of the inner periphery 101 and part of the outer periphery 102. A first end of the section S3, for the reasons of description referred to as an upstream end of the section S3, as viewed in the circumferential direction P, forms a side 108 of a well 103, which side 108 connects to the inner periphery 101. A recess opening into the inner periphery 101 forms a side 109 and the bottom 104 of a subsequent well 103, as viewed in the circumferential direction P. The previously mentioned side 108 further connects to an edge of section S3 running substantially alongside the inner or outer periphery, said edge forming an inner channel wall 110, radially viewed, of channel section 105a. The channel wall 110 passes, via a radius r2, into a substantially radially running edge which forms a downstream channel wall 111, as viewed in the circumferential direction P, of channel

section 105b. Said channel wall 111 in turn passes into the outer periphery 102, which extends, in the circumferential direction P, up to a substantially radially running edge, said edge forming an upstream channel wall 112, as viewed in the circumferential direction P, of a subsequent channel section 105b, as viewed in the circumferential direction P. Said channel wall 112 in turn passes, via a radius r3, into an edge of section S3 running substantially alongside the inner or outer periphery, said edge forming an outer channel wall 113, viewed radially, of channel section 105a.

In the illustrated embodiment, each section S1-S4 comprises an angular width β of about 135° between its upstream and downstream ends. Combined with adjacent sections, the sides 108 and 109 are included in a respective well 103, whose center lines r1 comprise an angular width γ of about 90°. Combined with adjacent sections, the channel walls 111 and 112 are included in a respective channel section 105b which from the associated well 103 is offset in the circumferential direction P at an angular distance α of about 45°.

It should be noted that the well 103 has a width w1 in the direction of the inner periphery 101 which is greater than a width w2 of the first channel section 105a. The second channel section 105b may be of the same width w2 or of a different width. It may also be expressed such that the channel 105 provides a smaller flow area than the well 103. This creates an increased resistance and a form of restriction for the flow of the elastic and sluggishly flowing sealing compound, which reduces the possibility of the sealing compound to escape from the well 103 via the channel 105. Without limiting the invention thereto, it may be stated as a benchmark that w1 may be 2 to 4 times greater than w2.

The fact that the inlet into the channel 105 opens out into the side of the well in an area near to the bottom of the well 104 also contributes to an increased flow resistance, and therefore the flow must change direction from a radially directed flow into the well into a laterally directed flow out of the well. The design of the new spacer plate 100 with a widened inlet into the inner periphery also allows a larger volume of sealing compound to be stored and buffered in the well 103 before sealing compound can flow out into the channel 105.

The spacer plate sections S1-S4 may be coated on opposite sides A, B with an adhesive by which the spacer plate 100 can be glued to the inner clamping disc before the clamping disc is fixed onto the glass pane during assembly. The spacer plate 100 may have a thickness d of about 0.5–2 mm, and preferably consists of a resilient or elastic material, such as a natural rubber, a synthetic rubber or other polymer material.

The spacer plate 100 may be formed by punching out of a sheet of pre-fabricated double-coated adhesive material. When produced by punching, all the sections included in the spacer plate are preferably formed simultaneously from one and the same starting sheet and are fixed in mutual position by means of a covering protective film that protects the adhesive up to assembly.

In an alternative embodiment, the wells and channels of the spacer plate may be shaped by, for example, casting or pressing an annular substance, whereby the sections of the spacer plate are held together by a thin layer of material that forms the top or bottom of the spacer plate.

It should be understood that the advantages of the invention may be achieved with alternative embodiments of the spacer plate, see Fig. 5, Fig. 6 and Fig. 7.

Instead of, as in the embodiment described above, the channel 105 extending laterally or sideways from the well 103, an alternatively designed spacer plate 200 according to Fig. 5 may include channels 205 which extend from the area of a bottom 204 of a well 203 in order to open out at 207 radially or almost radially in the outer periphery 202, which via the channels 205 and associated wells 203 is in flow connection with an inner periphery 201.

In an alternatively designed spacer plate 300, see Fig. 6, arcuate channels 305 may extend from the area of a bottom 304 of a well 303 and open out at 307, tangentially or almost tangentially in the outer periphery 302, which via the channels 305 and associated wells 303 is in flow connection with an inner periphery 301.

Furthermore, the spacer plate may be made up of a different number of sections than four, such as two, three or more sections, where appropriate with a corresponding number of wells, channels and outlets. In a spacer plate 400 consisting of two sections S1 and S2, see Fig. 7, channels 405 may extend laterally from a respective bottom

area 404 of two wells 403 located in diametrically opposite positions of the spacer plate 400, to open out at 407 at an intersecting angle to the periphery 402, which via the channels 405 and associated wells 403 is in flow connection with an inner periphery 401. An angularly even distribution of wells and outlets in the inner and outer peripheries may support an even distribution and pressure distribution of the sealing compound around the coupling member 5, but a symmetrical disposition of wells and channels need not be a condition to utilize the advantages of the invention. It is understood that the spacer plate 100, 200, 300 or 400 may be mirror-inverted and that other alternative embodiments of the spacer plate may include different combinations of wells, channels/channel sections and sections shown here. However, a central aspect of the solution, as stated in the accompanying patent claims, is that the spacer plate has at least one passage between the inner and outer peripheries, which provides a buffer space in the form of a well open towards the inner periphery, which well via a channel extending from the bottom of the well or from the area of the bottom of the well is in flow communication with the outer periphery.

CLAIMS

1. Spacer plate (100; 200; 300; 400) for a clamping disc included in an assembly for insulating glass panels, which spacer plate is formed of a resilient or elastic material and is limited by an inner periphery (101; 201; 301; 401) and an outer periphery (102; 202; 302; 402), wherein at least one passage through the spacer plate (100; 200; 300; 400) fluidly connects its inner periphery (101; 201; 301; 401) to its outer periphery (102; 202; 302; 402), characterized in that the at least one passage consists of a well (103; 203; 303; 403) opening out into the inner periphery (101; 201; 301; 401) with a bottom (104; 204; 304; 404) located radially inside the outer periphery (102; 202; 302; 402), and with a channel (105; 205; 305; 405) extending from the area of said bottom (104; 204; 304; 404) and opening out (107; 207; 307; 407) into the outer periphery (102; 202; 302; 402).

2. Spacer plate according to claim 1, wherein the channel (105; 305; 405) opens out into an outlet (107; 307; 407) which is offset in the circumferential direction (P) of the spacer plate relative to the well (103; 303; 403).

3. Spacer plate according to claim 1 or 2, wherein the channel (105; 405) extends laterally from the area of the bottom (104; 404) of the well (103; 403).

4. Spacer plate according to any one of the preceding claims, wherein the channel (105) has a first channel section (105a) running alongside and substantially parallel or nearly parallel to the inner and outer peripheries.

5. Spacer plate according to claim 4, wherein the channel (105) has a second channel section (105b) connecting to the first channel section (105a) and opening out substantially radially into the outer periphery (102).

6. Spacer plate according to claim 4 or 5, comprising two or more sections (S1-S4) of complementary shape in such a way that each section (S1-S4), on the one hand, provides an inner wall (110), viewed radially, of the first channel

section (105a) and, on the other hand, provides an outer wall (113), viewed radially, of a subsequent first channel section (105a), as viewed in the circumferential direction (P).

7. Spacer plate according to claim 5 or 6, comprising two or more sections (S1-S4) of complementary shape in such a way that each section (S1-S4), on the one hand, provides a wall (111), located downstream in the circumferential direction (P), of the second channel section (105b) and, on the other hand, provides a wall (112), located upstream in the circumferential direction (P), of a subsequent second channel section (105b), as viewed in the circumferential direction (P).

8. Spacer plate according to claim 7, wherein the well (103; 203; 303; 403) is formed from two consecutive sections (S1-S4) in such a way that a width (w1) of the opening of the well in the direction of the inner periphery (101; 201; 301; 401) is greater than a width (w2) of the channel (105; 205; 305; 405).

9. Spacer plate according to claim 8, wherein the width (w1) of the well (103; 203; 303; 403) is 2 to 4 times greater than the width (w2) of the channel (105; 205; 305; 405).

10. Spacer plate according to any one of the preceding claims, consisting of four sections (S1-S4) which together form four wells (103; 203; 303) and four outlets (107; 207; 307), wherein the well and the associated outlet are angularly offset from each other at about 45°.

11. Spacer plate according to any one of the preceding claims, wherein the spacer plate (100; 200; 300; 400) comprises two opposite sides (A, B) which are both coated with an adhesive.

12. Spacer plate according to any one of claims 6 to 11, wherein the spacer plate sections (S1-S4) are punched out of a sheet of self-adhesive material and mutually fixed in position by means of a removable protective film.

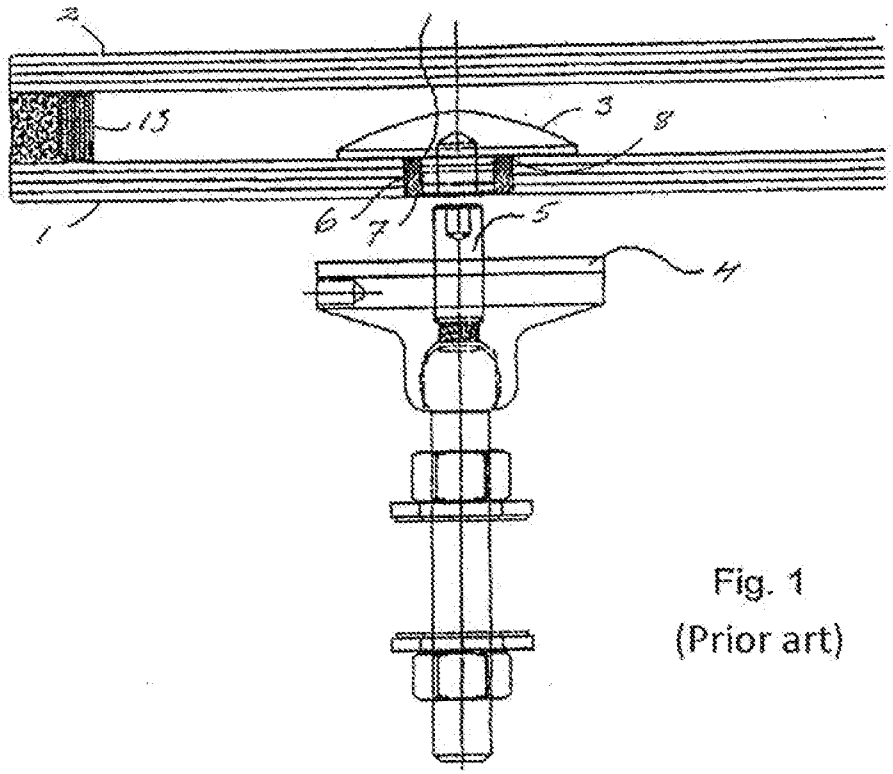

Fig. 1
(Prior art)

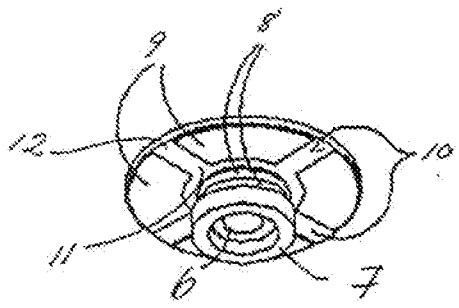

Fig. 2
(Prior art)

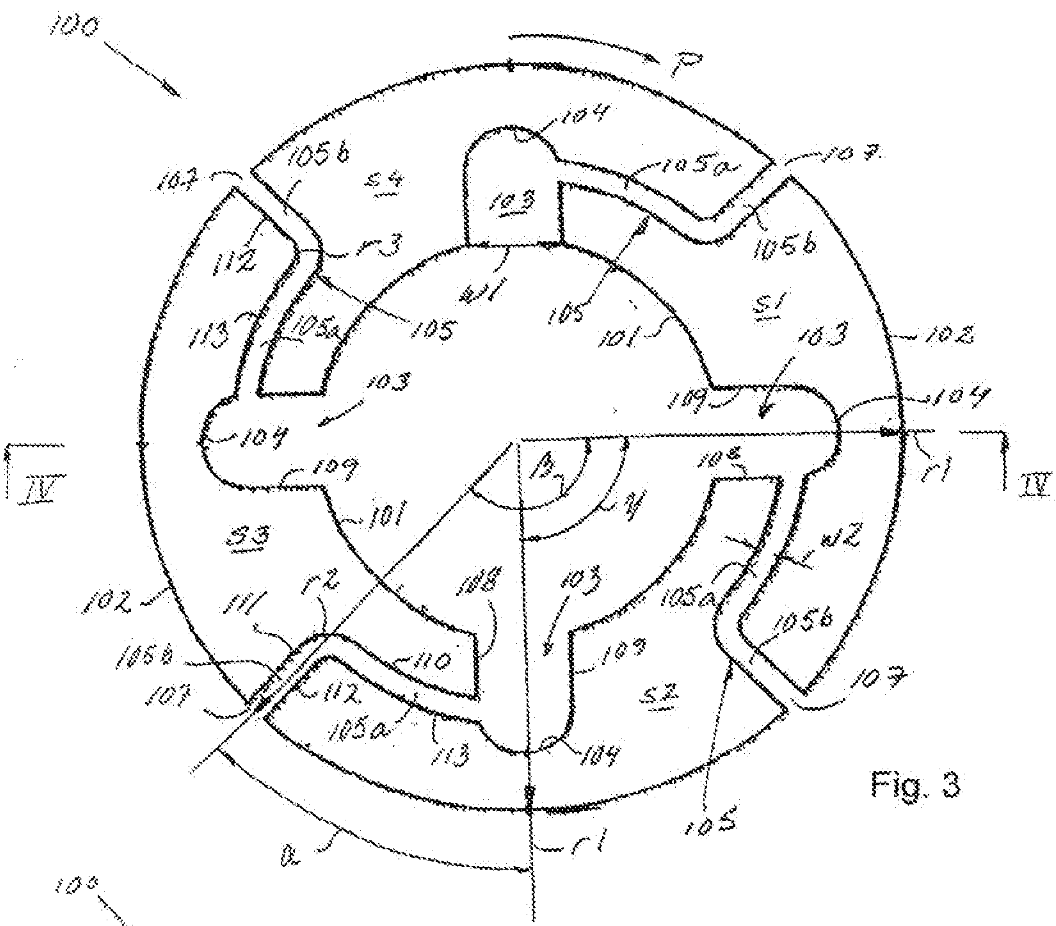
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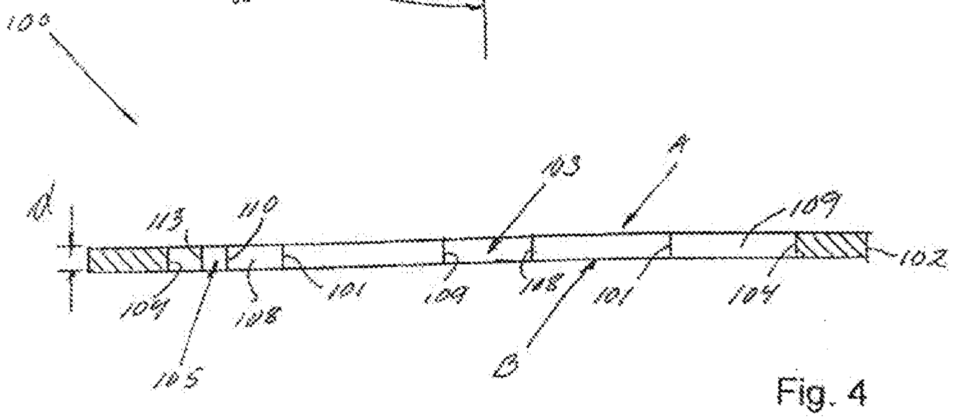
Fig. 3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A
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105
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Fig. 4

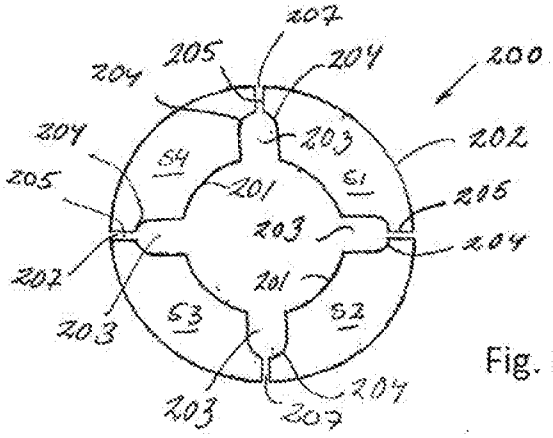

Fig. 5

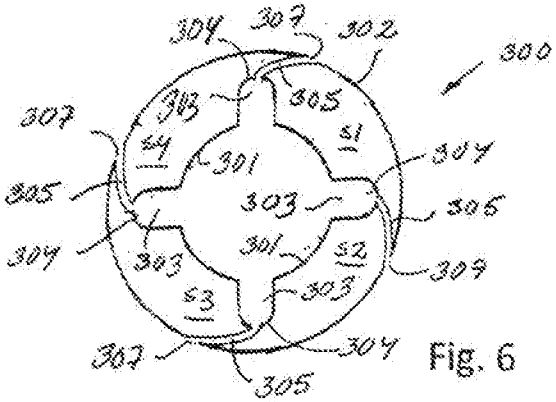

Fig. 6

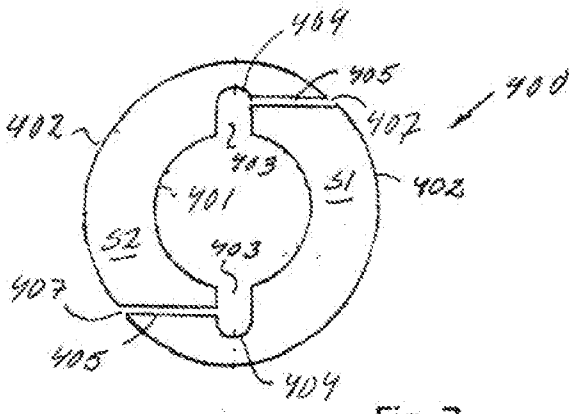

Fig. 7

INTERNATIONAL SEARCH REPORT

International application No
PCT/SE2024/050042

A. CLASSIFICATION OF SUBJECT MATTER
INV. E06B3/54
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
E06B F16B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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	28 November 2007 (2007-11-28)	10-12
A	figures 3-5,7a,7b	4-9
	paragraph [0001]	
	paragraph [0015]	
	paragraph [0029]	

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A	figures 1,4	4-9
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X	WO 2004/104346 A1 (UPGLAZE HB [SE];	1-3,
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	cited in the application	
	figure 1a	
	page 6, lines 1-13	

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents :

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
30 April 2024	21/05/2024

Name and mailing address of the ISA/	Authorized officer
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1

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
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