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(74) Representative: **Hostens, Veerle et al**

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President Kennedypark 31 C

8500 Kortrijk (BE)

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(56) References cited:

EP-A1- 0 655 541

DE-A1- 10 104 215

DE-B3-102009 048 917

DE-C- 242 507

NL-A- 9 400 071

DE-A1- 4 123 977

DE-A1-102010 017 447

DE-C- 202 671

DE-U1- 9 414 272

US-A1- 2004 206 007

(73) Proprietor: **Saint-Gobain Glass France S.A.**

92400 Courbevoie (FR)

(72) Inventor: **PACQUEU, Olivier Jozef Engelbert**

B-8020 Oostkamp (BE)

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Description

[0001] The present invention relates to a fireproof or soundproof glass door comprising a pivot hinge for hanging the door leaf in a door opening, comprising a mounting block which is fastenable to the upper side or underside of the door leaf.

[0002] A pivot hinge is a hinge which on the one hand comprises a trunnion (pivot pin), which is fastened either to the door leaf or to the door opening, and on the other hand comprises a socket (bushing), which is respectively arranged either in the door opening or in the door leaf and in which the trunnion can be rotatably arranged.

[0003] In existing pivot hinges, which cannot be partially integrated in the door leaf or can be partially integrated in the door leaf with difficulty - for reasons including but not limited to the fact that the door leaf is made of glass which should remain unperforated - there is always a relatively large amount of play between the door leaf and the edge of the door opening when using a pivot hinge to hang a door leaf in a door opening. It is desirable to minimize said play for a number of reasons.

[0004] The reason for this is that such play is undesirable not only from an aesthetic perspective, but also because of draughts, transfer of smoke, fire and heat in the event of fire and transmission of noise between the areas between which the door is hung.

[0005] In such doors, this play is usually eliminated with the aid of profiles.

[0006] In order to allow the passage of more natural light to certain areas, the demand for translucent doors with translucent door leaves is not only increasing in general, but also for fireproof and soundproof doors. Such a translucent door leaf can be made of glass, for example. For aesthetic reasons and to maximize the incidence of light, the intention in such doors is that there are no frames, or as few frames as possible, enclosing the door leaf.

[0007] In the event of fire, fireproof doors form a fire barrier between various areas for a certain amount of time, which prevents heat transfer. The present invention relates to fireproof or soundproof glass doors. In the case of fireproof glass doors, attempts have therefore long been made to find solutions for hanging the glass door leaf in a door opening with as little framework as possible and with a minimal amount of play between the door leaf and the edge of the door opening. A major difficulty in this case is that said fireproof doors should preferably meet the standards which apply to fireproof doors. European standards EN 13501 and EN 1634 can be given as a reference for these standards.

[0008] DE 10 2010 017 447 A1 and US 2004/0206007 A1 describe glass doors with pivot hinges which are fireproof in theory, but in practice, however, do not meet the standards which apply to fireproof doors. In this case it is necessary for the door leaf to be at least partially framed. It is also necessary to perforate the door leaf in order to be able to fasten the door fittings thereto. DE 41

23 977 discloses a fireproof glass door with a pivot hinge.

[0009] In DE 242 507 or DE 202 671 a pivot hinge is described, with which doors can be hung with little play between the door leaf and the edges of the door opening. It is however also necessary with this pivot hinge to perforate the door leaf in order to be able to fasten the door fittings thereto.

[0010] It is therefore the aim of the present invention to provide a door having a pivot hinge, by means of which the amount of play between a door leaf hung in a door opening using such a pivot hinge and the edges of the door opening can be minimized, without it being necessary for this purpose to integrate part of said pivot hinge in the door leaf itself and without it being necessary for this purpose to arrange profiles next to the pivot hinge in order to eliminate the play.

[0011] This aim of the invention is achieved by means of a fireproof and/or soundproof door according to claim 1.

[0012] Owing to the use of a pivot hinge, in which the trunnion can be fastened to a mounting block in this manner using flanges engaging behind one another, which mounting block to this end can be embodied with an extremely limited height, it is possible to minimize the amount of play between the door leaf and the door opening, without it being necessary for this purpose to perforate the door leaf in order to be able to provide the fastening means on the door leaf and without it being necessary for this purpose to arrange profiles next to the pivot hinge in order to eliminate the play.

[0013] A more aesthetic overall impression is obtained by minimizing the amount of play between the door leaf and the door opening, without perforating the door leaf and without using extra profiles to eliminate the play. Furthermore, there are fewer draughts and less transmission of noise. The space and its associated risk of fire extension are also reduced. The means required to bridge this space in the event of fire in order to be able to ensure fire resistance are therefore limited such that it is no longer necessary to provide a frame around the door leaf for this purpose. It is therefore possible to meet the demands in respect of fire safety, without it being necessary to provide an obvious frame around the door leaf and without it being necessary to perforate the door leaf.

[0014] According to the present invention, in order to fasten the trunnion to the mounting block, the second end of the trunnion is freely positionable in the insertion opening in a first position and is displaceable in the insertion opening from said first position to a second position, in which the flange of the trunnion engages behind the flange of the insertion opening.

[0015] In one case, the trunnion can more particularly be linearly displaceable in the insertion opening from the first position to the second position. The insertion opening is in this case then preferably embodied as a keyhole opening.

[0016] Alternatively, the trunnion can more particularly be rotatable in the insertion opening from the first position

to the second position. The respective flanges then extend over only part of the respective edges, such that they can be arranged next to one another in the first position (seen in the insertion opening), in which they do not engage with one another and in the second position (seen in the insertion opening) are arranged one behind the other, in order to engage with one another.

[0017] In a second particular embodiment according to the present invention, the trunnion more particularly comprises a first trunnion part, which comprises the first end of the trunnion, and a second trunnion part, which comprises the second end of the trunnion, wherein the exterior of the first trunnion part is conical at its other end than the end of the trunnion, wherein the second trunnion part comprises a fitting cavity, the interior of which is conical and is provided with indentations at the second end of the trunnion and wherein the first trunnion part is positionable via its conical end into the fitting cavity of the second trunnion part, in such a way that when the first trunnion part is positioned in the second trunnion part, the flange of the trunnion points outward. In this case, the trunnion is fastenable in the insertion opening by positioning the second trunnion part with the flange in the insertion opening and subsequently positioning the first trunnion part with its conical end in the fitting cavity of the second trunnion part, in such a way that the flange of the trunnion which points outward engages behind the flange of the insertion opening.

[0018] Since use is made of a pivot hinge, and since the mounting block of said pivot hinge is connected to the bracket, the door leaf will either be clamped locally along part of its upper side by the bracket, when the pivot hinge is arranged above the door, or along part of its underside, when the pivot hinge is arranged under the door.

[0019] According to the present invention, the door leaf is unperforated.

[0020] A door according to the present invention comprises a bracket for fastening the pivot hinge to the door leaf, wherein said bracket locally clamps the door leaf along part of the upper side or underside thereof and wherein the mounting block is fastenable to or forms part of said bracket.

[0021] In a first specific embodiment of a door according to the present invention, the door is fireproof. In a second specific embodiment of a door according to the present invention, the door is soundproof. A door according to the present invention is preferably both fireproof and soundproof.

[0022] In a particular embodiment of a fireproof door according to the invention, the bracket comprises a web plate which extends along at least part of a side edge of the door leaf and at least two upright flanges arranged in pairs which extend on both sides of the door leaf in order to clamp the door leaf.

[0023] Since use is made of a pivot hinge and since the mounting block of said pivot hinge is connected to the bracket, the web plate will extend either at least par-

tially along the upper edge of the door leaf, when the pivot hinge is arranged above the door, or at least partially along the bottom edge of the door leaf, when the pivot hinge is arranged under the door. In order to ensure proper fastening of the door leaf while covering the door leaf as little as possible, the web plate of such a bracket extends further in this direction than the upright flanges.

[0024] In order to be able to clamp the door leaf even more firmly, the bracket of a fireproof door according to the invention can also comprise a plurality of upright flanges arranged in pairs which locally clamp the door leaf at a distance from one another.

[0025] The upright flanges of such a bracket having at least two upright flanges arranged in pairs can, if desired, optionally be protected with the aid of swellable material which in turn can be protected by a cover plate, for example, in order to limit heat transfer via the bracket.

[0026] A bracket of a fireproof door according to the invention is preferably made of steel or stainless steel.

[0027] The web plate of an abovementioned bracket is also preferably perforated, in order to limit heat transfer. More specifically, said web plate can be provided with a plurality of rows of perforations extending in the longitudinal direction of the side edge, wherein the perforations of a first row are arranged in a staggered fashion with respect to the perforations of a second row. Such an arrangement of perforations has an insulating effect and ensures that conduction is greatly reduced.

[0028] More preferably, material which swells under the influence of heat (intumescent) is arranged between the web plate and the door leaf. It is possible to use a strip of material based on graphite, for example, as such swellable material.

[0029] In the event of fire, such swellable material swells and ensures good flame-tightness between the bracket and the glass. If perforations are provided in such a bracket, the swellable material can then also swell up in the event of fire and pass through the bracket and (help to) close off the space between the door leaf and the door opening.

[0030] The web plate of a bracket as described above preferably extends over the width of the door leaf.

[0031] In a preferred embodiment of a fireproof door according to the present invention, the bracket is fastened to the door leaf by means of structural adhesive which is protected by at least one fireproof element.

[0032] It is possible to use a prepolymerized polyurethane adhesive and more specifically a two-component sealant based on isocyanate as structural adhesive.

[0033] Such a structural adhesive ensures that the bracket can be fastened to the door leaf in a particularly firm fashion, without it being necessary to perforate said door leaf in order to fasten the bracket to the door leaf. However, a drawback of such a structural adhesive is that the structural adhesives which are best suited for this purpose will carbonize in the event of fire and ignite, which would compromise the fire resistance of the door. By protecting the structural adhesive from the external

surroundings using a fireproof element, it is possible to ensure the required level of fire resistance.

[0034] In order to be able to protect the structural adhesive in a simple manner and with a high degree of certainty without unnecessary loss of space, said fireproof element can more preferably be fireproof adhesive.

[0035] It is possible to select, for example, a high-temperature-resistant two-component epoxy adhesive based on metal as fireproof adhesive. An important consideration for such a fireproof adhesive is that it provides the required insulation between the door leaf and the bracket and, at least initially, retains its volume at least partially in the event of fire (it will nevertheless lose its bond). In this way, said fireproof adhesive will, at least initially, form a buffer between the glass and the bracket (which can reach high temperatures) in the event of fire, as a result of which glass breakage is avoided. Said fireproof adhesive preferably at least partially retains its adhesive strength at a temperature of 80°C and does not ignite at this temperature.

[0036] In a more specific embodiment of a fireproof door according to the present invention, metal tape is at least partially applied between the structural adhesive and the door leaf.

[0037] For example, in the case of fireproof glass comprising a plurality of layers of glass between which fireproof gel is applied, said fireproof gel is usually surrounded by a rubber seal which can be damaged by such a structural adhesive. Using a metal tape means that it is possible to protect such a rubber seal from the structural adhesive.

[0038] The door leaf of a glass door according to the present invention can more specifically be made of fire-resistant glass. Such fire-resistant glass can comprise a plurality of glass sheets between which fireproof material, such as a fireproof gel, for example, is applied. In this case it is possible for the glass sheets to be made from float glass, cast glass, toughened glass, thermally prestressed glass, laminated glass, layered glass, etc., depending on the fire-resistance requirements.

[0039] A fireproof door according to the invention preferably further comprises sheet material with a core based on sodium silicate or based on fireproof graphite, wherein said sheet material extends substantially over the sides of the door opening in order to expand in the event of fire and (help to) close off the space between the door leaf and the door opening.

[0040] In addition, it is possible for at least partially swellable material to be provided along the sides of the door opening, wherein said swellable material is more specifically able to at least partially cover the sheet material with a core based on sodium silicate or based on fireproof graphite.

[0041] The present invention will now be explained in more detail by means of the following detailed description of a preferred embodiment of a fireproof door according

to the present invention and a number of embodiments of pivot hinges. The sole aim of this description is to give illustrative examples and to indicate further advantages and features of said fireproof doors and said pivot hinges and can therefore by no means be interpreted as a limitation of the area of application of the invention or of the patent rights defined in the claims.

[0042] In this detailed description, reference numerals are used to refer to the attached drawings, in which

- **Figure 1** shows a front view of a fireproof door according to the invention, which is hung in a door opening and extends in said door opening;
- **Figure 2** shows a cross section of the fireproof door from Figure 1 at the location of its pivot hinge, with the door leaf extending in the door opening;
- **Figure 3** shows a detail of the cross section from Figure 2 at the upper side of the fireproof door;
- **Figure 4** shows a detail of the cross section from Figure 2 at the underside of the fireproof door;
- **Figure 5** shows a front view of the left-hand upper side of the fireproof door from Figure 1, with the door leaf extending in the door opening;
- **Figure 6** shows a front view of the socket of the fireproof door from Figure 1;
- **Figure 7** shows a front view of the trunnion with flange of the pivot hinge of the fireproof door from Figure 1;
- **Figure 8** shows a front view of the mounting block of the pivot hinge of the fireproof door from Figure 1;
- **Figure 9** shows a top view of the mounting block of the pivot hinge of the fireproof door from Figure 1;
- **Figure 10** shows a cross section of a trunnion with flange of a second embodiment of a pivot hinge according to the present invention;
- **Figure 11** shows a front view of the trunnion from Figure 10;
- **Figure 12** shows a longitudinal section of the trunnion from Figure 10;
- **Figure 13** shows a top view of a trunnion with flange of a third embodiment of a pivot hinge according to the present invention;
- **Figure 14** shows a front view of the trunnion from Figure 13;
- **Figure 15** shows a cross section of the trunnion from Figure 13, fastened in an insertion opening in a mounting block of the third embodiment of a pivot hinge according to the present invention;
- **Figure 16** shows a top view of the trunnion from Figure 13, arranged in the insertion opening in the mounting block of the third embodiment of a pivot hinge according to the present invention, in the first position thereof;
- **Figure 17** shows a top view of the trunnion from Figure 13, arranged in the insertion opening in the mounting block of the third embodiment of a pivot hinge according to the present invention, in the second position thereof;

- **Figure 18** shows a cross section of a trunnion comprising a first trunnion part and a second trunnion part of a fourth embodiment of a pivot hinge according to the present invention, wherein the second trunnion part is arranged in the insertion opening in the mounting block of this fourth embodiment of a pivot hinge according to the present invention;
- **Figure 19** shows a top view of the trunnion and the mounting block of the fourth embodiment from Figure 18, with the trunnion arranged in the insertion opening in the mounting block;
- **Figure 20** shows a cross section of the fourth embodiment of a pivot hinge according to the present invention, with the trunnion detached from the mounting block;
- **Figure 21** shows a cross section of the fourth embodiment of a pivot hinge according to the present invention, with the trunnion arranged in the insertion opening in the mounting block;
- **Figure 22** shows a front view of the left-hand underside of the fireproof door from Figure 1, with the door leaf extending in the door opening;
- **Figure 23** shows a top view of the bottom pivot of the fireproof door from Figure 1;
- **Figure 24** shows a front view of the bottom pivot of the fireproof door from Figure 1;
- **Figure 25** shows a side view of the bottom pivot of the fireproof door from Figure 1;
- **Figure 26** shows a front view of the bracket of the fireproof door from Figure 1;
- **Figure 27** shows a bottom view of the bracket of the fireproof door from Figure 1;
- **Figure 28** shows a detail of the bottom view of the bracket from Figure 27 at the location of the pivot hinge.

[0043] The fireproof door (1) illustrated in Figure 1 comprises a door leaf (2) which is hung in a door opening. The door is hung with the aid of, on the one hand, a pivot hinge (3) and a bracket (4), being fastening means at the upper side of the door leaf (2), and, on the other hand, a floor spring (19), a bottom support (18) and a bracket (4), being fastening means at the underside of the door leaf (2). The pivot hinge (3) and the bracket (4) at the top and the bottom support (18), the bracket (4) and the floor spring (19) at the bottom enable the door leaf (2) to rotate in the door opening between an open position, in which the door opening is open, and a closed position, in which the door leaf (2) extends in the door opening and substantially closes off said door opening.

[0044] It is also possible to provide soundproof doors with the same door fittings (3, 4, 18, 19) as used for said illustrated fireproof door (1).

[0045] The fireproof door (1) illustrated in Figure 1 is a swing door (1), since the door leaf (2) is not prevented from rotating in two directions with respect to the door opening (outward and inward). It is of course also possible to produce a single-action door (1), by arranging the

pivot hinge (3) on one side (the front side or the rear side) of the door leaf (2), as a result of which the door leaf (2) can rotate in only one direction with respect to the door opening.

[0046] Since the fastening means (3, 4, 18, 19) are arranged on the left-hand side of the door opening, the axis around which the door leaf (2) can rotate is also located along the left-hand side of the door leaf (2). It is of course also possible to provide an axis of rotation centrally with respect to the door leaf (2) instead of an axis of rotation at one side of the door leaf (2), so that a wider door leaf (2) can rotate about a central axis.

[0047] The fireproof door (1) in Figure 1 extends in the door opening. The sides of the door opening are covered with sheet material (13), which can be seen more clearly in Figures 3, 5 and 22. Said sheet material (13) comprises a core based on sodium silicate. It is possible, for example, to select sheet material (13) for this purpose which is known under the trade name palusol® and distributed by BASF. Said sheet material (13) will expand in the event of fire and (help to) close off the space between the door leaf (2) and the door opening.

[0048] An important consideration in the case of a fireproof door (1) according to the invention is that there is only a small amount of space between the door leaf (2) and the sides of the door opening, so that said space can be effectively closed off in the event of fire with the aid of swellable material, such as the abovementioned sheet material (13) or some other swellable material (12). The absence of fastening means makes it possible to minimize the amount of play between the door leaf (2) and the door opening along the side edges of the door opening. The amount of said play is 4 mm in the illustrated embodiment. Solely the abovementioned sheet material (13) is present in this case to close off the space between the door leaf (2) and the door opening in the event of fire. Said sheet material (13) can optionally be supplemented by another swellable material (12). In addition to said sheet material (13) in the door opening, further swellable material (12) is arranged on the upper side of the door leaf (2) along the upper side of the door opening (see Figure 5), where the amount of play between the door leaf (2) and the door opening is somewhat larger because of the presence of the pivot hinge (3), in order to close off the space between the door leaf (2) and the door opening in the event of fire, as discussed in more detail below. It is also possible for additional swellable material (12) to be provided in the door opening. In the illustrated embodiment the amount of play at the upper side is 7 mm. At the underside of the door opening the amount of play in the illustrated embodiment is 8 mm. However, at the underside of the door opening it is often more difficult to integrate such sheet material into the floor in such a way that it does not become damaged during normal passage through the door opening. It was therefore decided not to arrange such sheet material (13) at the underside of the door opening, but to provide only swellable material (12) at the underside of the door leaf (2) (see Figure 22)

in order to close off the space on the underside between the door leaf (2) and the door opening in the event of fire.

[0049] The door leaf (2) is made of glass and preferably of fire-resistant/fireproof glass. Said fire-resistant/fireproof glass can comprise a plurality of glass sheets between which fireproof material, for example a fireproof gel, is applied. The glass sheets can be made of float glass, cast glass, toughened glass, thermally prestressed glass, laminated glass, layered glass, etc.

[0050] The pivot hinge (3) in the illustrated embodiment of a fireproof door (1) is fastened to the door leaf (2) by means of a bracket (4), which can be seen more clearly in Figures 3 and 5. The pivot hinge (3) comprises a mounting block (5) and a trunnion (6) for this purpose.

[0051] The mounting block (5) is fixedly connected to the bracket (4). This can be effected by means of gluing, welding or with the aid of screws, for example. In the illustrated embodiment of a fireproof door (1), there are fastening openings (17) present in the bracket (4) (see Figures 27 and 28) and there are fastening openings (16) present in the mounting block (5) (see Figures 8 and 9), in order to be able to connect said bracket and mounting block to one another using screws.

[0052] A plate (23) with a socket (7) is arranged in the door opening, in which socket (7) the trunnion (6) of the pivot hinge (3) can be rotatably arranged. Said plate (23) with socket (7) is illustrated separately in Figure 6. Fastening openings (24) are provided in the plate (23) of the socket, so that the plate (23) of the socket can be fastened in the door opening by means of screws. It is of course possible to consider alternative fastening methods.

[0053] The trunnion (6) of the first embodiment can be detachably fastened in the corresponding mounting block (5). The detachable fastening of said trunnion (6) in the mounting block (5) can be effected, inter alia, by means of a keyhole opening (14) in the mounting block (5) (see Figures 8 and 9) and a flange (15) on the cylindrical trunnion (6) (see Figure 7), as shown in the first embodiment. Said keyhole opening (14) has a relatively wide part (first position) and a relatively narrow part (second position). The cylindrical trunnion (6) has a diameter which is at most the same as the width of the relatively narrow part of the keyhole opening (14), while the trunnion flange (15) is relatively wide, but is at most as wide as the relatively wide part of the keyhole opening (14). The trunnion (6) is arranged in the socket (7) when said socket (7) has been detached from the mounting block (5). The door leaf (2), to which the mounting block (5) is fastened using the bracket (4), is subsequently mounted in the door opening. The trunnion (6) is positioned in the relatively wide part of the keyhole opening (14) by means of the flange (15) and displaced in the keyhole opening (14) until the flange (15) of the trunnion (6) becomes fixed behind the flanges (25) which delimit the relatively narrow part of the keyhole opening (14). After the trunnion (6) has been positioned in the keyhole opening (14) in this manner, a fixing platelet can optionally be inserted into the relatively wide part of the keyhole opening (14) to

prevent the trunnion (6) from sliding back out of the relatively narrow part and becoming detached. This would be possible if the door leaf (2) is in its open state. Conversely, by optionally removing the fixing platelet and by pushing the trunnion (6) from the relatively narrow part of the keyhole opening (14) into the relatively wide part thereof, it is possible to release the trunnion (6) in order to remove the door leaf (2) from the door opening. Since the trunnion (6) is releasably connected in this way to the mounting block (5), it is possible to minimize the space between the door leaf (2) and the door opening.

[0054] It is also possible to replace the first embodiment of a pivot hinge (3) of a fireproof door (1) according to the present invention with, for example, one of the alternative pivot hinges (3) according to the present invention, parts of which are illustrated in Figures 10 to 21.

[0055] The second embodiment according to the present invention, a trunnion of which is illustrated in Figures 10 to 12, corresponds to the first embodiment according to the present invention, but in this case the trunnion (6) is now provided with an adjusting screw (28). After the trunnion (6) has been positioned in the insertion opening (14) of the mounting block (5), the head of said adjusting screw (28), into which a hand tool can be engaged in order to rotate said adjusting screw (28), is situated in the insertion opening (14). By rotating the trunnion (6), it is possible to ensure that said adjusting screw (28) in said insertion opening (14) can be reached in order to be rotated from the first position. Rotating the adjusting screw (28) makes it possible to adjust the position of the door leaf (2) in the door opening in a horizontal direction.

[0056] In the third embodiment according to the present invention, the trunnion (6) and mounting block (5) of which are illustrated in Figures 13 to 17, the trunnion (6) is once again substantially cylindrical and in this case has a flange (15) which extends over only half of the periphery of the cylindrical base of the trunnion (6) at the edge of the second end of the trunnion (6). In the corresponding mounting block (5), an insertion opening (14) is provided which is delimited on one side (the right-hand side in Figures 16 and 17) by means of a semi-circular flange (25). The trunnion (6) can be positioned in the insertion opening (14) via its second end with its flange (15) facing the side of the insertion opening (14) opposite the side with the flange (25) of the insertion opening (14) (see Figure 16). The trunnion (6) is subsequently rotated through 180° in the insertion opening (14) until the flange (15) of the trunnion (6) engages below the flange (25) of the insertion opening (14) (see Figure 17). After the trunnion (6) has been rotated in this manner, it is also optionally possible in this embodiment to arrange a fixing platelet in the insertion opening (14) next to the trunnion (6) and the flanges (15, 25) to prevent the trunnion (6) from becoming detached again by rotation. In order to release the trunnion (6) again, said fixing plate must be removed again, if necessary, and the trunnion (6) can once again be rotated through 180° until the flanges (15) and (25) no longer engage with one another.

[0057] In the fourth embodiment according to the present invention, of which the trunnion (6), mounting block (5) and a plate (23) containing the socket (7) are illustrated in Figures 18 to 21, the trunnion (6) is formed from two parts. The first trunnion part (6a) comprises the first end of the trunnion (6). At its other end said trunnion part (6a) is conical. The second trunnion part (6b) comprises the second end of the trunnion (6) and is hollow. Said second trunnion part (6b) comprises a conical fitting cavity. At the second end of the trunnion (6), said second trunnion part (6b) is provided with indentations. A lever system (26) is fastened to the plate (23) containing the socket (7) for moving the first trunnion part (6a) with respect to the second trunnion part (6b). By moving the first trunnion part (6a) downward using said lever system (26), as illustrated in Figures 20 and 21, the first trunnion part (6a) is positioned with its conical end into the fitting cavity of the second trunnion part (6b). When the first trunnion part (6a) is arranged in the second trunnion part (6b), the flange (15) of the trunnion (6) points outward. In the mounting block (5), there is an insertion opening which corresponds to the periphery of the flange (15) of the trunnion (6), which insertion opening is provided with a flange (25) around its periphery. The trunnion (6) can be fastened in the insertion opening (14) by first positioning the second trunnion part (6b) with the flange (15) in the insertion opening (14) of the mounting block (5) and subsequently positioning the first trunnion part (6a) with its conical end in the fitting cavity of the second trunnion part (6b), in such a way that the flange (15) of the trunnion (6) which points outward engages behind the flange (25) of the insertion opening (14).

[0058] The bracket (4) of the illustrated embodiment of a fireproof door (1) according to the present invention is made of steel. Said bracket (4) comprises a web plate (9), which extends along the upper edge of the door leaf (2) and which comprises upright flanges (10) arranged in pairs, which extend on both sides of the door leaf (2), in order to clamp the door leaf (2). The bracket (4) in the illustrated embodiment comprises two upright flanges (10) arranged in pairs. It is of course also possible, where necessary (for example owing to strength requirements) or where desired (for example owing to aesthetic considerations), to provide one pair of flanges (10) or several pairs of flanges (10) per bracket (4).

[0059] The web plate (9) of the bracket (4) is provided with a plurality of rows of perforations (11a, 11b) which extend in the longitudinal direction of the bracket (4) (see Figures 15 and 16). The perforations (11a) of a first row are arranged in a staggered fashion with respect to the perforations (11b) of a second row. In this way, said perforations (11a, 11b) limit convection via the web plate (9) between an area where fire is present and an adjacent area. A strip of material (12) which swells under the influence of heat is arranged between the web plate (9) and the door leaf (2), for example swellable material based on graphite. In the event of fire, said strip of swellable material (12) ensures good insulation between the

bracket (4) and the glass of the door leaf (2). In this way, the heat of the bracket (4) is prevented from causing breakage of the glass. The perforations (11a, 11b) mean that said swellable material (12) can also easily expand through the perforations (11a, 11b) into the space between the door leaf (2) and the door opening.

[0060] The door leaf (2) is fastened in the flanges (10) by means of structural adhesive (8). A prepolymerized polyurethane adhesive and more specifically a two-component sealant based on isocyanate can be used as structural adhesive. Such a structural adhesive is known, for example, under the name Quick Bond prepolymer from Veidec®.

[0061] Such a structural adhesive (8) ensures that the bracket (4) can be fastened to the door leaf (2) in a particularly firm fashion, without it being necessary to perforate the door leaf (2) in order to fasten the bracket (4) to the door leaf (2). Since such a structural adhesive (8) carbonizes in the event of fire and will possibly ignite, said adhesive (8) is protected from the external surroundings. This can be effected, for example, with the aid of fireproof adhesive (8). It is possible to use, for example, a high-temperature-resistant two-component epoxy adhesive based on metal as such fireproof adhesive (8). Such a suitable adhesive is known, for example, under the name Technofix from Promante.

[0062] A metal tape is applied, where necessary, between the structural adhesive (8) and the door leaf (2), in order not to damage the rubber seals between the various layers of fireproof glass.

[0063] Other elements which are fastened to the door leaf (2) are also preferably fastened in the same manner, using a combination of structural adhesive (8) and fireproof adhesive (8), in order to avoid perforating the door leaf (2) and to embody the door (1) in a fireproof manner. The illustrated door handle (22) for opening and closing the door (1) is therefore also preferably glued to the door leaf (2) using a combination of structural adhesive (8) and fireproof adhesive (8). The bracket (4) for fastening the bottom pivot (18) to the door leaf (2) is also preferably fastened to the underside of the door leaf (2) using a combination of structural adhesive (8) and fireproof adhesive (8).

[0064] The bracket (4) for fastening the bottom pivot (18) can be embodied in the same manner as the bracket (4) for fastening the pivot hinge (3) to the upper side of the door leaf (2). In this case too, a strip of fireproof material (12) is applied between the web plate (9) of the bracket (4) and the door leaf (2). The flanges (10) are in this case likewise glued to the door leaf (2). The bottom pivot (18) can be fixedly attached to the bracket (4) by means of gluing or welding or using screws, for example. As can be seen in Figures 10 to 13, the bottom pivot (18) is provided in a known manner with an opening (20), in which the shaft (21) of the floor spring (19) can be arranged in a known manner.

Claims

1. Fireproof and/or soundproof door (1), comprising a glass door leaf (2) and comprising a pivot hinge (3), for hanging the glass door leaf (2) in a door opening, the pivot hinge (3) comprising a mounting block (5) which is fastenable to the upper side or underside of the door leaf (2), a socket (7) which is fastenable in or is arranged in the edge of the door opening and a trunnion (6) which at a first end is positionable in the socket (7) in order to be rotatably arranged in the socket (7) and at a second end is fastenable to the mounting block, **characterized in that** the door leaf (2) is unperforated and comprises a bracket (4) for fastening the pivot hinge (3) to the door leaf (2), wherein said bracket (4) locally clamps the door leaf (2) along part of the upper side or underside thereof, **in that** the trunnion (6) comprises a flange (15) at its second end, which extends at least partially along the edge of the trunnion (6) at said second end, and **in that** the mounting block (5) comprises an insertion opening (14) and comprises a flange (25) which extends at least partially along the edge of the insertion opening (14), wherein in the fastened state of the mounting block (5), the insertion opening (14) is only accessible to the trunnion (6) from the side facing the socket (7) and wherein the trunnion (6) at its second end is fastenable to the mounting block (5) from said side via the insertion opening (14), wherein, in the fastened state of the trunnion (6), the flange (15) of the trunnion (6) engages in the insertion opening (14) behind the flange (25) of the insertion opening (14), wherein in order to fasten the trunnion (6) to the mounting block (5), the second end of the trunnion (6) is freely positionable in the insertion opening (14) in a first position and is displaceable in the insertion opening (14) from said first position to a second position, in which the flange (15) of the trunnion (6) engages behind the flange (25) of the insertion opening (14) and wherein the mounting block is fastenable to or forms part of said bracket (4).
2. Fireproof and/or soundproof door (1) according to Claim 1, **characterized in that** the trunnion (6) is linearly displaceable in the insertion opening (14) from the first position to the second position.
3. Fireproof and/or soundproof door (1) according to Claim 2, **characterized in that** the insertion opening (14) is embodied as a keyhole opening (14).
4. Fireproof and/or soundproof door (1) according to Claim 1, **characterized in that** the trunnion (6) is rotatable in the insertion opening (14) from the first position to the second position.
5. Fireproof door (1) according to any of the preceding claims, **characterized in that** the bracket (4) com-

prises a web plate (9) which extends along at least part of a side edge of the door leaf (2) and is perforated, and **in that** the bracket (4) comprises at least two upright flanges (10) arranged in pairs which extend on both sides of the door leaf (2) in order to clamp the door leaf (2).

6. Fireproof door (1) according to any of the preceding claims, **characterized in that** the bracket (4) is fastened to the door leaf (2) by means of structural adhesive (8), which is protected by fireproof adhesive (8).
7. Fireproof door (1) according to any of the preceding claims, **characterized in that** the fireproof door (1) comprises sheet material (13) with a core based on sodium silicate, wherein said sheet material (13) extends substantially over the sides of the door opening.
8. Fireproof door (1) according to any of the preceding claims, **characterized in that** the fireproof door (1) comprises sheet material (13) with a core based on fireproof graphite, wherein said sheet material (13) extends substantially over the sides of the door opening.

Patentansprüche

1. Feuerschutz- und/oder Schallschutztür (1), umfassend ein Glastürblatt (2) und umfassend ein Schwenkscharnier (3), zum Einhängen des Glastürblatts (2) in eine Türöffnung, wobei das Schwenkscharnier (3) einen Befestigungsblock (5), der an der Oberseite oder Unterseite des Türblatts (2) befestigbar ist, eine Buchse (7), die in der Kante der Türöffnung befestigbar ist oder darin angeordnet ist, und einen Zapfen (6), der an einem ersten Ende in der Buchse (7) positionierbar ist, um drehbar in der Buchse (7) angeordnet zu werden, und an einem zweiten Ende an dem Befestigungsblock befestigbar ist, umfasst, **dadurch gekennzeichnet, dass** das Türblatt (2) nicht perforiert ist und eine Halterung (4) zum Befestigen des Schwenkscharniers (3) am Türblatt (2) umfasst, wobei die Halterung (4) das Türblatt (2) lokal entlang eines Teils der Oberseite oder der Unterseite davon einklemmt, dass der Zapfen (6) einen Flansch (15) an seinem zweiten Ende umfasst, der sich zumindest teilweise entlang der Kante des Zapfens (6) an dem zweiten Ende erstreckt, und dass der Befestigungsblock (5) eine Einsatzöffnung (14) umfasst und einen Flansch (25) umfasst, der sich zumindest teilweise entlang der Kante der Einsatzöffnung (14) erstreckt, wobei, im befestigten Zustand des Befestigungsblocks (5), die Einsatzöffnung (14) für den Zapfen (6) nur von der Seite zugänglich ist, die zur Buchse (7) zeigt, und wobei der

- Zapfen (6) an seinem zweiten Ende von dieser Seite über die Einsatzöffnung (14) an dem Befestigungsblock (5) befestigbar ist, wobei, im befestigten Zustand des Zapfens (6), der Flansch (15) des Zapfens (6) in die Einsatzöffnung (14) hinter dem Flansch (25) der Einsatzöffnung (14) eingreift, wobei, um den Zapfen (6) an dem Befestigungsblock (5) zu befestigen, das zweite Ende des Zapfens (6) in der Einsatzöffnung (14) in einer ersten Position frei positionierbar ist und in der Einsatzöffnung (14) von der ersten Position in eine zweite Position versetzbar ist, in der der Flansch (15) des Zapfens (6) hinter dem Flansch (25) der Einsatzöffnung (14) eingreift und wobei der Befestigungsblock an der Halterung (4) befestigbar ist oder einen Teil derselben bildet.
2. Feuerschutz- und/oder Schallschutztür (1) nach Anspruch 1, **dadurch gekennzeichnet, dass** der Zapfen (6) in der Einsatzöffnung (14) linear von der ersten Position in die zweite Position versetzbar ist.
 3. Feuerschutz- und/oder Schallschutztür (1) nach Anspruch 2, **dadurch gekennzeichnet, dass** die Einsatzöffnung (14) als eine Schlüssellochöffnung (14) ausgeführt ist.
 4. Feuerschutz- und/oder Schallschutztür (1) nach Anspruch 1, **dadurch gekennzeichnet, dass** der Zapfen (6) in der Einsatzöffnung (14) von der ersten Position in die zweite Position drehbar ist.
 5. Feuerschutztür (1) nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die Halterung (4) ein Stegblech (9) umfasst, das sich entlang zumindest eines Teils einer Seitenkante des Türblatts (2) erstreckt und perforiert ist, und dass die Halterung (4) mindestens zwei aufrechte Flansche (10) umfasst, die in Paaren angeordnet sind, die sich auf beiden Seiten des Türblatts (2) erstrecken, um das Türblatt (2) einzuklemmen.
 6. Feuerschutztür (1) nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die Halterung (4) am Türblatt (2) mittels eines Strukturklebers (8) befestigt wird, der durch feuerfesten Klebstoff (8) geschützt wird.
 7. Feuerschutztür (1) nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die Feuerschutztür (1) Blechmaterial (13) mit einem Kern auf der Basis von Natriumsilikat umfasst, wobei sich das Blechmaterial (13) im Wesentlichen über die Seiten der Türöffnung erstreckt.
 8. Feuerschutztür (1) nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die Feuerschutztür (1) Blechmaterial (13) mit einem Kern auf der Basis von feuerfestem Graphit umfasst,

wobei sich das Blechmaterial (13) im Wesentlichen über die Seiten der Türöffnung erstreckt.

5 Revendications

1. Porte incombustible et/ou anti-bruit (1), comprenant un battant de porte en verre (2) et comprenant une charnière à pivot (3), pour suspendre le battant de porte en verre (2) dans une ouverture de porte, la charnière à pivot (3) comprenant un bloc de montage (5) qui peut être fixé au côté supérieur ou au côté inférieur du battant de porte (2), une douille (7) qui peut être fixée ou qui est agencée dans le bord de l'ouverture de porte et un tourillon (6) qui peut être positionné, à une première extrémité, dans la douille (7) afin d'être agencé de manière rotative dans la douille (7) et peut être fixé, à une deuxième extrémité, au bloc de montage, **caractérisée en ce que** le battant de porte (2) est non perforé et comprend un support (4) pour la fixation de la charnière à pivot (3) au battant de porte (2), ledit support (4) serrant localement le battant de porte (2) le long d'une partie de son côté supérieur ou de son côté inférieur, **en ce que** le tourillon (6) comprend une bride (15) à sa deuxième extrémité, laquelle s'étend au moins partiellement le long du bord du tourillon (6) à ladite deuxième extrémité, et **en ce que** le bloc de montage (5) comprend une ouverture d'insertion (14) et comprend une bride (25) qui s'étend au moins partiellement le long du bord de l'ouverture d'insertion (14), et, dans l'état monté du bloc de montage (5), l'ouverture d'insertion (14) étant accessible seulement au tourillon (6) depuis le côté tourné vers la douille (7) et le tourillon (6) pouvant, à sa deuxième extrémité, être fixé au bloc de montage (5) depuis ledit côté via l'ouverture d'insertion (14), et, dans l'état fixé du tourillon (6), la bride (15) du tourillon (6) venant en prise dans l'ouverture d'insertion (14) derrière la bride (25) de l'ouverture d'insertion (14), et, afin de fixer le tourillon (6) au bloc de montage (5), la deuxième extrémité du tourillon (6) pouvant être positionnée librement dans l'ouverture d'insertion (14) dans une première position et étant déplaçable dans l'ouverture d'insertion (14) de ladite première position à une deuxième position dans laquelle la bride (15) du tourillon (6) vient en prise derrière la bride (25) de l'ouverture d'insertion (14), et le bloc de montage pouvant être fixé audit support (4) ou formant une partie de celui-ci.
2. Porte incombustible et/ou anti-bruit (1) selon la revendication 1, **caractérisée en ce que** le tourillon (6) est déplaçable linéairement dans l'ouverture d'insertion (14) de la première position à la deuxième position.
3. Porte incombustible et/ou anti-bruit (1) selon la re-

vendication 2, **caractérisée en ce que** l'ouverture d'insertion (14) est réalisée en tant qu'ouverture en trou de serrure (14).

4. Porte incombustible et/ou anti-bruit (1) selon la revendication 1, **caractérisée en ce que** le tourillon (6) est rotatif dans l'ouverture d'insertion (14) de la première position à la deuxième position. 5

5. Porte incombustible (1) selon l'une quelconque des revendications précédentes, **caractérisée en ce que** le support (4) comprend une âme (9) qui s'étend le long d'au moins une partie d'un bord latéral du battant de porte (2) et est perforée, et **en ce que** le support (4) comprend au moins deux brides verticales (10) agencées par paires qui s'étendent des deux côtés du battant de porte (2) afin de serrer le battant de porte (2). 10
15

6. Porte incombustible (1) selon l'une quelconque des revendications précédentes, **caractérisée en ce que** le support (4) est fixé au battant de porte (2) à l'aide d'un adhésif structural (8), lequel est protégé par un adhésif ignifuge (8). 20
25

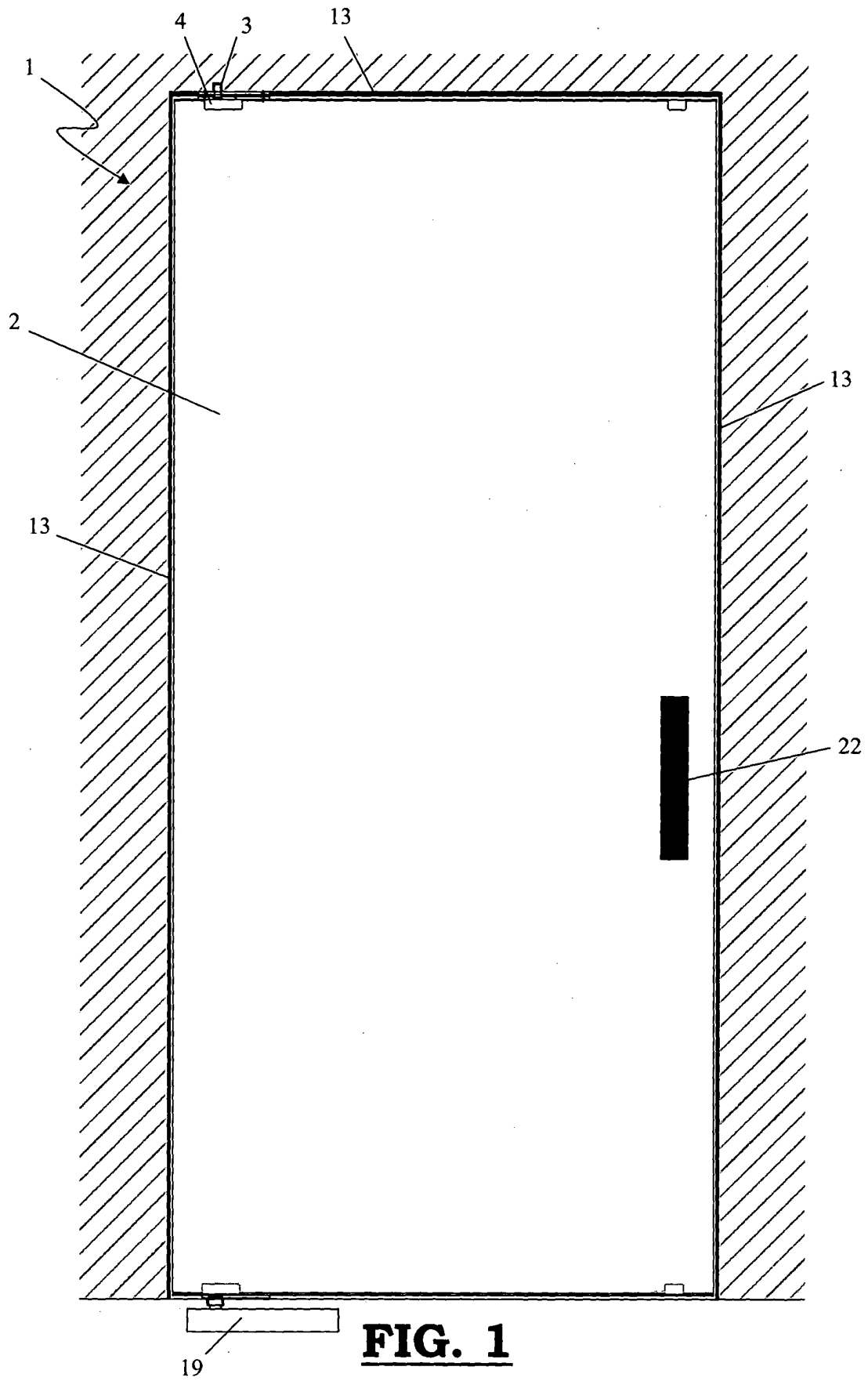
7. Porte incombustible (1) selon l'une quelconque des revendications précédentes, **caractérisée en ce que** la porte incombustible (1) comprend un matériau en feuille (13) doté d'une partie centrale à base de silicate de sodium, ledit matériau en feuille (13) s'étendant sensiblement sur les côtés de l'ouverture de porte. 30

8. Porte incombustible (1) selon l'une quelconque des revendications précédentes, **caractérisée en ce que** la porte incombustible (1) comprend un matériau en feuille (13) doté d'une partie centrale à base de graphite ignifugé, ledit matériau en feuille (13) s'étendant sensiblement sur les côtés de l'ouverture de porte. 35
40

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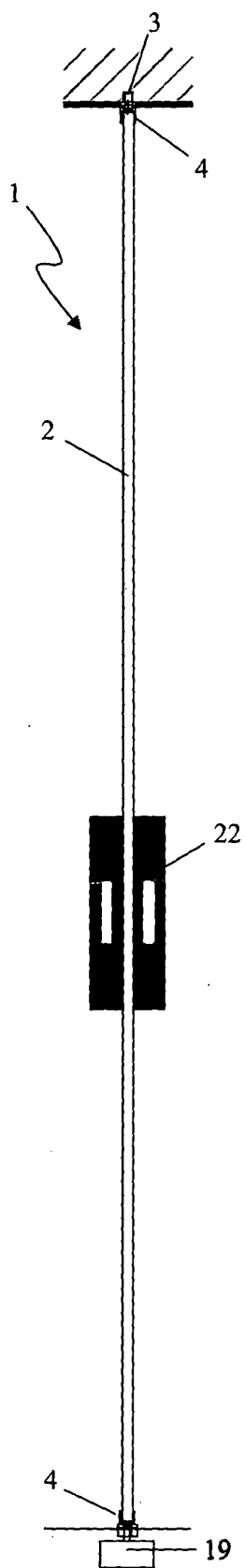


FIG. 2

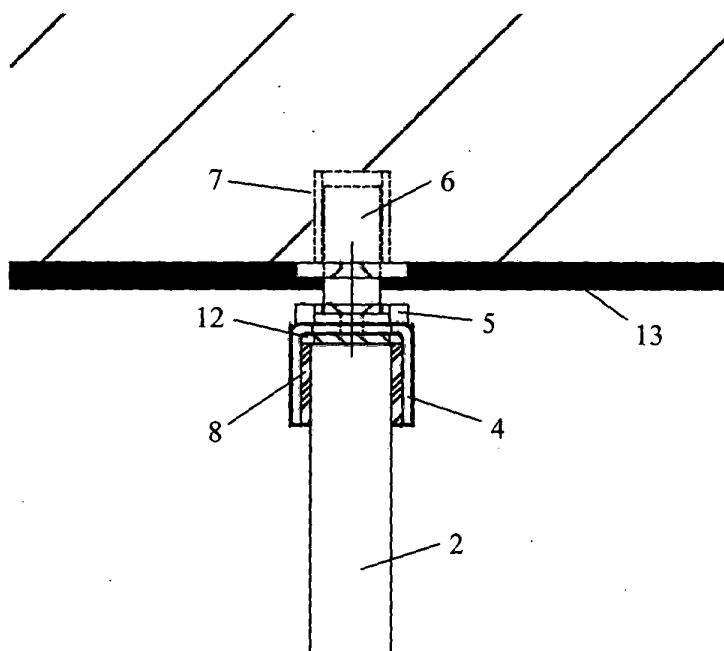


FIG. 3

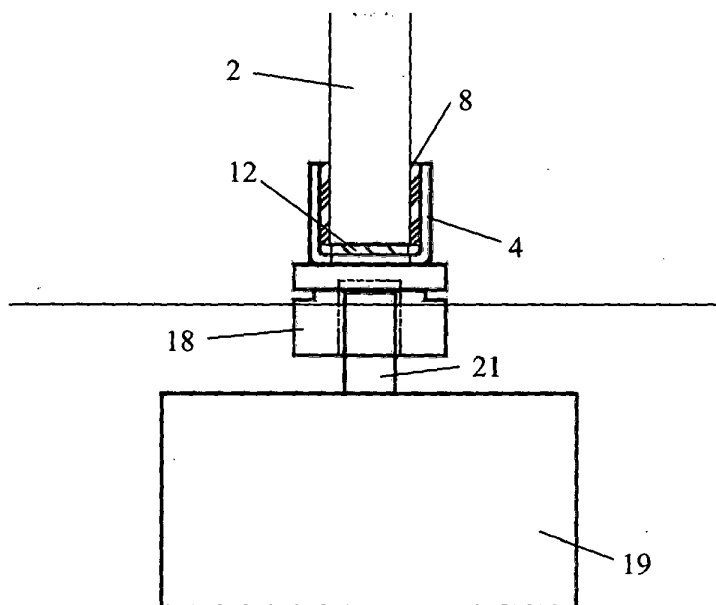
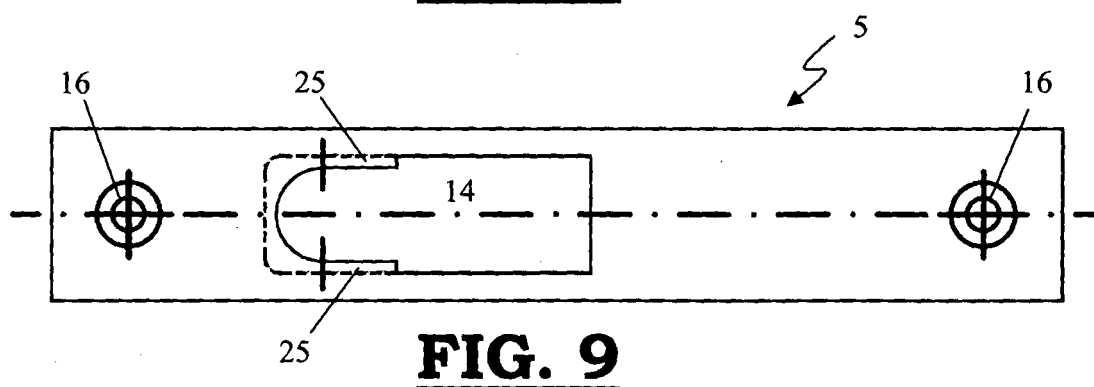
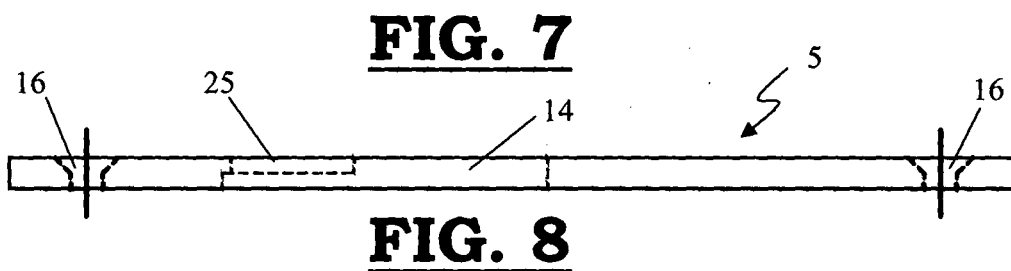
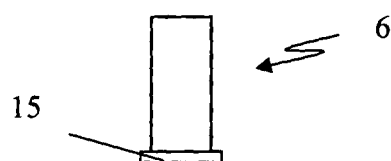
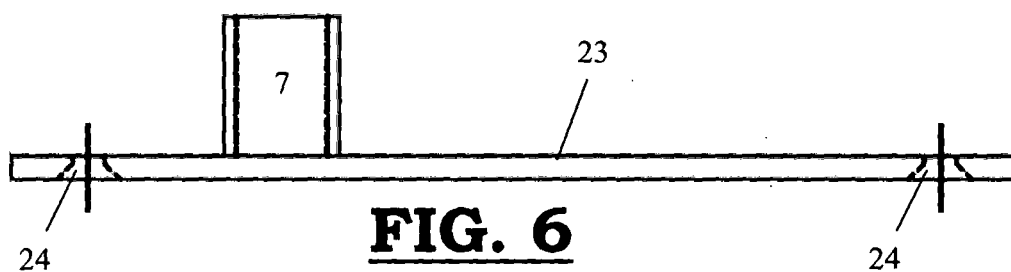
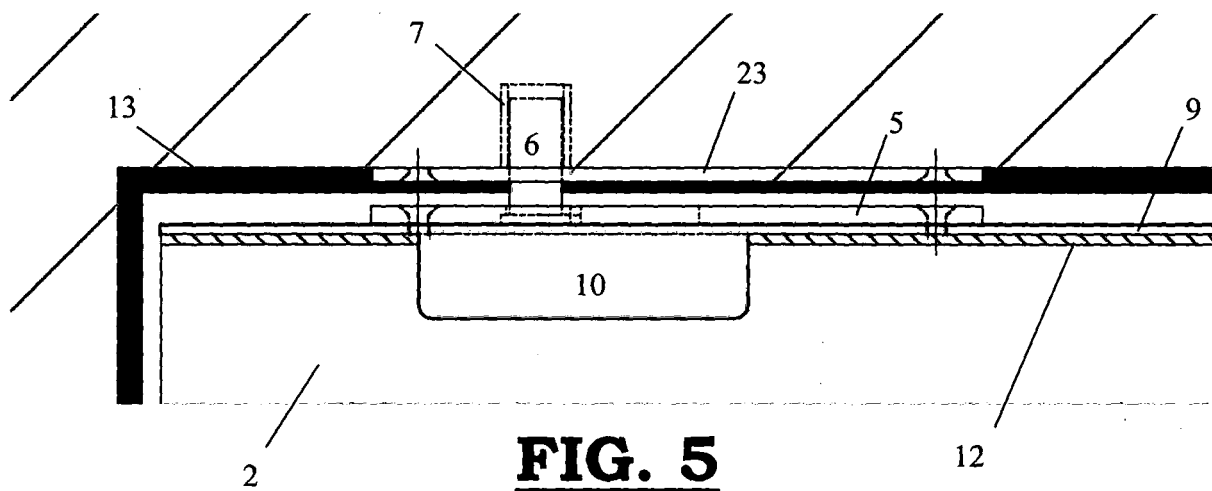


FIG. 4



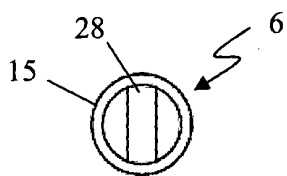


FIG. 10

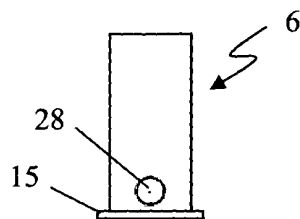


FIG. 11

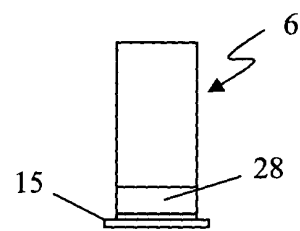


FIG. 12

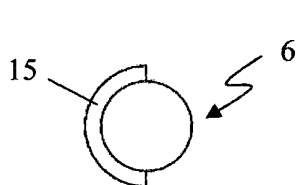


FIG. 13

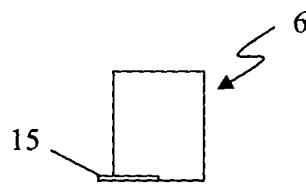


FIG. 14

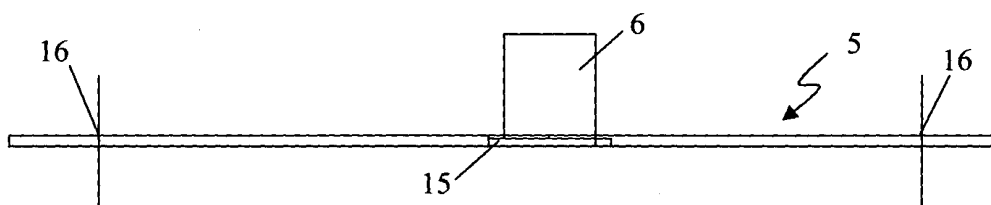


FIG. 15

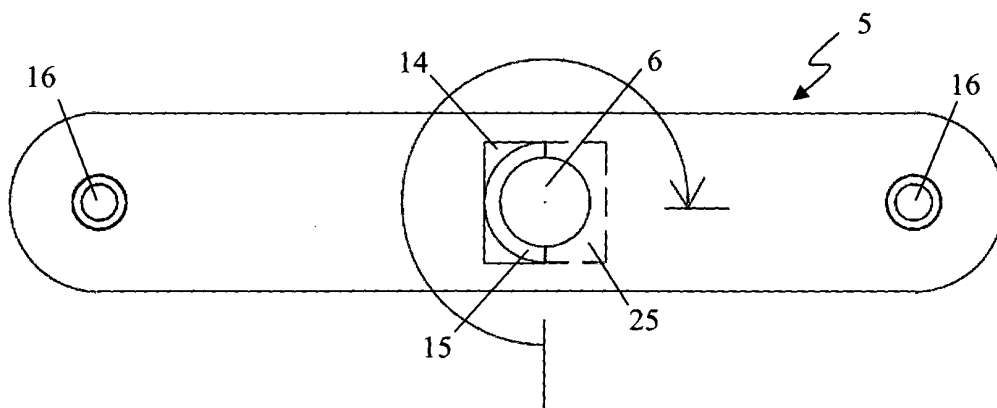


FIG. 16

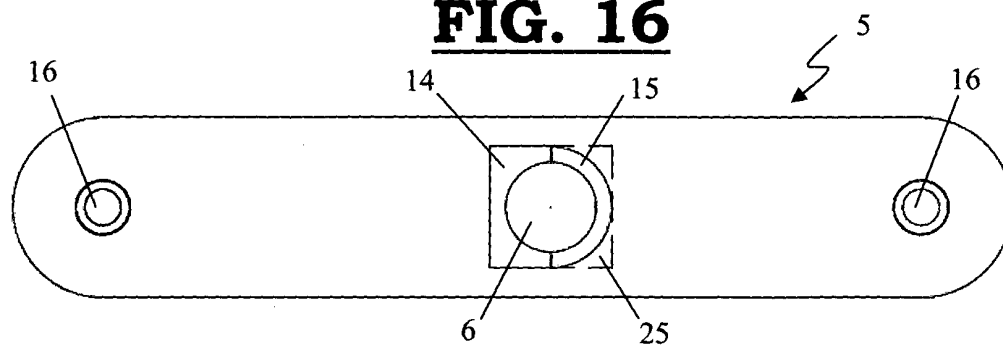


FIG. 17

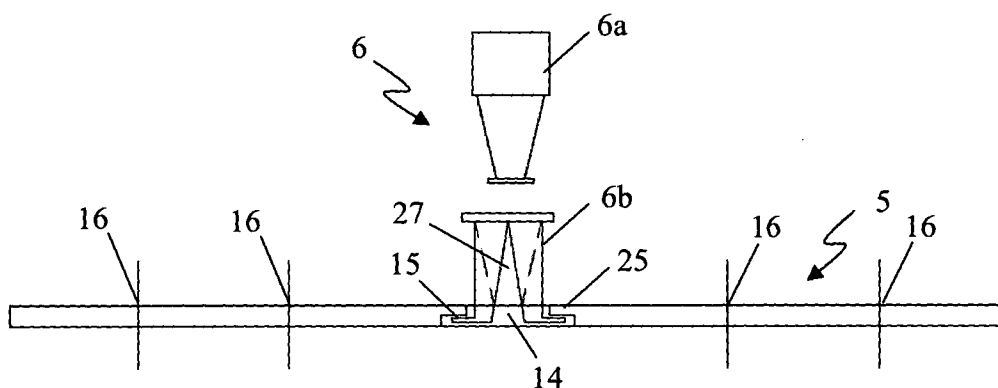


FIG. 18

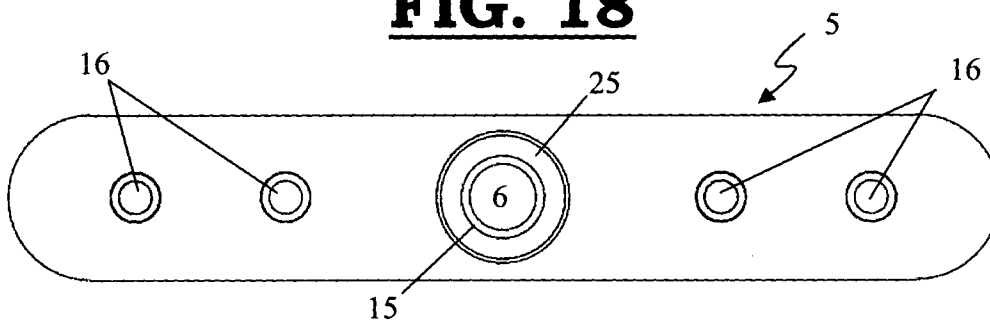


FIG. 19

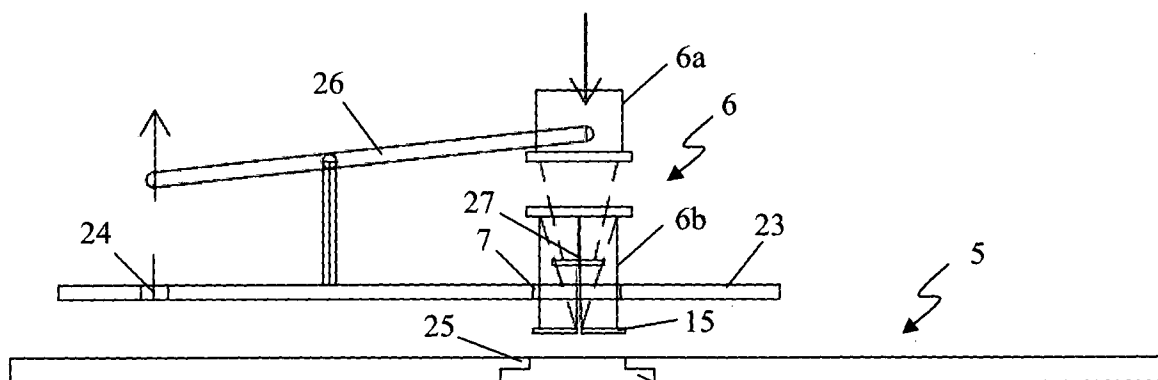


FIG. 20

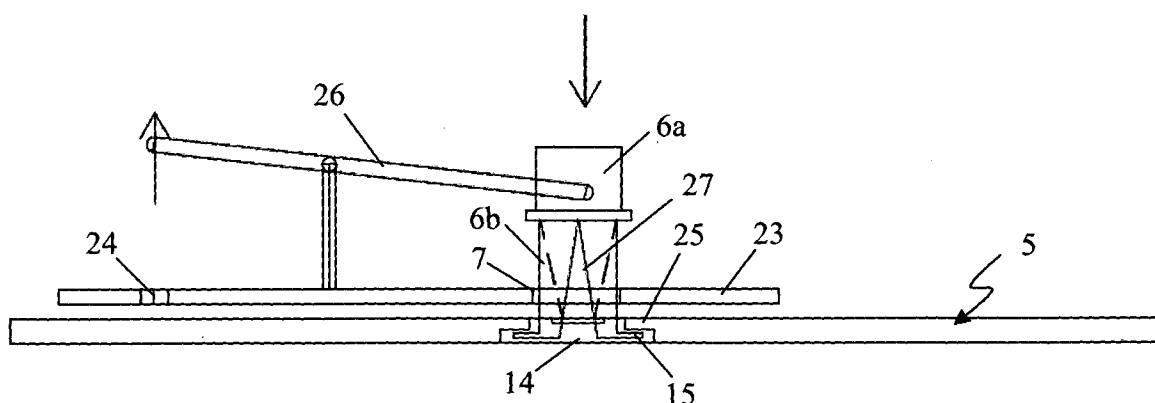


FIG. 21

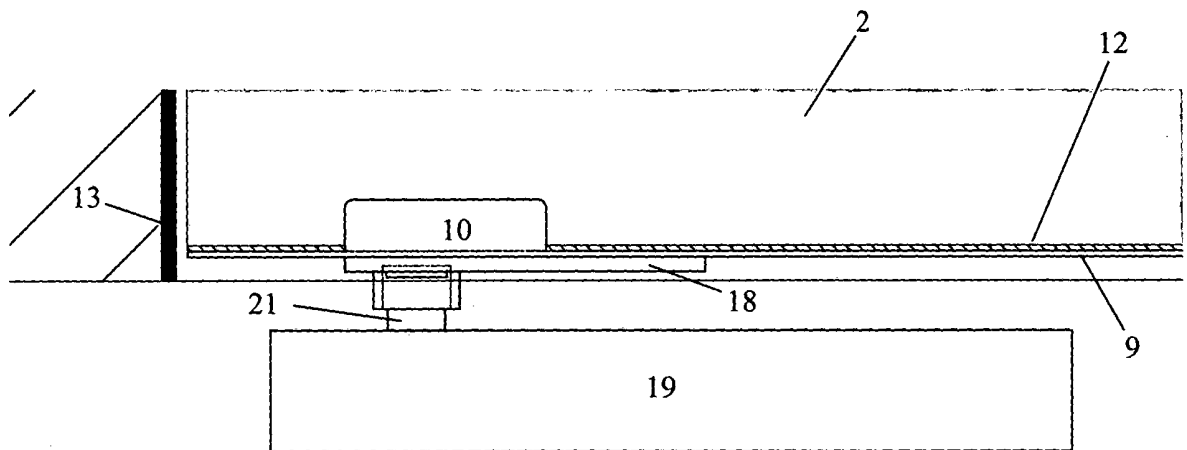


FIG. 22

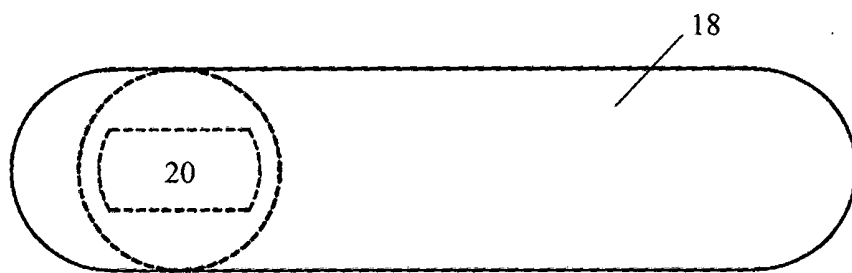


FIG. 23

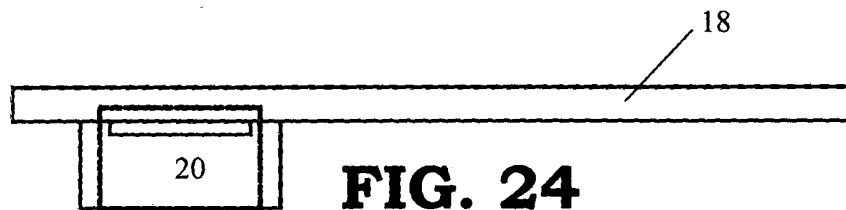


FIG. 24

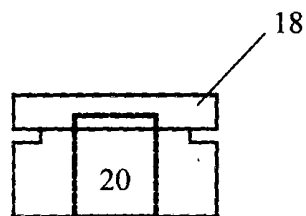
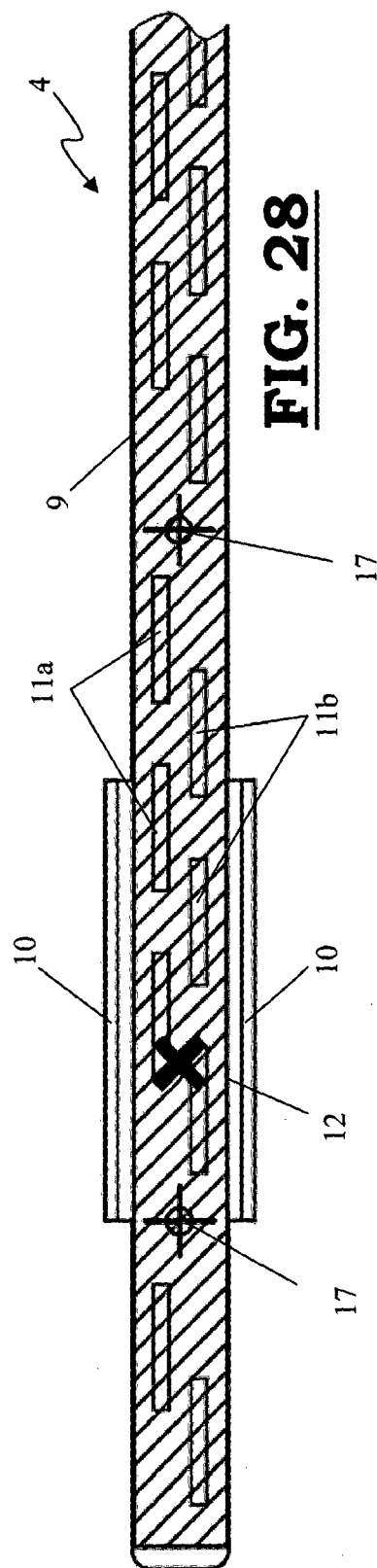
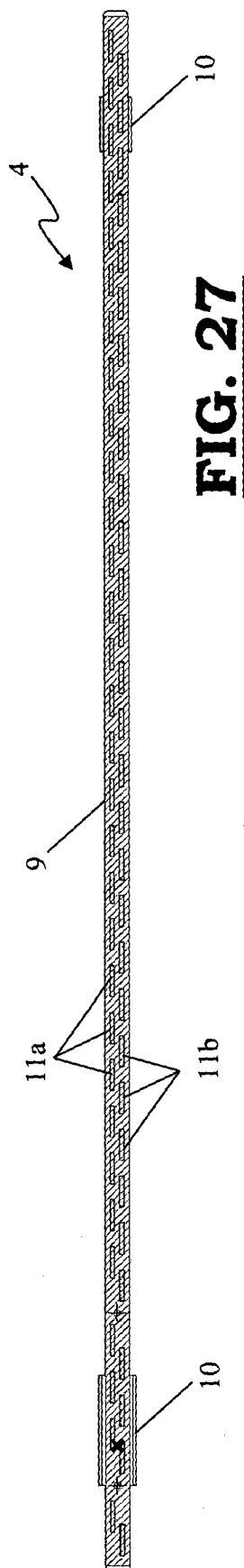
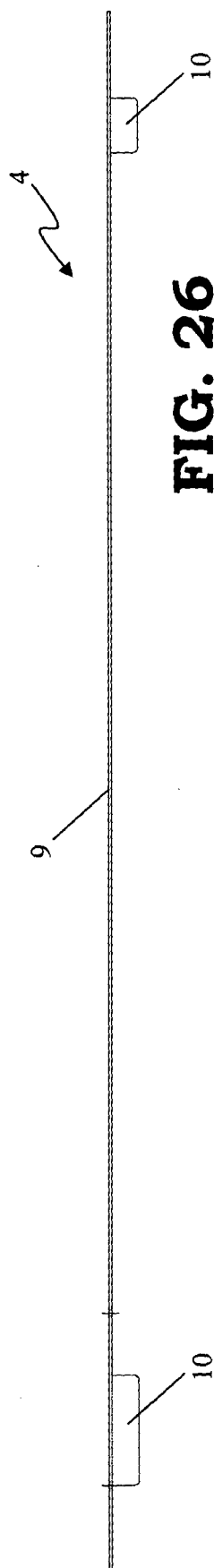


FIG. 25



REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- DE 102010017447 A1 [0008]
- US 20040206007 A1 [0008]
- DE 4123977 [0008]
- DE 242507 [0009]
- DE 202671 A [0009]