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(54) **Mounting system and method for mounting a sheet substantially in one plane**

(57) A mounting system (1) for mounting a sheet (2) substantially in one plane, comprising a mounting structure (3) and a plurality of connection pieces (4) for attachment to the sheet, wherein the mounting structure comprises a central member (5) and a plurality of elongated mounting members (6) having a first distal end (7)

for attachment to the central member and a second distal end (8) for attachment to one of the connection pieces, wherein the mounting structure further comprises a spring element (9,10) for biasing the second distal end of at least one of the mounting members in an outward direction (D) with respect to the central member.

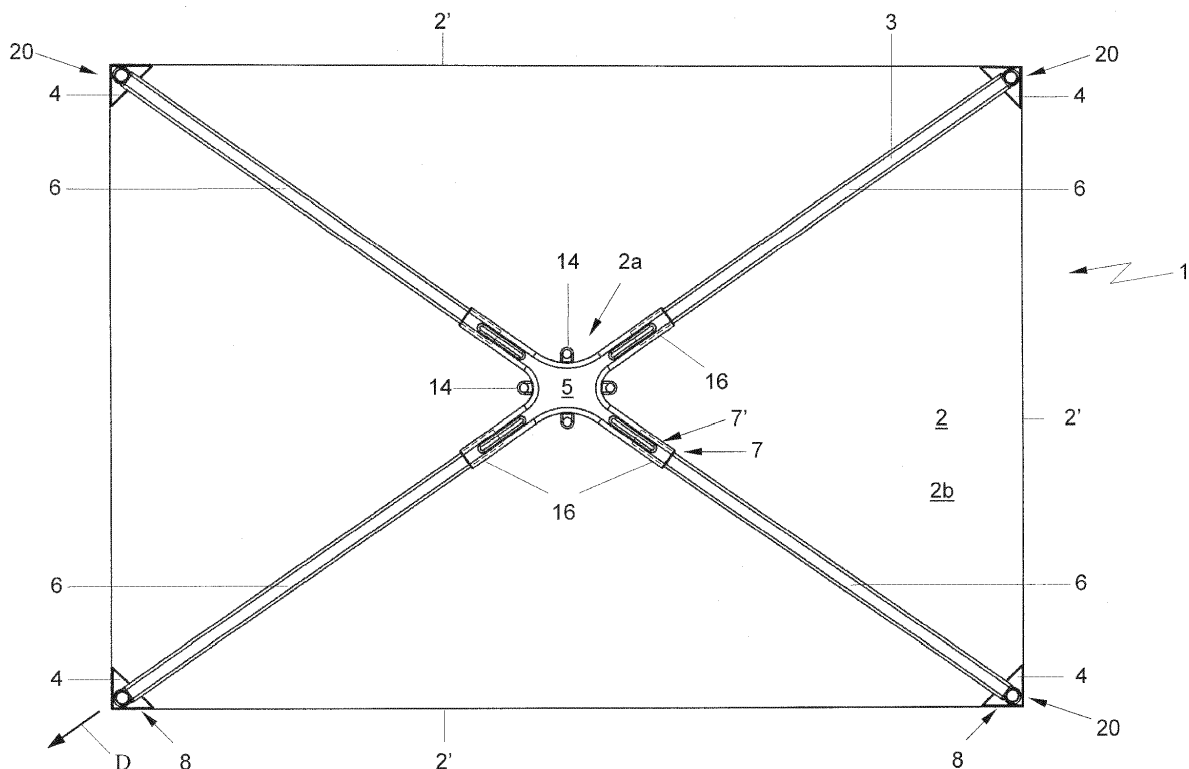


Fig. 1

Description

[0001] The invention relates to a mounting system for mounting a sheet substantially in one plane, comprising a mounting structure. Furthermore, the invention relates to a sheet mounted on a mounting system. The invention also relates to a composition comprising a mounting system. Moreover, the invention relates to a method for mounting a sheet substantially in one plane. Preferably, the sheet is a thin sheet. Further, the sheet is a flexible sheet and preferably a rollable sheet, such as a sheet of paper, a sheet of photographic paper, a poster, a placard, or a poster printed on a plastic foil.

[0002] There are different known methods for mounting a sheet substantially in one plane. For example, one known method is mounting a sheet on a wall by taping or pinning the corners of the sheet to the wall. Disadvantages hereof include e.g. damaging the sheet and the wall, and blocking the view on parts of the sheet. Another known method is bonding the sheet on a known mounting system, e.g. a board being far more rigid than the sheet, and subsequently hanging the known mounting system with the bonded sheet to a wall, which is cumbersome and time consuming. Besides, the end result will very much depend on the skills of the user.

[0003] In yet another known method another known mounting system is used, by which the sheet is clamped between a back board and a glass plate. Positioning the sheet properly between the board and the plate may be very hard. Especially, it may be hard to apply the glass plate, without shifting the sheet. Therefore, this method can become a time consuming business. Moreover, the sheet may shift in time, despite having been mounted properly. Besides, clips are to be used for the clamping, and parts of the clips will extend at the front side and thus block the view on parts of the sheet. Furthermore, the glass plate may reflect annoyingly and/or the colour of the glass plate may influence the perception of the sheet. Besides, this method may be expensive, and the used mounting system may be disadvantageously heavy and, in view of the glass, dangerous.

[0004] Moreover, a conventionally mounted sheet may be sensitive to external factors, such as pressure, temperature and humidity, as a result of which the sheet may deform. Due to this, it is possible that a sheet is not neatly flat, despite having been mounted properly in one plane.

[0005] American patent publication US 5 090 143 discloses a device for hanging posters or the like on walls. The device includes a plurality of corner pieces, wherein one corner piece is secured to each corner of the poster. One end of an elongated strut is detachably secured to each corner piece while the other ends of the struts are secured to a center support.

[0006] International patent publication WO 2010 036 115 discloses a method for mounting a canvas or a sheet substantially in one plane. A plurality of engagement members is attached on the back of the canvas or sheet in the vicinity of corners between two edges or along two

opposite edges thereof. These engagement members are forced apart by fitting one or more mounting members in between.

[0007] It is an object of the invention to provide a mounting system and/or a method for mounting a sheet according to the preamble, wherein at least one of the disadvantages mentioned above is counteracted. In particular, the invention aims at providing a mounting system and/or a method for mounting a sheet according to the preamble, wherein there is no need of using a board and/or plate for supporting the sheet.

[0008] Thereto, the mounting system comprises a plurality of connection pieces for attachment to the sheet, and the mounting structure comprises a central member and a plurality of elongated mounting members, having a first distal end for attachment to the central member and a second distal end for attachment to one of the connection pieces, and further the mounting structure comprises a spring element for biasing the second distal end of at least one of the mounting members in an outward direction with respect to the central member. In a supporting system according to the invention there is no need to support the whole surface of a sheet, e.g. by a board, another mounting system or a wall.

[0009] By providing a mounting system which comprises a plurality of connection pieces for attachment to the sheet, and a mounting structure comprising a central member and a plurality of elongated mounting members, having a first distal end for attachment to the central member and a second distal end for attachment to one of the connection pieces, wherein the mounting structure further comprises a spring element for biasing the second distal end of at least one of the mounting members in an outward direction with respect to the central member, a support for the whole surface of the sheet may be superfluous.

[0010] Preferably, the central member is arranged such that said central member can hold the elongated members in a single plane. Therefore, the sheet can be mounted very flat.

[0011] Preferably, the elongated members are located substantially in a single plane, what can provide a relatively flat mounting system. As a result, it is relatively easy to provide a mounting system wherein a central member can hold the elongated members in a single plane.

[0012] Advantageous embodiments according to the invention are described in the appending claims.

[0013] By way of example only, embodiments of the present invention will now be described with reference to the accompanying figures in which:

Figure 1 shows a schematic view of a first embodiment of a mounting system according to the invention and a sheet;

Figure 2 shows a schematic exploded view of a mounting structure of the mounting system of Figure 1 and a sheet;

Figure 3a shows a schematic top view of a central member of the mounting system of Figure 1;

Figure 3b shows a schematic top view of an alternative central member of a mounting system according to the invention;

Figure 4 shows a perspective view of a pressing element of the mounting system of Figure 1;

Figure 5 shows a schematic cross sectional view of an elongated mounting member of the mounting system of Figure 1;

Figure 6 shows a perspective view of an attachment means of the mounting system of Figure 1;

Figure 7 shows a perspective view of a first embodiment of a connection piece of the mounting system of Figure 1;

Figure 8a shows a perspective view of a second embodiment of the connection piece of the mounting system of Figure 1 in a first position;

Figure 8b shows a perspective view of the connection piece of Figure 8a in a second position;

Figure 9a shows a perspective view of a third embodiment of a connection piece according to the invention;

Figure 9b shows a second view of the connection piece of Figure 9a;

Figure 9c shows a cross-section of the connection piece of Figure 9a;

Figure 10 shows a perspective view of an alternative embodiment of an attachment means according to the invention;

Figure 11a shows a perspective view of a fourth embodiment of a connection piece according to the invention; and

Figure 11b shows a second view of the connection piece of Figure 11a.

[0014] Fig. 1 shows a schematic view of a first embodiment of a mounting system 1 according to the invention and a sheet 2. The mounting system 1 is suitable for mounting the sheet 2 substantially in one plane. Preferably, the sheet 2 is a thin sheet. Further, the sheet 2 is a flexible sheet, preferably a rollable sheet, such as a sheet of paper, a sheet of photographic paper, a poster, a placard, or a poster printed on a plastic foil.

[0015] Highly preferably, the mounting system 1 is a poster mounting system and/or a photograph mounting system.

[0016] The mounting system 1 comprises in this embodiment a mounting structure 3 and a plurality of connection pieces 4 for attachment to the sheet 2. The mounting structure 3 comprises a central member 5 and a plurality of elongated mounting members 6. Each mounting member 6 has a first distal end 7 for attachment to the central member 5 and a second distal end 8 for attachment to one of the connection pieces 4. Further, the mounting structure 3 comprises one or more spring elements 9; 10 for biasing the second distal end 8 of at least one of the mounting members 6 in an outward di-

rection D with respect to the central member 5.

[0017] By providing a mounting system 1 according to the invention, in principle, only support for parts of the sheet may be needed. Principally, a sheet can be mounted by biasing a second distal end of one or more of the mounting members 6 and thereby biasing the connection pieces 4 in an outward direction D with respect to the ventral member 5. Therefore, the need of using a board and/or plate having a size substantially equal to, or even larger than, the size of the sheet may be reduced significantly or may even be removed at all. Further, the sheet can be mounted relatively easily, and, since for example the spring elements may constantly keep biasing the connection pieces, the sheet may stay substantially in one plane, even if the sheet deforms as a result of an external factor, such as pressure, temperature or humidity.

[0018] Outward should be understood at least as meaning away from the central member 5.

[0019] The mounting system 1 and/or the mounting structure 3 may be arranged for mounting sheet having a standard sheet format and/or sheet size. For example, the system and/or structure may be arranged for mounting a sheet having a standard photographic print size and/or shape, and/or a standard paper size and/or shape, e.g. an ISO 216, ISO 269 or ANSI/ASME Y14.1 size, such as for example but not limited to A2, A3, A4, folio etc. The mounting system 1 may comprise four mounting members 6, e.g. each having the second distal end 8 for attachment to a connection piece 4 attached near one of four corners 20 of a rectangular sheet 2. Additionally the mounting system 1 may comprise more than the four shown mounting members 6 comprising second distal ends, e.g. additional mounting members 6 for attachment to a connection piece 4 attached between two corners 20 of a rectangular sheet 2, preferably near an edge 2' delimiting the sheet 2.

[0020] Advantageously, the mounting structure 3 may comprise, preferably four, mounting members 6, preferably of substantially an equal length, placed under such angles that the second distal ends 8 form angular points of a virtual rectangular, wherein an aspect ratio of the virtual rectangular substantially corresponds with an aspect ratio of a standard sheet size. For example, the aspect ratio of the virtual rectangular formed by the second distal ends 8 of the mounting members 6 may be substantially equal to $1:\sqrt{2}$, in order to correspond to an aspect ratio of a sheet according to ISO 216, ISO 217 or ISO 269, e.g. an A4, A3, A2, A1, B4, B2, C3, C2 or C0 sheet. For another example, the aspect ratio of the virtual rectangular may e.g. be substantially equal to 22:9, in order to correspond to an aspect ratio of a US Letter size sheet, or substantially equal to e.g. 16:11, 10:7, 3:2, 4:3, 7:5, 5:4, 6:5, 14:11, or 17:11, in order to correspond to an aspect ratio of a standard photographic print sheet.

[0021] Besides, the length of the mounting members 6 may correspond to the size of one standard sheet such as a photograph or a poster of a standard size. Advantageously, the mounting structure 3 comprises replace-

able mounting members 6, which may be replaced by mounting members having another length, preferably corresponding to the size of another standard sheet. Alternatively or additionally, the mounting member may have an adjustable length. For that, the mounting member 6 may e.g. comprise grooves for snapping off a part of the mounting member, in order to obtain a mounting member with a length adapted to a right standard sheet size.

[0022] Additionally or alternatively, the system 1 and/or the structure 3 may be arranged for mounting a sheet 2 having a nonrectangular form, e.g. a polygonal form. For example, the mounting system 1 may comprise three mounting members 6, e.g. when arranged for mounting a triangular sheet, or 5, 6, 7, 8 or more mounting members 6, e.g. when arranged for mounting a star-shaped, circular or oval sheet.

[0023] Advantageously, the mounting system 1 is substantially flat. The mounting system 1 preferably may have a limited thickness, e.g. 5, 10, 15, 20, 25 or 30 mm. The limited thickness is preferably measured in a lateral direction with respect to a flat plane, being preferably substantially parallel to the sheet 2. If the mounting system 1 with a thereon mounted sheet 2 is e.g. attached to a flat wall with a back side of the sheet facing the wall, the distance between the wall and the sheet 2 may be limited on account of the limited thickness of the mounting system.

[0024] Fig. 2 shows a schematic exploded view of a mounting structure 3 of the mounting system 1 of Fig. 1 and a sheet 2. Although the central member 5 of the here shown embodiment is substantially cross shaped and comprises four arms 77 for coupling to the elongated mounting members 6, the central member 5 may alternatively have another shape. For example, the central member can have more or less than four arms and be substantially star shaped. Further, the central member 5 does not need to have arms 77 or other protruding parts 16 and/or can for instance be disc-shaped or rectangular. The central member 5 may comprise two parts 5a, 5b. Alternatively, the central member 5 may comprise one part or a plurality of parts being bigger than two, e.g. three, four or five parts. Preferably, the parts 5a, 5b are formed as shell parts. The parts 5a, 5b may be injection moulded, e.g. from a plastic or an aluminium alloy. Further, the parts 5a, 5b can be connected to each other, preferably by snapping. Therefore, one or more of the parts may be provided with snapping means. Alternatively or additionally, the parts may be mounted to each other, e.g. by means of welding, soldering, gluing or screwing.

[0025] Furthermore, the central member 5 may comprise a cavity 22 for containing the spring element 9; 10. Preferably, the cavity 22 is provided in an arm 77 of the central member 5. The spring element 9; 10 may comprise a pressing element 10 (shown in Fig. 4) and a spring 9, e.g. a spiral spring. The pressing element 10 may comprise an elongated guiding part 17 having a first distal end 17a being in contact with a pressing part 18, and a

second distal end 17b. The spring 9, preferably a coiled spring, may be installed around the guiding part 17, which can be substantially cylindrically. The spring element 9; 10 may be installed in the cavity 22. The spring 9, preferably a pressure spring, may be biased, with a first distal end 9a pushing against the pressing part 18, and with a second distal end 9b pressing against a stop 23 comprised in the central member 5. The stop 23 may comprise a hole 26 forming a passage for the elongated guiding part 17.

[0026] Fig. 3a shows a schematic top view of a central member 5 of the mounting system 1 of Fig. 1. The pressing element 10 may be shiftable between a first position 24, wherein a stop block 19 guided by a slot 21 in the central part 5 is blocked by a first blockade 21a, preferably formed by an edge at a first distal end 21a of the slot 21, and a second position 25, wherein the stop block 19 is blocked by a second blockade 21b, preferably formed by an edge 21b at a second distal end 21b of the slot 21. In order to prevent the guiding part 17 from slipping out of the hole 26, the elongated guiding part 17 has preferably a length greater than the distance from the hole 26 up to the first blockade 21a. By having such a length, the second distal end 17b of the guiding part 17 may in the first position 24 be behind the stop 23 with respect to the pressing-part 18.

[0027] Furthermore, the mounting structure 3 may comprise one or a plurality of suspension members 14, for, preferably releasable, attachment of the mounting system 1 to a supporting structure, such as a wall, a ceiling or a stand. The suspension member 14 may for instance be provided on the central member 5 or on at least one of the mounting members 6. The suspension member 14 may e.g. comprise a ring, a hook, a wire, or a rope. Preferably, the suspension member 14 is provided at an axis of symmetry of the mounting system 1 and/or of the mounting structure 3. Alternatively or additionally, a plurality of suspension members 14, e.g. two or three, is provided next to each other, for instance substantially on a line substantially transverse to the axis of symmetry of the mounting system 1 and/or of the mounting structure 3.

[0028] The central member 5 shown in Fig. 3a comprises four suspension members 14. Here, the suspension members 14 are provided with eyes 14a.

[0029] Alternatively or additionally, the suspension members 14 are provided at other parts of the mounting system 1, which parts do for instance not form a portion of the mounting structure 3. For example, one or a plurality of connection pieces can be provided with one or a plurality of suspension members 14.

[0030] Figure 3b shows a schematic top view of an alternative central member 5 of a mounting system 1 according to the invention. Its suspension members 14 preferably have an indentation 14b or passageway 14b for receiving an external carrying or supporting element, e.g. a hook, supporting cable, or a screw, nail, hook, or the like element extending from a wall. Preferably, at least one indentation 14b or passageway 14b is formed in such

a way that an upper side 14d of it is substantially tapering upward, when the mounting system 1 is in a suspended state during normal use. A suspension member 14 may for example comprise two spokes 14e extending from two adjacent arms 77 and connected to each other by a tip or upper side 14d, offset from the body of the central member 5. A tip 14c to which the indentation 14b or passageway 14b can taper is preferably rounded off. Although the here shown embodiment comprises four suspension members 14, the central member may comprise another number of suspension members 14, e.g. one or two.

[0031] Fig. 4 shows a perspective view of a pressing element 10 of the mounting system 1 of Fig. 1. Herein, two stop blocks 19 are comprised at two opposite sides of the pressing part 18. Alternatively, another number of stop blocks 19 and/or other stop elements 19 may be provided, e.g. one or a plurality greater than two, for example three or four. Additionally or alternatively, the stop blocks 19 or the other stop elements 19 may be comprised at other places at the pressing element 10, e.g. next to each other at the pressing part 18 and/or at the guiding part 17. Moreover, the pressing element 10 may have no stop blocks or other stop elements 19. The stop blocks or other stop elements 19 may be comprised at the elongated mounting member 6, preferably near its first distal end 7.

[0032] Fig. 5 shows a schematic cross sectional view of an elongated mounting member 6 of the mounting system 1 of Fig. 1. The elongated mounting members 6 may comprise a profile section 15, preferably an extrusion profile section. The extrusion profile section may be made of a plastic or a metal, such as aluminium. Alternatively or additionally, the mounting member 6 may comprise a section 15 produced using other techniques, e.g. injection moulding or a material removal method. Furthermore, the mounting member 6 and the other parts of the mounting system 1 may comprise other materials, such as other metals, synthetics, ceramics, wood, composites, etc.

[0033] Preferably, the at least one mounting member 6 is biased in the outward direction D with respect to the central member 5. Hereto, the mounting member 6 may be pushed in an outward direction with respect to the central member 5 by the spring element 9; 10, e.g. by the first distal end 7 of the mounting member 6 being pushed by the pressing part 18, which is being pushed by the spring 9. With reference to Fig. 3a, the spring element 9; 10 is there shown being biased in the outward direction D. Advantageously, the spring element 9; 10 may supply a force working in a direction substantially parallel with the outward direction D. Alternatively or additionally, the spring element 9; 10 may supply a force working in another direction, and the mounting structure 3 may comprise means for transforming at least a part of the supplied force into a resulting force working in a direction substantially parallel with the outward direction D. Thus the second distal end 8 is pushed outward from

the central member 5.

[0034] The first distal end 7 of the at least one mounting member 6 may telescopically engages the central member 5. Hereto, the central member 5 preferably comprises at least one hole 27 for telescopically receiving the first distal end 7 of the at least one mounting member 6. Alternatively or additionally, the first distal end 7 of the at least one mounting member 6 comprises at least one hole for telescopically receiving a protruding part of the central member 5. Preferably, each of the protruding parts and/or the holes 27 of the central part 5 extends substantially in the outward direction D. Further, each of the extending protruding parts and/or the holes 27 of the central part 5 is located in substantially in the same flat plane, due to which the central part 5 can hold the elongated mounting members in a single plane. Preferably, at least one, and more preferably both, of the planes are substantially parallel to a mounted sheet 2. Therefore, a mounting system can be provided relatively well, which is arranged for mounting a flexible sheet 2 particularly flat, has a small thickness, and is arranged for being hung flat to e.g. a wall.

[0035] As described above, the mounting member 6 may comprise, preferably near its first distal end 7, one or a plurality of stop blocks 19. A stop block at the mounting member 6 may prevent the mounting member 6 to slide from, off and/or out of the central member 5. The stop block at the mounting member 6 may be guided by a slot in the central member 5.

[0036] Alternatively, a stop block may be comprised in the central member 5 and may be guided by e.g. a slot in the mounting member 6, which guidance may be restricted by a stop which may be comprised in the mounting member 6.

[0037] In another embodiment, not shown in the figures, the first distal end 7 of the at least one mounting member 6 is fixedly attached to the central member 5. The mounting member may comprise a plurality of parts telescopically engaging each other, e.g. two or three parts. The spring element 9; 10, for biasing the second distal end 8 of at least one of the mounting members 6 in an outward direction with respect to the central member 5, may be comprised in the mounting member.

[0038] Additionally or alternatively, the spring element 9; 10 may be comprised in the connection piece 4. It is noted that the mounting structure 3 can comprise a plurality of spring elements 9; 10 for biasing the second distal end 8 of a mounting member 6 outward, e.g. two or three spring elements.

[0039] Moreover, the mounting structure 3 may alternatively and/or additionally comprise one or a plurality of other spring elements 9; 10 for biasing the second distal end 8 of at least one of the mounting members 6 in an outward direction with respect to the central member 5. For example, the mounting structure 3 may have a spring element comprising an elastic band, a leaf spring and/or a torsion spring.

[0040] Further, the mounting system 1 may comprise

an attachment means 11 for attachment of the second distal end 8 of the at least one elongated mounting member 6 to one of the connection pieces 4, preferably at least partly irrespective of the angle between the mounting member 6 and the one connection piece 4, in a plane substantially parallel with a sheet 2 when mounted. Therefore, the elongated mounting member 6 can be attached to the connection piece 4 such way that the sheet 2 can be mounted without rotation of the connection pieces 4 relatively to each other, preferably in the plane of the sheet, even when the connection piece 4 is attached to the sheet in such a way that said connection piece 4 is not exactly in line with the elongated mounting member 6 seen in the plane parallel to the sheet 2. As a result, mutual rotation of connection pieces 4 when attached to a sheet can be counteracted as well as undesired deformation of the sheet 2, such as bulging, puckering, creasing, undulation and/or even tearing. A further advantage thereof may be that a connection piece 4 not positioned completely well into a corner of the sheet will not lead up to undesired deformation of said sheet 2.

[0041] In Fig. 6 an embodiment of the attachment means 11 of the mounting system 1 of Fig. 1 is shown in a perspective view. The attachment means 11 may preferably comprise a releasable attachment means, and may more preferably comprise a clamping element 13 for clamping the attachment means 11 to the mounting member 6 and/or a clamping element 12 for clamping the attachment means 11 to the connection piece 4. The clamping element 12 for attachment of the attachment means 11 to the connection piece 4 may e.g. comprise two snap connectors 12a, 12b and may partly surround a cylindrically space 30. The clamping element 13 for attachment of the attachment means 11 to the mounting member 6 may be suitable for clamping the element 13 into a hollow space 31 comprised in the second distal end 8 of the mounting member 6. Additionally or alternatively, the attachment of the attachment means 11 to the mounting member 6 may be arranged by providing e.g. another snap connection, a screwed connection, a glue connection or a welding connection. Alternatively, the attachment means 11 may be formed as an integral part of the elongated mounting member 6.

[0042] With reference to Fig. 7, which shows a perspective view of a first embodiment of a connection piece 4 of the mounting system 1 of Fig. 1, it is noted that the connection piece 4 may comprise a substantially flat connection surface 51 and a coupling piece 28. The coupling piece 28 may comprise a substantially cylindrical part 29, having a central axis A preferably substantially transverse to the connection surface 51. Besides, the coupling piece 28 may comprise a top part 50 being connected to the substantially cylindrical part 29, said top part 50 extending in a radial direction R with reference to the substantially cylindrical part 29. The top part 50 may be suitable for preventing the attachment means 11 sliding off the substantially cylindrical part 29, in a direction parallel to the axis A transverse to the connection surface. By

providing an attachment of the substantially cylindrical part 29 and the clamping element 12 which can rotate around the cylindrical part 29, an attachment of the second distal end 8 of the at least one elongated mounting member 6 to one of the connection pieces 4 is obtained, which is irrespective of the angle between the mounting member 6 and the connection piece 4 in a plane substantially parallel with a sheet 2 when mounted.

[0043] In another embodiment the connection piece 4 and the attachment means 11 are connected using another joint, e.g. a plug-and-hole joint, for example, a plug is formed by a protruding portion of the attachment means 11 and a hole is comprised in the coupling piece 28. Further, by providing a coupling piece 28 which is rotatable around an axis A substantially transverse to the connection surface, an attachment of the second distal end 8 of the at least one elongated mounting member 6 to one of the connection pieces 4 may be obtained, which is irrespective of the angle between the mounting member 6 and the connection piece 4 in a plane substantially parallel with a sheet 2 when mounted.

[0044] Advantageously, the substantially flat connection surface 51 of the connection piece 4 may be comprised in a base part 40 of the connection piece 4. Preferably, the connection surface extends up to an edge 40a, 40b of the base part 40. Although the base part 40 and the connection surface each can have any contour, e.g. round, oval, polygonal or rectangular, the base part 40 and/or the connection surface may preferably have a contour substantially corresponding with a contour of a right-angled triangle. Advantageously, the coupling piece 28 is located near a substantially right angle 40c of the base part 40 and/or the connection surface. By providing the connection piece 4 having the coupling piece 28 located near the right angle 40c formed by the two substantially transverse edges 40a, 40b, a user of the mounting system 1 may tend to attach the coupling piece 28 in and/or in the vicinity of the, preferably right-angled, corner 20 of the sheet 2. By attaching the coupling piece 28 in and/or in the vicinity of the corner 20 of the sheet, the user places the coupling piece 28 very near the corner of the sheet, which may advantage the mounting of the sheet.

[0045] At least one of the connection pieces 4 may comprise a fixing means, for adhesive attachment of the at least one connection piece 4 to the sheet 2. Preferably, at least one of the substantially flat connection surfaces 51 comprises the adhesive fixing means. In an advantageous embodiment the fixing means comprises double-sided tape attached to connection surface.

[0046] Preferably, the connection surface and/or a bonding zone connecting the connection surface to the sheet has a surface size great enough to prevent shear between the sheet 2 and the connection piece 4. Further, the fixing means may be suitable for either permanent or releasable fixation.

[0047] Alternatively or additionally, at least one of the connection pieces 4 comprises a fixing means, for

clenching attachment of the at least one connection piece 4 to the sheet 2.

[0048] Fig. 8a shows a perspective view of a second embodiment of the connection piece 4 of the mounting system 1 of Fig. 1 in a first position, and Fig. 8b shows a perspective view of the connection piece 4 in a second position. The fixing means for attachment of the connection piece 4 to the sheet 2 by clenching may e.g. comprise two clench strips 60, which may be connected to the base part 40 by means of e.g. film hinges 61. Moreover, additional snap fingers 62 may be provided, preferably at the clench strip 60 and/or at the connection surface 51. The additional snap fingers 62 may be arranged for cooperating with corresponding snap openings 63. The corresponding snap openings 63 may be provided at respectively the connection surface 51 and/or the clench strip 60. In the shown first position, the clench strips 60 are not yet snapped. In the shown second position, the additional snap fingers 62, which may be provided with a sharp point 64, are pierced through the sheet 2, and the clench strips 60 are subsequently rotated around the film hinges 61 in a direction R, after which the additional snap fingers 62 are snapped in the snap openings 63.

[0049] Furthermore, the sheet may be an unrolled sheet e.g. an unrolled photo poster or an unrolled thin metal sheet, e.g. previously having been stored in a cylindrical container. Since the unrolled sheet may have a tendency to roll up again, it may be advantageous to attach the connection pieces 4 close to the edges 2' and/or corners 20 of the sheet 2. In order to prevent, or at least reduce, that the unrolled sheet may roll up again, the connection piece 4 and/or a part of thereof comprising the connection surface may be rigid, in order to stay substantially flat. Moreover, the spring element 9; 10 may be arranged to supply a force large enough to prevent, or at least reduce, rolling up of the unrolled sheet. Advantageously, the mounting structure 3 has a rigidity large enough to prevent a substantial deformation of itself due to the forces applied to it by the sheet with the tendency to roll up again.

[0050] Figures 9a and 9b show views of a third embodiment of a connection piece 4 according to the invention. Figure 9c shows a cross-section of said connection piece 4. A substantially flat connection surface 51 of the connection piece 4 can be stuck to a rear side of the sheet 2. A second distal end 8 of the connection piece can be attached to a mounting member 6. For this purpose, the second distal end 8 may be inserted into a catch hollow 70, which for example is provided in a coupling piece 28 of the connection piece 4. Additionally or alternatively, the second distal end 8 can be provided with an integrated or separated attachment means 11 arranged for insertion into the catch hollow. The catch hollow 70 arranged for receiving at least a part of the attachment means 11 and/or the distal end 8 of the mounting member 6 can extend substantially in a direction 73 corresponding substantially to the outward direction D in which the mounting member can be pushed into

the catch hollow. Preferably, the second distal end 8 can be attached to the connection piece 4 at least partly irrespectively of the angle between the mounting member 6 and the connection piece 4, seen in a plane substantially parallel with a sheet 2 when mounted. Therefore, the catch hollow 70 can for instance have a self-locating shape, as can be seen in the embodiment shown in Fig. 9a, wherein the catch hollow 70 tapers. Alternatively or additionally, the catch hollow 70 can be provided in a portion being at least partially rotatable with respect to a base part 40.

[0051] In Fig. 9a, the catch hollow 70 is given a self-locating shape by making the catch hollow taper from an entry 70a in the outward direction D, in at least the plane being substantially parallel with a sheet 2 when mounted. Additionally or alternatively, the catch hollow 70 may taper in the outward direction D in other planes, for instance in a transverse plane 71 being substantially transverse to the plane being substantially parallel with the mounted sheet.

[0052] Figure 10 shows a perspective view of an alternative embodiment of an attachment means 11 according to the invention. Here, the attachment means 11 is provided with a clamping element 13 which for instance can be clamped in a distal end 8 of the mounting member 6. Here, the attachment means 11 is provided with a rounded off insertion portion 72 which can be inserted into the catch hollow 70 of the connection piece 4. However, the insertion portion 72 does not need to be rounded off. Alternatively or additionally, the insertion portion 72 may taper in the outward direction D. By the tapering of the catch hollow, the attachment means 11 and/or a distal end 8 of the mounting member 6 being pushed into the catch hollow can be clamped therein. Furthermore, it can be inserted relatively easily. In an advantageously embodiment, the insertion portion 72 and/or the portion of the connection piece 4 in which the catch hollow 70 is provided, is made off a compressible material, as a result of which it can be clamped relatively well.

[0053] As can be seen in Fig. 9a and Fig. 9c, the connection piece 4 can be provided with a suspension member 14.

[0054] In an advantageously embodiment, as can be seen best in the cross-section shown in Fig. 9c, the catch hollow's direction 73 in which the catch hollow 70 is extending makes, in the transverse plane 71, a compensation angle 76 relative to the connection surface 51. As a result, it can be realized that the sheet 2 can be mounted very flat. Since the mounting member 6 can during normal use push against the connection piece 4 in the outward direction D, and since the sheet 2 slightly offset from the mounting member 6 can meanwhile pull the connection piece 4 in the inward direction, the connection piece 4 can tilt somewhat substantially in the transverse plane 71. Therefore, the most outward located corner 74 of the base part 40 of the connection piece 4 can for instance be pushed in direction toward a mounted sheet 2 and/or a most inward located portion 75 of the base part 40 can

for instance be pulled away in a direction away from the mounted sheet 2. Consequently, the sheet may deform unintentionally, as a result of which it is not mounted nicely in one flat plane. By choosing the compensation angle 76 such that the connection surfaces 51 tilt, as result of the moments exerted by the mounting members 6 pushing outward and the sheet pulling inward, to such extent that the connection surfaces 51 together lie in one flat plane during use, deformation of the mounted sheet 2 can be counteracted. Preferably, the compensation angle 76 is chosen depending on the pushing force exerted during use by the mounting member 6 and/or depending on the pulling force exerted during use by the sheet 2. The preferential compensation angle can differ for different sheets and/or different mounting structures 3. For instance, the compensation angle 74 can be larger than 0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8, 0.9, or 1.0 degrees, but preferably it is less than 3, 2, 1.5, 1, 0.9, 0.8, or 0.7 degrees.

[0055] Alternatively or additionally, the second distal end 8 of the mounting member 6 and/or the attachment means 11 can extend in a direction which in the transverse plane 71 is at an angle with a corresponding connection surface 51. Also as a result of this, there can be compensated for the tilts of the connection pieces 4 caused by the moments.

[0056] Fig. 11a and Fig. 11b show views of a fourth embodiment of a connection piece 4 according to the invention. Here, the connection piece 4 has a first connection surface 51a and a second connection surface 51b. Preferably, the connection surfaces 51a, 51b are substantially flat and substantially parallel to each other. More preferably, a coupling piece 28 is provided between the two connection surfaces 51a, 51b. Here, the connection piece 4 comprises a catch hollow 70 provided in the coupling piece 28, which catch hollow may taper in the outward direction D, and which is adapted to receive a second distal end 8 of a mounting member 6 and/or an attachment means 11 provided at the second distal end 8. Alternatively, a different coupling piece 28 may be provided. For example, a coupling piece 28 which is pivotable relative to at least one and preferably with respect to both connection surfaces. Herein, the two connection surfaces 51a, 51b may rotate relative to each other substantially parallel to the transverse plane 71. Alternatively, the connection surfaces can be fixed relative to each other, for example by means of a transverse connection, which for example can serve as an axis of a substantially cylindrical coupling piece 28. Optionally, the connection piece 4 is provided with at least one suspension member 14.

[0057] It is noted that the here shown connection piece 4 is formed as an integral part, for example by means of injection molding. Alternatively, the connection piece 4 can comprise a plurality of mutually connectable components.

[0058] Another aspect of the invention is a sheet 2 mounted on a mounting system 1. Herein, the connection

pieces 4 are preferably all attached to a single side of the sheet, e.g. to a back side 2b of the sheet 2. More preferably, the connection pieces 4 are connected to the sheet 2 without this being visible at the front of said sheet, for example with the aid of glue and/or double-sided tape. Therefore, it is made possible to keep the front side of a poster or photograph free, and thus make it completely visible. Additionally, the central member 5 can be attached to the same side of the sheet 2, e.g. by using a fixing means, for example a double-sided tape. If, for example, the sheet 2 comprises the back side 2b and a front side being an image side, the image side may be free of the connection pieces 4. Further, the front side may as well be free of any other parts of the mounting system 1. The connection pieces 4 are more preferably attached near corners 20 of said sheet 2. Alternatively or additionally, one or a plurality of connection pieces 4 are attached near the edge 2' delimiting the sheet 2, especially when the sheet 2 has no corners 20, which is the case with e.g. a round sheet.

[0059] Yet another aspect of the invention is a composition, comprising a mounting system 1, and a sheet 2 mounted on the mounting system 1.

[0060] A method for mounting a sheet 2 substantially in one plane according to the invention may comprise the following steps. A user may first provide a sheet 2. For example, the user may unroll a photographic sheet and place it with its image side on a table. Therefore, the back side may be facing upward. Subsequently the user may attach a plurality of connection pieces 4 to the sheet, preferably to one side of said sheet 2, e.g. the back side. For this purpose, the user may use e.g. double sided tape or glue. Alternatively, the user may use fixing means, for adhesive attachment, such as double sided tape, which are provided at the connection pieces. Thereafter, the user may provide a central member 5 of a mounting structure 3. The user may place the central member 5 loosely on the sheet 2, preferably near a center 2a of the sheet 2. Alternatively, the user may fixedly attach the central member 5 to the sheet, e.g. by gluing. Alternatively, the fixing means, for adhesive attachment, such as double sided tape, may be provided at the central member 5.

[0061] Next, the user may attach a first distal end 7 of at least one of the elongated mounting members 6 to the central member 5. Hereto, the user may slide the distal end of the one mounting member 6 into a hole 27 for telescopically receiving the first distal end 7 of the at least one mounting member 6. Then, the user may attach a second distal end 8 of the at least one elongated mounting member 6 to one of the attached connection pieces 4, preferably by clicking the distal end 8 on a coupling piece 28, more preferably a coupling piece 28 comprising a substantially cylindrical part 29. By releasing the mounting member 6, the user may allow at least one spring element 9; 10 comprised in the mounting structure 3 to push the second distal end 8 of the at least one elongated mounting member 6 in an outward direction D with re-

spect to the central member 5, with this allowing the sheet to stretch.

[0062] It is noted that the method is not restricted to a method wherein the steps described above and/or below are executed in the here presented order. Actually, it is not necessary to complete a step before executing another step. For example, two or more steps may be executed simultaneous or partly simultaneous. Besides, one or a plurality of steps may be partly executed, e.g. subsequently attaching one of the connection pieces 4 to the sheet 2, attaching the second distal end 8 of one elongated mounting member 6 to the one connection piece 4, and attaching the first distal end 7 of the one mounting member 6 to the central member, before attaching another connection piece 4 to the sheet 2.

[0063] Advantageously, the method may comprise the step of nesting the first distal end 7 into and/or over part 16 of the central member 5. It is noted that steps or part of the steps of the method may be executed by different persons and/or machines, at different times and/or at different places. Besides, the method may comprise additional steps. For example, the step of attaching the first distal end 7 to the central member 5 may be executed in a factory, and the user of the mounting system 1 may receive a completely assembled mounting system 1. Thereupon, the user may detach the connection pieces 4 from the second distal ends 8 of the elongated mounting members 6, and subsequently provide a rectangular sheet 2, attach the connection pieces to four corners of the sheet and reattach the second distal ends 8 to the connection pieces 4.

[0064] Alternatively or additionally, the step of attaching the first distal end 7 to the central member 5 may comprise the step of nesting a protruding part 16 of the central member, such as e.g. an arm 77, into and/or over a part 7' of the first distal end 7.

[0065] Furthermore, the method may comprise one or a plurality of other steps. For example, providing an attachment means 11 for attachment of the second distal end 8 of the at least one elongated mounting member 6 to one of the connection pieces 4 preferably at least partly irrespective of the angle between the mounting member 6 and the one connection piece 4 in a plane substantially parallel with a sheet 2 when mounted, wherein the attachment means 11 preferably comprise a clamping element 12, 13 for each of the mounting members 6 and/or connection pieces 4. The method may further comprise the step of attaching the attachment means 11 to the second distal end 8 of the at least one elongated mounting member 6, and/or the step of attaching the attachment means 11 to the one connection piece 4.

[0066] Advantageously, the step of attaching the connection pieces 4 to the sheet may comprise the step of adhering at least one and preferably all of the connection pieces 4 to the sheet 2, preferably to the same side of the sheet 2, near at least one and preferably all of the respective corners 20 thereof.

[0067] The invention is not restricted to the embodi-

ments described above. It will be understood that many variants are possible.

[0068] It is noted that the mounting system 1 according to the invention may e.g. also comprise one or a plurality of elongated mounting members 6, which are rotatably connected to the central member 5. By doing so, for example provide a mounting system 1 may be provided, which may be transformed into a substantially elongated mode, said mode being suitable for e.g. packing, storing and/or shipping the mounting system 1, preferably together with a rolled up sheet, in a cylindrical container. Alternatively or additionally, the central member 5 may e.g. comprise parts that are rotatable with respect to each other. Additionally, it is noted that the central member 5 is then preferably arranged such that it can hold the elongated mounting members 6 in a single plane.

[0069] In another embodiment, extra connection pieces may be provided between the first distal end 7 of the mounting member 6 and the central member 5, e.g. for clamping the first distal end 7 onto the central member 5. Alternatively or additionally, the mounting members 6 may be a modular mounting member, e.g. comprising mounting member parts and yet other extra connection pieces to connect said mounting member parts to each other. Besides, parts, members and/or pieces of the mounting structure 3 and/or one or a plurality of the connection pieces 4 may be combined as to form one integrally formed piece, comprising more than one part, member and/or piece. For example, the connection pieces 4 may be fixedly attached to the respective mounting members 6, and thus be comprised in the mounting structure 3. Mounting such an embodiment of the mounting structure 3 may be carried out by e.g. firstly attach a first connection piece 4 of a first second distal end 8 to a first corner 20 of the sheet 2, and subsequently push a second connection piece 4 of a second second distal end 8 of an opposite mounting member 6 toward the central member 5, thereby e.g. as a result pushing the central member toward the attached first connection piece 4, in order to compress the mounting structure 3 that much, that the second connection piece can be attached to a second corner 20 of the sheet 2, e.g. a corner 20 opposite to the first corner 20.

[0070] In yet another embodiment, the central member 5 may comprise additional connection pieces, e.g. for clamping on a connection piece comprised at the first distal end 7 of the mounting member 6, wherein the additional connection pieces are being biased in the outward direction D, with respect to the central member 5. Advantageously, the central member 5 may only include spring elements and the additional connection pieces, e.g. four leaf springs, each connected with one of its distal ends to one of the additional connection pieces and with another distal end to another of the additional connection pieces.

[0071] These and other embodiments, including at least but not limited to any combination of parts of the embodiments described and/or shown here above, will

be apparent for the person skilled in the art and are considered to lie within the scope of invention as defined in the following claims.

Claims

1. Mounting system (1) for mounting a sheet (2) substantially in one plane, comprising a mounting structure (3) and a plurality of connection pieces (4) for attachment to the sheet (2), wherein the mounting structure (3) comprises a central member (5) and a plurality of elongated mounting members (6) having a first distal end (7) for connection to the central member (5) and a second distal end (8) for connection to one of the connection pieces (4), wherein the mounting structure (3) further comprises a spring element (9; 10) for biasing the second distal end (8) of at least one of the mounting members (6) in an outward direction (D) with respect to the central member (5).
2. Mounting system (1) according to claim 1, wherein the at least one mounting member (6) is biased in the outward direction (D) with respect to the central member (5).
3. Mounting system (1) according to claim 1 or 2, wherein the first distal end (7) of the at least one mounting member (6) telescopically engages the central member (5).
4. Mounting system (1) according to any one of the preceding claims, further comprising attachment means (11) for attachment of the second distal end (8) of the at least one elongated mounting member (6) to one of the connection pieces (4) preferably at least partly irrespective of the angle between the mounting member (6) and the one connection piece (4) in a plane substantially parallel with a sheet (2) when mounted, wherein the attachment means (11) preferably comprise a clamping element (12, 13) for each of the mounting members (6) and/or connection pieces (4).
5. Mounting system (1) according to any one of the preceding claims, wherein the mounting structure (3) comprises at least one suspension member (14), for attachment of the mounting system (1) to a supporting structure, such as a wall.
6. Mounting system (1) according to any one of the preceding claims, wherein at least one of the connection pieces (4) comprises a fixing means, for adhesive and/or clenching attachment of the at least one connection piece (4) to the sheet (2).
7. Mounting system (1) according to any one of the pre-

ceding claims, wherein the elongated mounting members (6) comprise a profile section (15), preferably an aluminium extrusion profile section.

8. Sheet (2) mounted on a mounting system (1) according to any one of the preceding claims, wherein the connection pieces (4) are preferably all attached to a same side of the sheet (2), more preferably near corners (20) of said sheet (2), wherein the central member (5) can additionally be attached to the same side of the sheet (2).
9. Composition, comprising a mounting system (1) according to any one of the claims 1-7, and a sheet (2) mounted on the mounting system (1).
10. Method for mounting a sheet (2) substantially in one plane, comprising the steps of:
 - providing the sheet (2);
 - attaching a plurality of connection pieces (4) to the sheet (2), preferably to one side of said sheet (2);
 - providing a central member (5) of a mounting structure (3);
 - providing a plurality of elongated mounting members (6) of the mounting structure (3);
 - attaching a first distal end (7) of at least one of the elongated mounting members (6) to the central member (5);
 - attaching a second distal end (8) of the at least one elongated mounting member (6) to one of the attached connection pieces (4); and
 - allowing at least one spring element (9; 10) comprised in the mounting structure (3) to push the second distal end (8) of the at least one elongated mounting member (6) in an outward direction (D) with respect to the central member (5).
11. Method according to claim 10, wherein the step of attaching the first distal end (7) to the central member (5) comprises the step of nesting the first distal end (7) into and/or over part of the central member (5).
12. Method according to claim 10, wherein the step of attaching the first distal end (7) to the central member (5) comprises the step of nesting a protruding part (16) of the central member (5) into and/or over part (7') of the first distal end (7).
13. Method according to any one of the claims 10-12, further comprising the steps of:
 - providing an attachment means (11) for attachment of the second distal end (8) of the at least one elongated mounting member (6) to one of the connection pieces (4) preferably at least

partly irrespective of the angle between the mounting member (6) and the one connection piece (4) in a plane substantially parallel with a sheet (2) when mounted, wherein the attachment means (11) preferably comprise a clamping element (12, 13) for each of the mounting members (6) and/or connection pieces (4);
attaching the attachment means (11) to the second distal end (8) of the at least one elongated mounting member (6); and
attaching the attachment means (11) to the one connection piece (4).

14. Method according to any one of the claims 10-13, wherein the step of attaching the plurality of connection pieces (4) to the sheet (2) comprises the step of adhering at least one, and preferably all, of the connection pieces (4) to the sheet (2), preferably to the same side of the sheet (2), near at least one and preferably all of the respective corners (20) thereof.
15. Method according to any one of the claims 10-14, wherein the step of attaching the plurality of connection pieces (4) to the sheet (2) comprises the step of clenching at least one, and preferably all, of the connection pieces (4) to the sheet (2), preferably near at least one and more preferably all of the respective corners (20) thereof.

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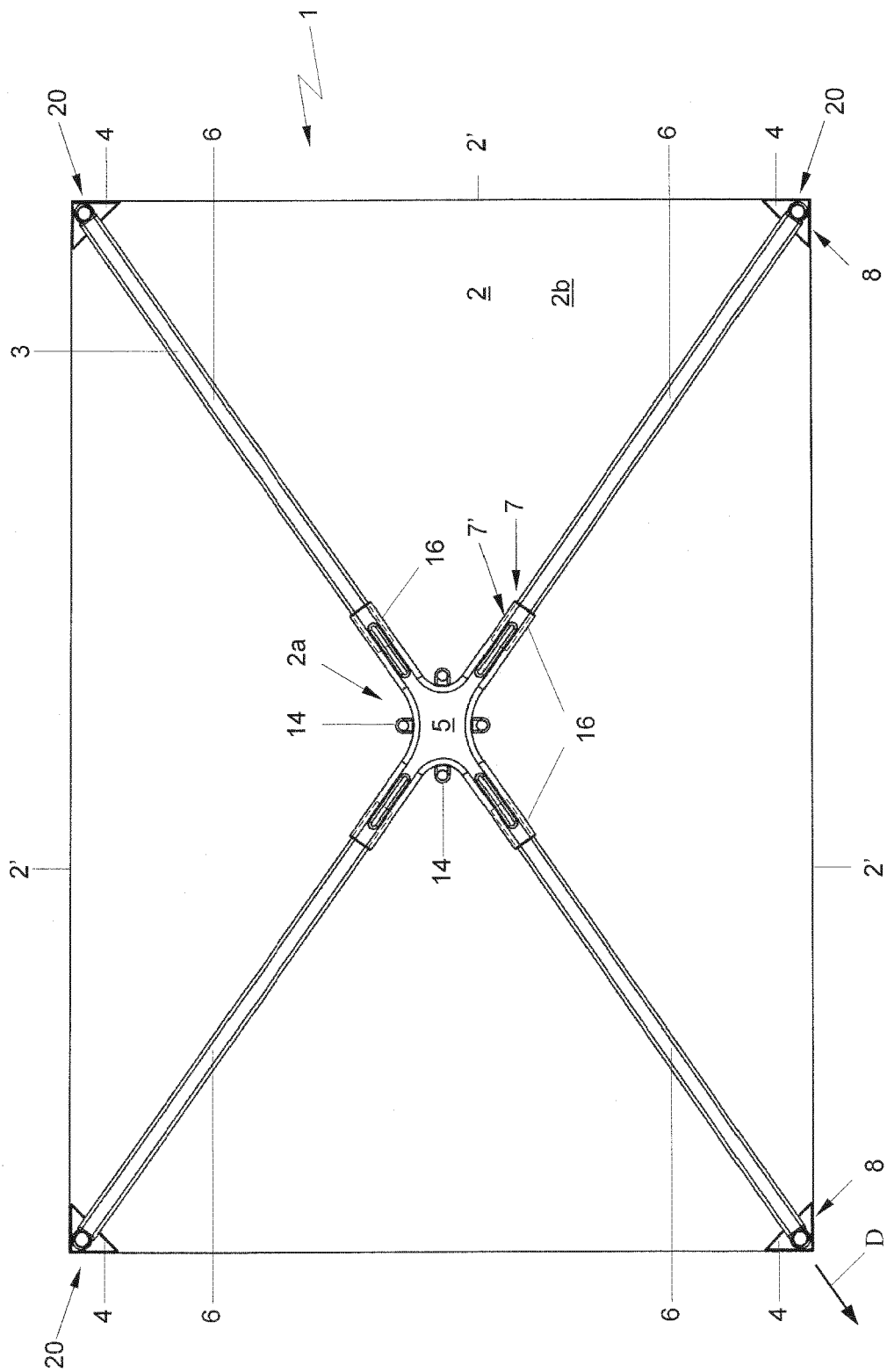
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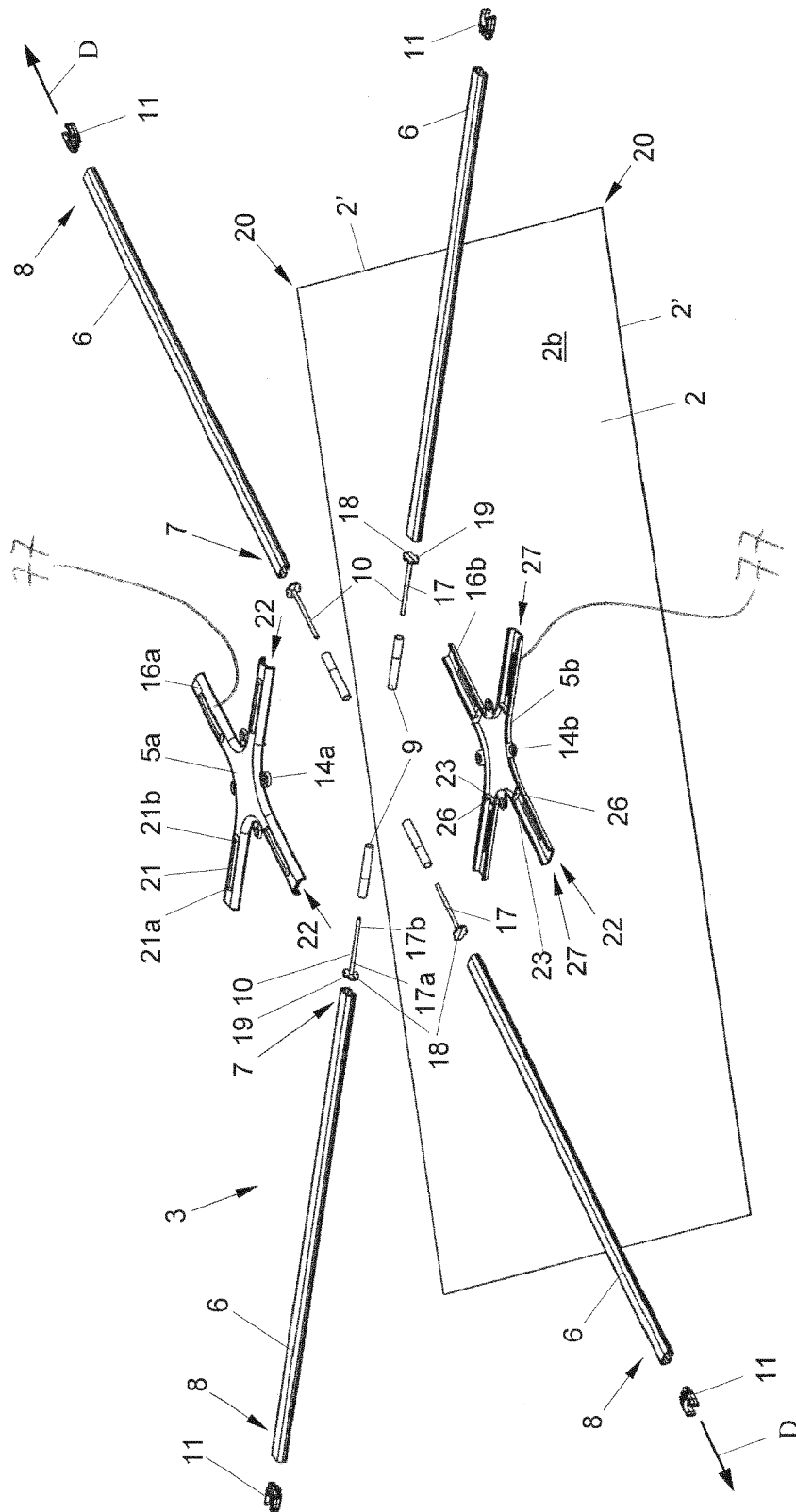


Fig. 2

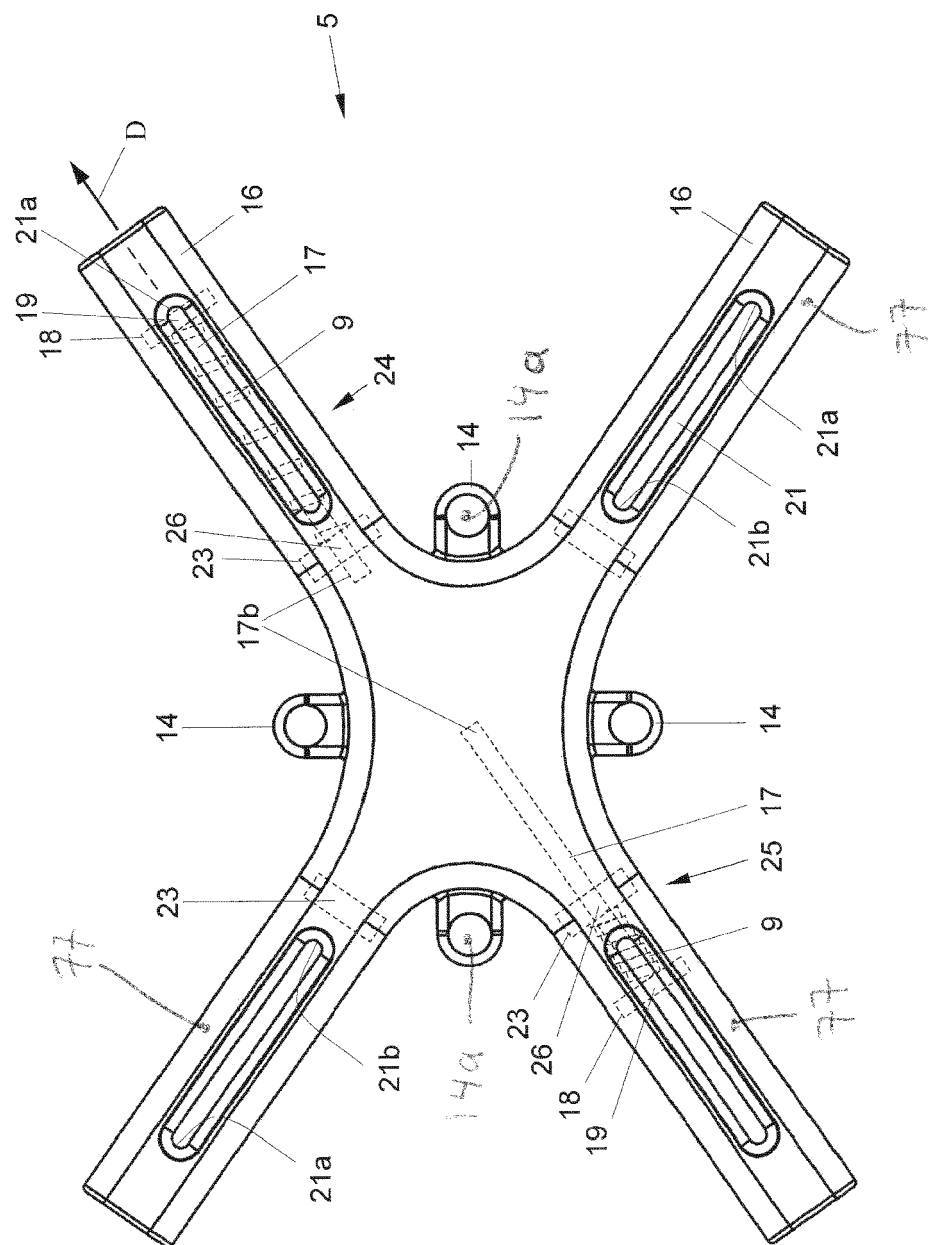
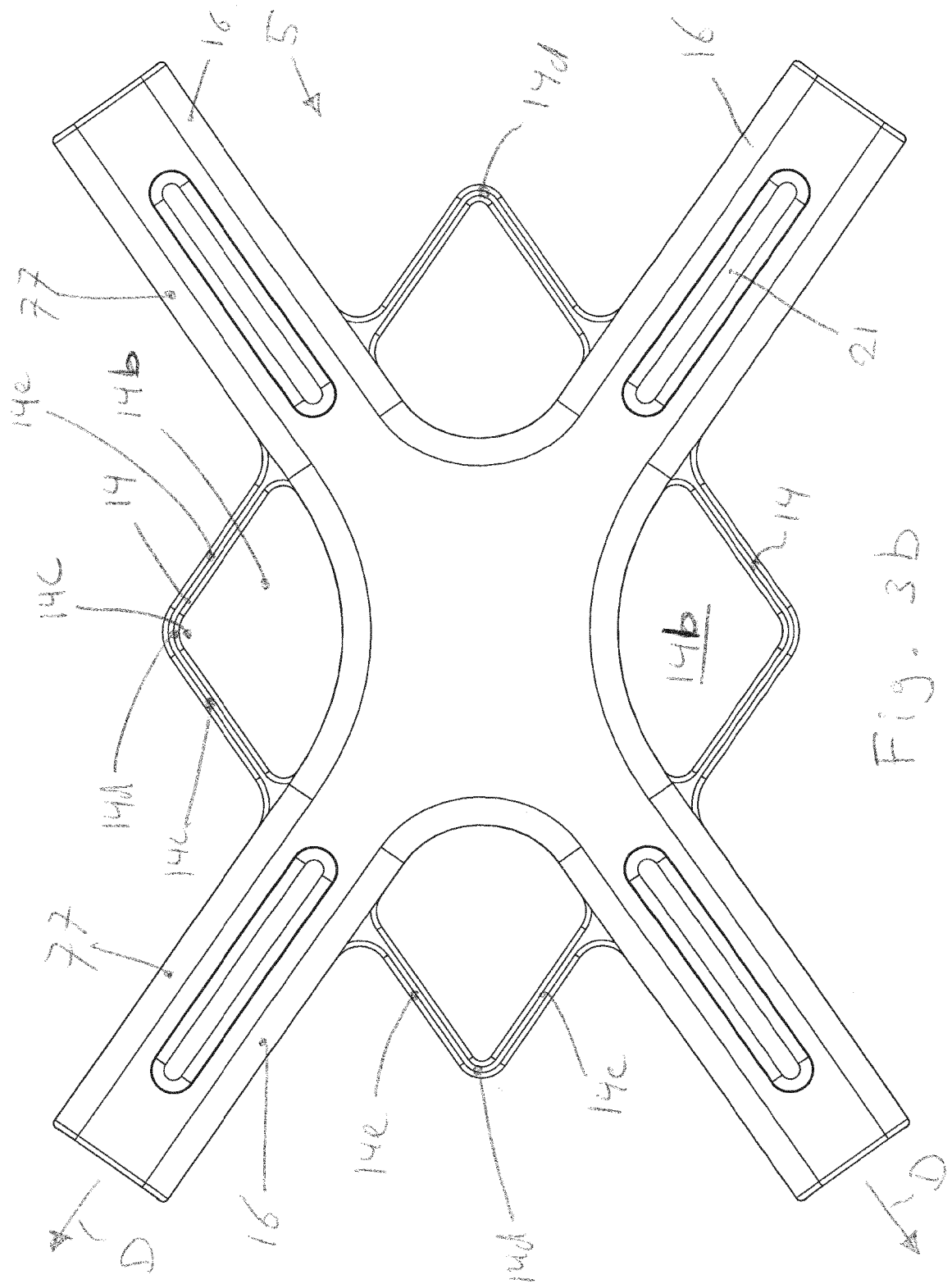


Fig. 3a



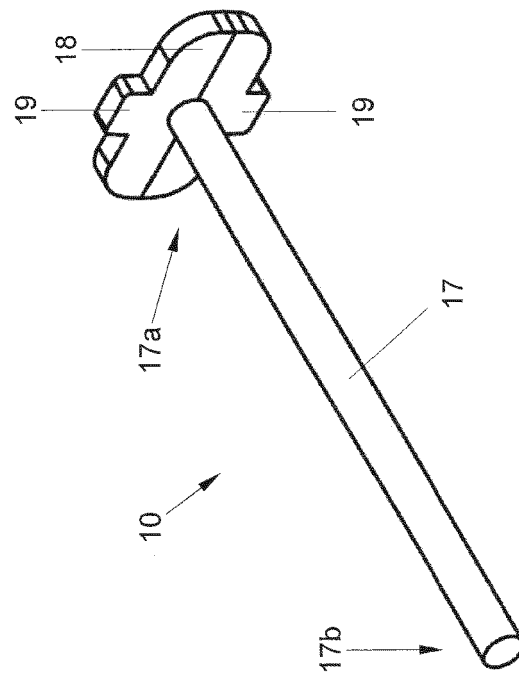


Fig. 4

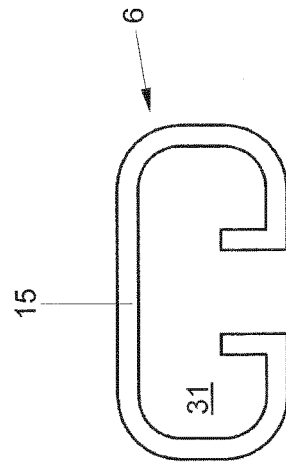


Fig. 5

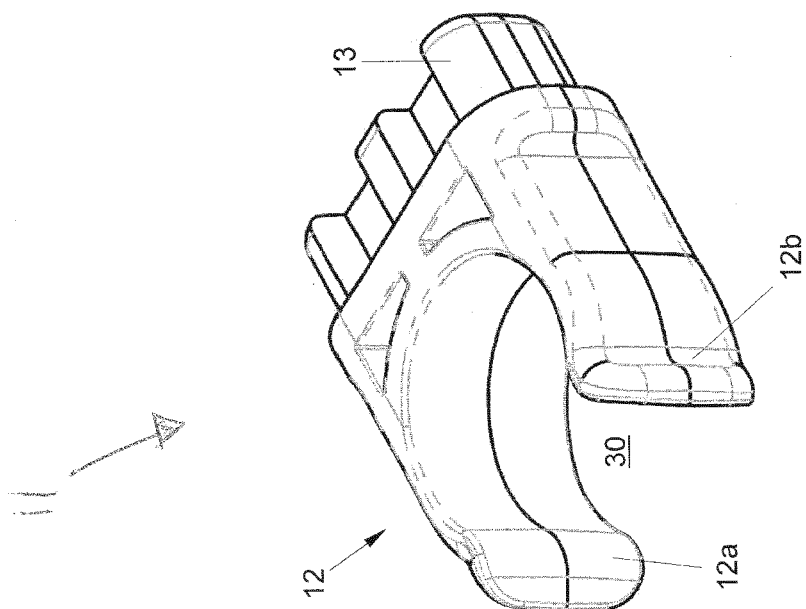


Fig. 6

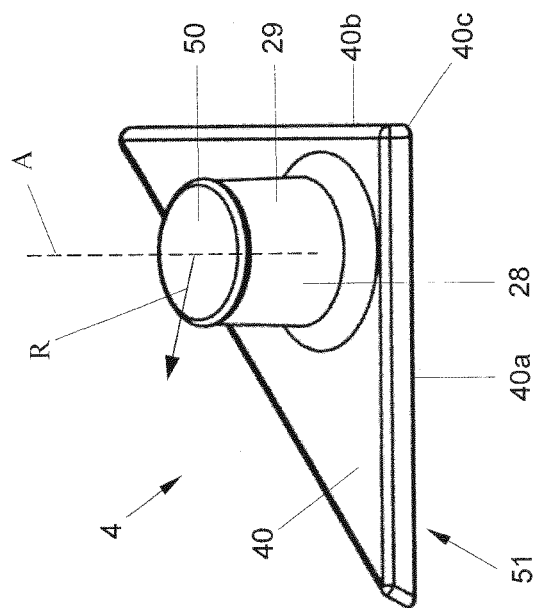


Fig. 7

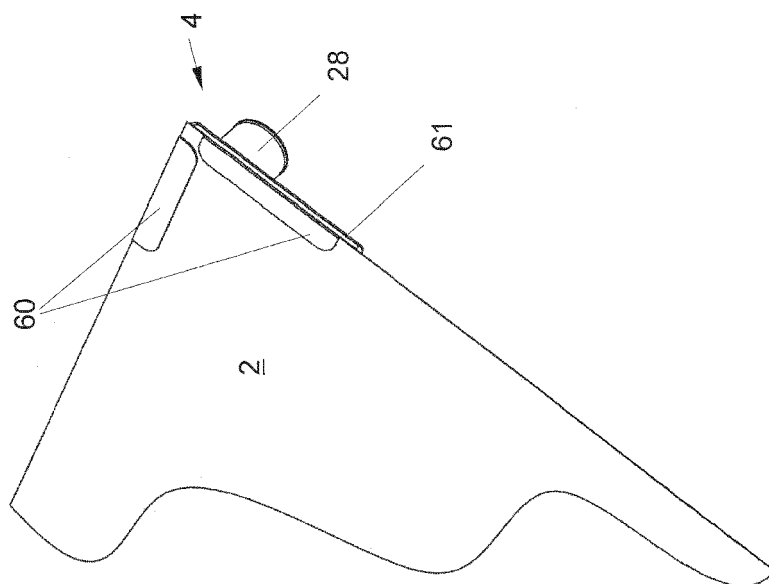


Fig. 8b

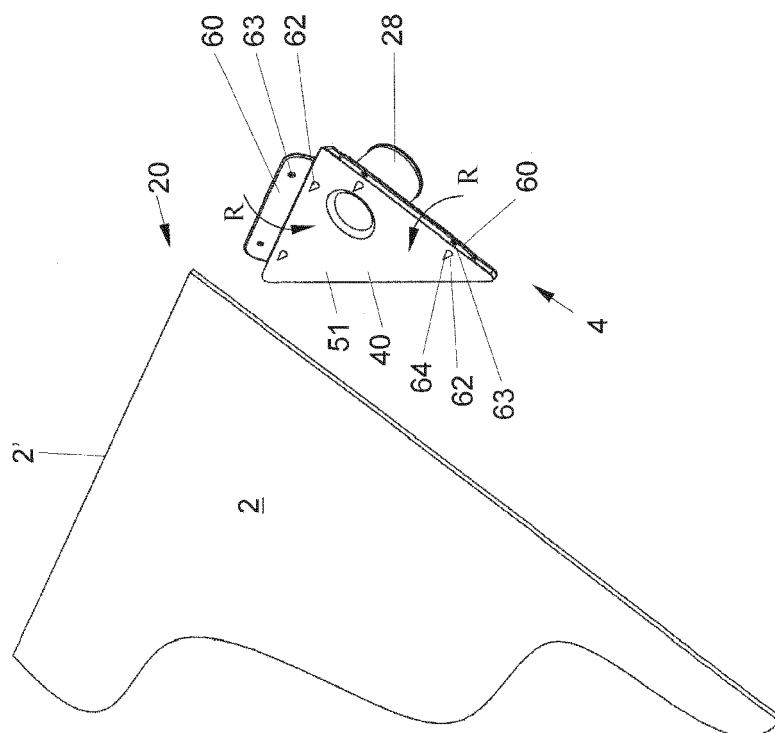


Fig. 8a

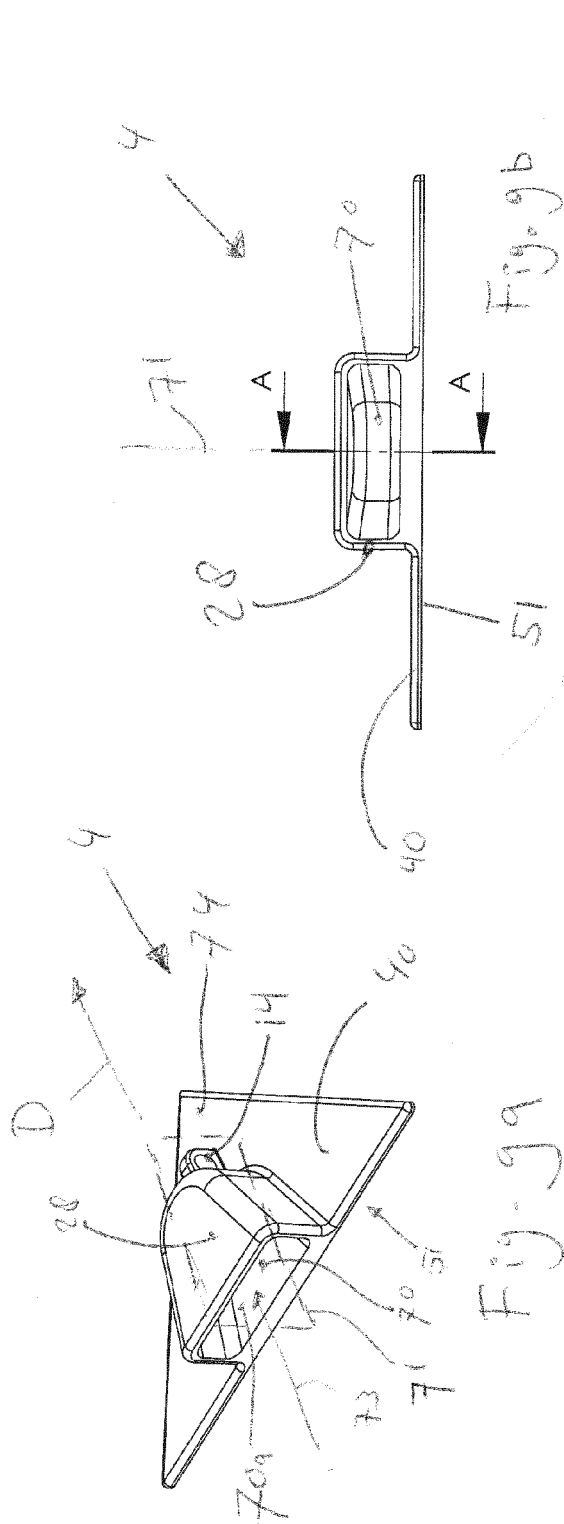


Fig. 9a

Fig. 9b

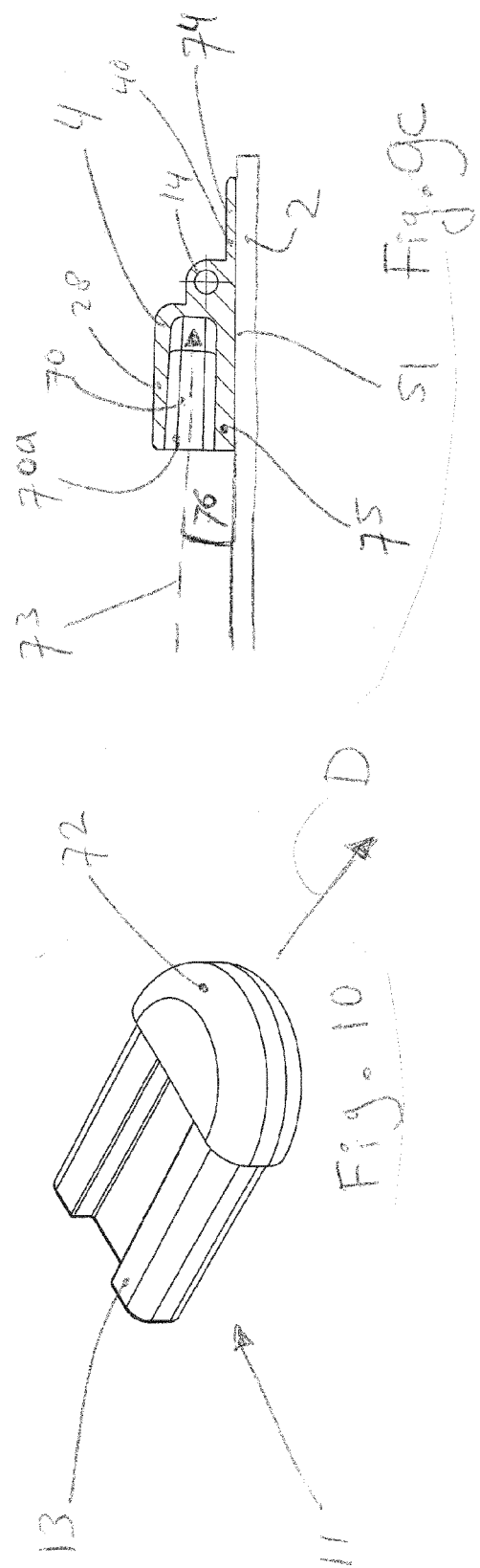


Fig. 10

Fig. 9c

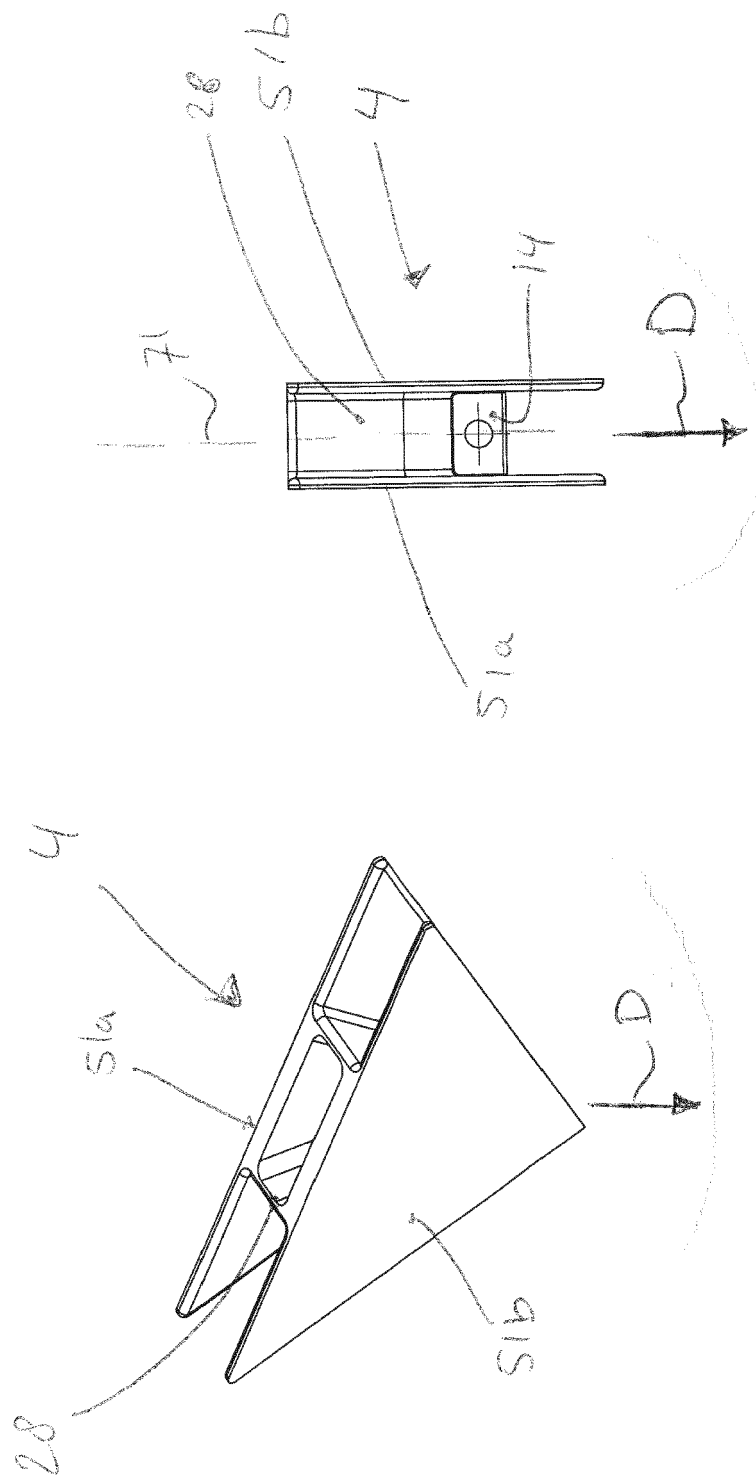


Fig. 11b

Fig. 11a



EUROPEAN SEARCH REPORT

 Application Number
EP 12 15 4089

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Place of search Munich		Date of completion of the search 15 May 2012	Examiner Greiner, Ernst
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