

(19) **DANMARK**

(10) **DK/EP 2963202 T3**



Patent- og
Varemærkestyrelsen

(12) Oversættelse af
europæisk patentskrift

-
- (51) Int.Cl.: ***E 04 D 12/00 (2006.01)*** ***E 04 B 1/26 (2006.01)*** ***E 04 D 13/16 (2006.01)***
- (45) Oversættelsen bekendtgjort den: **2018-06-18**
- (80) Dato for Den Europæiske Patentmyndigheds bekendtgørelse om meddelelse af patentet: **2018-03-21**
- (86) Europæisk ansøgning nr.: **15172926.6**
- (86) Europæisk indleveringsdag: **2015-06-19**
- (87) Den europæiske ansøgnings publiceringsdag: **2016-01-06**
- (30) Prioritet: **2014-07-03 DE 102014109329**
- (84) Designerede stater: **AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR**
- (73) Patenthaver: **Monier Roofing Components GmbH, Frankfurter Landstrasse 2-4, 61440 Oberursel, Tyskland**
- (72) Opfinder: **Müller, Catrin, Merowingerweg 11, 61381 Friedrichsdorf, Tyskland**
Labbad, Basilius, Gattenhöferweg 22a, 61440 Oberursel, Tyskland
- (74) Fuldmægtig i Danmark: **Plougmann Vingtoft A/S, Rued Langgaards Vej 8, 2300 København S, Danmark**
- (54) Benævnelse: **ANVENDELSE AF EN FASTGØRELSESINDRETNING TIL FASTGØRELSE AF TAGSTRUKTURER TIL ET TAG MED HØJ REJSNING**
- (56) Fremdragne publikationer:
EP-A2- 0 119 077
CH-A2- 702 527
DE-A1-102012 016 634
DE-U1-202005 002 473
DE-U1-202005 020 804
FR-A1- 2 105 002
FR-A1- 2 512 863
GB-A- 2 151 274
US-A1- 2012 291 382

The present invention refers to the use of a fixing device for fixing roof structures to a high-pitched roof, comprising a screwing portion which comprises screw through-holes for inserting fixing screws.

DE 20 2007 015 887 U1 describes a fixing device for fixing roof structures to a high-pitched roof. A screw plate forming a screwing portion may be fixed by means of fixing screws passing through spacer bushings to a roof rafter, wherein the spacer bushings pass through a rafter thermal insulator. A hook is fixed to the screw plate for fixing to a roof structure. A fixing screw may be directed obliquely with respect to the extension direction of the roof rafter by means of an angle plate.

10 DE 10 2009 022 161 A1 describes a fixing element for roof structures having a fixing body. The fixing body has pass-through openings for screws, which force an insertion at an acute angle of a fixing screw with respect to a roof rafter which is positioned beneath the fixing element.

A fixing device supported by an outwards directed side of a rafter thermal insulator and which is fixed to the rafter by means of fixing screws passing through the rafter thermal insulator is described in DE 10 2010 037 831 A1.

A butt joint for connecting two crossing square wood profiles having the same cross-sectional profile is described in DE 202005020804 U1. It is formed by a mounting bracket covering the butt joint of the wood profiles and having a U-shaped cross-section, wherein 20 a receiving space for receiving a square wood profile remains between the side parts of the mounting bracket.

FR 2105002 A1 describes a similar mounting bracket. Also, in this case a square profile has to be received in a receiving space between side parts.

GB 2151274 A describes a fixing device for fixing roof structures to a high-pitched 25 roof having a rail forming a U-profile, wherein the free ends of the profile legs have end sections facing one another, which can engage with the grooves of a roof rafter.

US 2012/291382 A1 describes a roof understructure constructed from a plurality of U-shaped metal profiles, in which the free ends of the profile legs of the U-profile are 30 spaced further apart from one another than the regions of the side parts, through which they are rooted at the longitudinal edges of a U-shaped web portion.

The object of the invention is to propose a fixing device of the present type, which is easy to be mounted and advantageous regarding the transmission of forces to the rafters.

This object is achieved by the invention provided in the claims. First of all, and 35 essentially, claim 1 proposes side parts, which protrude from longitudinal edges of the

screwing portion. A receiving space for receiving a counter batten is left between the side parts. The fixing device is applied, according to the invention, onto a counter batten, which extends in parallel to the rafter on the outer side of the insulation. The wings are supported by the insulation. In a rafter insulation, the rafter insulation elements, which are usually subject to pressure, are applied onto the roof rafters extending between the roof ridge and the eave. Counter battens are applied in parallel to the rafters on the outer sides of the insulation elements, beneath which the rafters extend. The counter battens thus provide an orientation for the positioning of the roof rafters, when the rafter insulation has been applied. The roof battens are positioned transversally with respect to the counter battens, wherein the roof battens support the roof skin. According to the invention, the fixing devices are applied onto the counter battens, wherein the counter battens extend through the receiving space. The inner sides of the side parts abut against the side surfaces of the counter batten. The lower side of the fixing area, which is preferably provided by a fixing plate, may lie on the upper side of the counter batten. The side parts form pressure zones which are facing each other, so that the fixing device clamps over the counter batten. In order to mount the fixing device, the side parts have to be slightly bent away from each other. The generated tension gives rise to a clamping force.

The second ends of the side parts are at a shorter distance from one another than the regions of the side parts, through which the side parts are rooted to the longitudinal edges of the fixing portion. Thus, a slightly trapezoidal cross-section is obtained. At least one screw through-hole has an oblique extension. The screw through-hole thus forces a fixing screw to be inserted with an acute-angled orientation with respect to the rafter. To this end, the screwing portion is slightly curved. The fixing device preferably has only two screw through-holes. Both screw through-holes are associated to the fixing portion, which extends over the width-wise side surface of the counter batten. The screw through-holes are positioned approximately centered between both longitudinal edges and are spaced from each other in a direction parallel to the longitudinal edges. Since the counter battens are inserted in the receiving space in a form-filling way, the transversal forces generated when screwing the fixing screws through the counter batten are absorbed by the side parts. This avoids a splintering of the counter batten, so that long and large diameter fixing screws may be screwed through the screw through-holes and the counter batten, which penetrate through the insulation up into the rafters, where they are retentively screwed by means of their threads. The diameter of the fixing screws may be 8 mm or more. An optimal fixing of the fixing device occurs by means of oblique screw through-holes. Both screw through-holes may be oriented at a 45 degree angle with respect to the

extending direction of the screwing portion or the receiving space or the counter batten or the rafter. The screw through-holes allow the screwing of two fixing screws along the extending direction of the counter batten, in a direction pointing obliquely away from each other. Thus, a trapezoidal fixing structure is obtained, wherein both fixing screws extend
5 along the trapezoid legs. In a preferred embodiment of the invention, the side parts form two wings and/or four support feet. The four support feet respectively form two support feet pairs. The support feet support the side parts on the insulation. In order to reduce the surface pressure, wings protrude from the second ends of the side parts. The wings respectively protrude away from the receiving space. The wings lie in a common plane
10 and are commonly supported on the upper side of the insulation. The fixing system may thus be clamped onto a counter batten, which typically is 40 x 60 mm. In the region of the free ends of the side walls, the clear width is smaller than the thickness of the counter batten. Thus, the U-shaped cross-section of such formed sheet saddle widens up when inserted onto the counter batten. The thus generated restoring force causes the side walls
15 to be securely pressed against the wood of the counter batten. Thus, a solid seating of the saddle shaped fixing device on the counter batten is obtained, so that a splintering of the counter batten when screwing the screws is avoided. The fixing device may be formed by a punched and bent sheet metal part or a cast metal part. If the fixing device is a punched and bent sheet metal part, then preferably two side parts are respectively provided at both
20 ends of the screwing portion. Also, both screw through-holes with inclinations directed away from one another are positioned in the region of these ends of the screwing portion. A cut-out is thus provided between the thus formed side part pairs. In that place, a sheet portion forms a fixing device for a part of a roof structure or a plank. The fixing device may be provided with obliquely upward protruding side walls, for fixing to a plank which
25 extends obliquely with respect to the counter battens. The fixing device may protrude laterally from the screwing plate. Two fixing devices, each having a U-shape, may be provided, which are fixed to a respective longitudinal edge of the fixing portion. It may however also be foreseen that the fixing devices are just angular parts, which are fixed to the longitudinal edges of the screwing portion. The fixing devices are preferably fixed by
30 integral material fit to the screwing portion. A fixing device formed by a cast piece may be provided with wings, which extend over the entire length of the screwing portion. The fixing device may be a hook, which is locally associated to the screwing portion. In a preferred embodiment of the invention an adapter is provided. This is an oblong body provided with a U-shaped cross-section, which may be inserted into the receiving space,
35 in order to provide the clear width of the receiving space for use of the device on counter

battens of smaller cross section. The adapter may be a plastics material part. It may be provided on its outer wall with a plurality of ribs, in particular ribs which are arranged cross-wise, which abut against the inner side of the side parts or the lower side of the screwing plate provided by the screwing portion. In order to fix the adapter inside the receiving space, protrusions may protrude from the side wall of the adapter, which lock inside corresponding openings of the receiving space, which are associated with the side parts.

Exemplary embodiments of the invention are explained in the following by means of appended drawings. In particular:

- 10 Fig. 1 shows a perspective view of a first exemplary embodiment of the invention,
 Fig. 2 shows the first exemplary embodiment in a plan view from above,
 Fig. 3 shows the first exemplary embodiment in a front view,
 Fig. 4 shows the first exemplary embodiment in a side view,
 Fig. 5 shows the first exemplary embodiment in a representation according to Fig. 4,
15 however in a position fixed to a roof understructure,
 Fig. 6 shows the fixing device applied on a counter batten of the first embodiment in
 a view according to arrow IV in Fig. 5,
 Fig. 7 shows the plan view of the fixing device fixed to the roof,
 Fig. 8 shows a representation according to Fig. 1 of a second exemplary
20 embodiment,
 Fig. 9 shows a representation according to Fig. 2 of the second exemplary
 embodiment,
 Fig. 10 shows a representation according to Fig. 3 of the second exemplary
 embodiment,
25 Fig. 11 shows a representation according to Fig. 4 of the second exemplary
 embodiment,
 Fig. 12 shows a representation according to Fig. 5 of the second exemplary
 embodiment,
 Fig. 13 shows a representation according to Fig. 6 of the second exemplary
30 embodiment,
 Fig. 14 shows a representation according to Fig. 7 of the second exemplary
 embodiment,
 Fig. 15 shows a representation according to Fig. 1 of a third exemplary
 embodiment,
35 Fig. 16 shows a representation according to Fig. 2 of the third exemplary

embodiment,

Fig. 17 shows a representation according to Fig. 3 of the third exemplary embodiment,

Fig. 18 shows a representation according to Fig. 4 of the third exemplary
5 embodiment,

Fig. 19 shows a representation according to Fig. 5 of the third exemplary embodiment,

Fig. 20 shows a representation according to Fig. 6 of the third exemplary embodiment,

10 Fig. 21 shows a representation according to Fig. 7 of the third exemplary embodiment,

Fig. 22 shows a perspective representation of an adapter,

Fig. 23 shows a plan view of the adapter of Fig. 22,

Fig. 24 shows a side view of the adapter of Fig. 22,

15 Fig. 25 shows a side view of the adapter of Fig. 22, and

Fig. 26 shows a sectional view of an adapter according to Figs. 22 to 25, which is inserted into a fixing device according to Figs. 15 to 21.

In both exemplary embodiments shown in Figs. 1 to 7 and 8 to 14, the parts are punched and bent parts, which are formed by sheet metal. By punching and subsequent
20 bending the fixing devices described in the following are produced.

A middle oblong screwing portion 1 having a rectangular base forms a screwing plate. Respective pairs of side parts 2 protrude from the end regions facing in opposite direction of the longitudinal edges 5. The distance between the inner walls of the side parts 2 in the region of their roots, thus directly in the region of the longitudinal edges 5, is
25 equal to about 60 mm. The distance between the inner walls of the side parts 2 is slightly smaller in the region of their second ends 2', so that the receiving space 6 formed between the side parts 2 has a slightly trapezoidal cross-section. The height of the side parts 2 is about 40 mm.

From the second ends 2' of side parts 2 opposite facing wings 7 protrude. The
30 wings 7 approximately extend in a common plane. A cut-out 8 extends between both pairs of side parts 2 or the pairs of wings 7. The cut-out portion of side parts 2 therein forms an extension 9 extending in parallel to the extension plane of wings 7, which extension forms a fixing device for fixing a roof structure. Side walls 10 vertically and upwardly protrude from the strip-shaped extension 9, transversally to the extension direction of the receiving
35 space 6, so that the fixing devices 9 form a respective U-shaped structure. The side walls

10 have openings 11 for the passage of nails or screws, by which a plank positioned in the U-structures 10, 11 may be fixed to the fixing device. Both U-shaped fixing structures 9, 10 are spaced apart by the width of the screwing portion 1. The extensions 9, which protrude from both sides of the screwing portion 1, are approximately in a common plane.

- 5 The side walls 10 protruding from the same are also in a common plane, which, however, is transversal to the plane of extensions 9.

In the region of the free ends of the screwing portion 1, thus between the wings 7, openings are provided inside the screwing portion 1. These are screw through-holes 3. The screw through-holes are positioned in the region of embossments, so that they force
10 the insertion of fixing screws 4 with an orientation of about 45 degrees with respect to the screwing portion 1.

Figures 5 to 7 show a fixing device fixed to a roof structure. The roof structure is made of rafters 24, which extend between eave and ridge. A plurality of parallel rafters 24 support insulation elements 23. Counter battens 22, which typically have a cross-section
15 of 60 mm by 40 mm, extend in parallel to the rafters 24 and at the height of the rafters 24 on the insulation elements 23. A fixing device is positioned on a counter batten 22. Since the clear distance between both side parts 2 in the region of their second ends 2' is slightly smaller, than the width of the counter batten, the side parts 2 have to be slightly bent away from each other, in order to position the fixing device on the counter batten 22,
20 as shown in figures 5 to 7. In the applied condition, the side parts 2 are clamped over the side walls of the counter batten. In Fig. 6, both side parts 2 extend forming an acute angle to each other. The side parts 2 may however also abut against the side walls of a counter batten, such that they extend in parallel to each other.

The fixing of the fixing device to the rafter occurs by means of long, at least 8 mm
25 thick full-threaded fixing screws. These are initially screwed through the oblique screw through-holes 3 through the counter battens 22 and then through the insulation 23, until their forward region is anchored inside the rafter 24. Fig. 5 shows that the fixing screws 5 extend along the legs of a trapezoid. They engage obliquely, in opposite directions, into the rafters 24.

30 The fixing device 9 is used for receiving a portion of a roof structure. In the exemplary embodiment, the fixing device 9 supports a plank 25, which is supported by a side wall 10. Planks of different widths may be positioned between both side walls 10.

The wings 7 are supported on the upper side of insulation 23. In this way, pressure forces are introduced, with a lower surface pressure into the insulation 23. Since the
35 wings 7 extend on both sides of the counter batten 22, they are also capable of

transferring possible torques applied to the fixing device, with respect to the extension direction of the counter batten 22, to the insulation 23. A torsion of the counter batten 22 is thus essentially prevented.

The second exemplary embodiment shown in figures 11 to 14 essentially corresponds to parts of the first embodiment. The cut-out 8 is in this case slightly shorter, so that the wings 7 have a slightly larger length. The notches from the cut-out 8 are here perpendicularly bent upwards and thus form to a certain extent extensions of side parts 2. Side walls 10 protrude from these fixing devices 9, which are in a common plane. The side walls 10 form support walls for supporting a plank 25, for example. Figures 12 to 14 show that the second embodiment is mounted similarly to the first embodiment to a counter batten. Reference is thus made to above statements.

The example shown in figures 15 to 21 is made of metal. Here, a cast component is used. The cast component forms a screwing portion 1, which has the shape of an oblong rectangle. Respective side parts 2 protrude from the longitudinal edges 5 in a direction transversal to the extension plane of the screwing portion 1, over the entire length of the same screwing portion. A receiving space 6 is formed between the side parts, for receiving a counter batten 22. Also, in this case both second ends 2' of side parts 2 are at a smaller distance from each other than the width of the counter batten, so that the fixing device may be clamped over the counter batten.

Wings 7 protrude from the second end 2' of the side parts 2. The wings extend in this case over the entire length of the fixing device and are supported, in the mounted state, on the upper side of a rafter insulation.

A first fixing opening 3 is formed by an oblique hole, which confers an inclined orientation with respect to the extension plane of screwing portion 1 to a fixing screw which is inserted through the screw through-hole 3.

A second screw through-hole 3' extends transversally to the extension plane of the screwing portion 1, so that a fixing screw passing through this screw through-hole 3 is screwed perpendicularly into a roof rafter 24.

A side wall 11 protrudes from the upper side of the screwing portion 1. This wall is stiffened on the back side by stiffening elements 13. A hook plate 12 protrudes from the side wall 10, which extends approximately in parallel to the screwing portion 1. In the hook thus formed a plank 25 may be inserted, as shown in figures 19 to 21. These figures also show that the screw inserted through the screw through-hole 3' is screwed in a transversal direction with respect to its extension direction into the roof rafter 24, while a second fixing screw 4, which is inserted through the screw through-hole 3, is screwed at

an angle of 45 degrees into the roof rafter 24.

Figures 22 to 25 show an adapter piece. This is a U-shaped plastics material body, which has a U-shaped web 16 and U-shaped legs 17. Cross-wise extending webs 18, 19 protrude from the outer walls of the U-web 16 or the outer walls of the U-legs 17. These
5 are spacer webs. Two longitudinal slits 21 are also provided inside the U-shaped web 16.

Side protrusions 20 protrude from the U-shaped legs 17, which form detent protrusions. The interspace between the U-shaped legs 187 or the U-shaped web 16 has a cross-sectional area for counter battens having a smaller cross-section.

Figure 26 shows the use of adapter 15. It is inserted into the receiving space 6 of
10 one of the above described fixing devices and in particular in the receiving space 6 of the third embodiment. The detent protrusions 20 lock into detent openings 14 of side parts 2. The adapter is then locked with a form-fit inside the receiving space 6. The ribs 18, 19 abut against the inner walls of side parts 2 or the underside of the screwing plate 1.

Reference list:

	1	screwing plate
5	2	side part
	2'	free end
	3	screw through-hole
	3'	screw through-hole
	4	fixing screw
10	5	longitudinal edge
	6	receiving space
	7	wing
	8	cut-out
	9	fixing device
15	10	side wall
	11	opening
	12	hook
	13	stiffener
	14	opening
20	15	adapter
	16	U-shaped web
	17	U-shaped leg
	18	rib
	19	rib
25	20	protrusion
	21	longitudinal slit
	22	counter batten
	23	insulation + rafter
	24	rafter
30	25	part of a roof structure, plank

Patentkrav

1. Anvendelse af en fastgørelsesindretning til fastgørelse af tagstrukturer til et tag med høj rejsning, omfattende en skrudedel (1) der omfatter gennemgående skruehuller (3) til indsætning af fastgørelsesskruer og omfatter langsgående kanter (5),
5 omfattende to sidedele (2) der hver er fastgjort med en første ende til en af de langsgående kanter (5) og omfatter anden ender der er i en kortere afstand fra hinanden end de første ender, således at et modtagerum (6) som har et trapezoidt tværsnit er dannet mellem sidedelene (2), og omfattende vinger (7) der strækker sig i et fælles plan og rager frem fra de andre ender (2') af sidedelene (2) væk fra
10 modtagerummet (6),
hvor sidedelene (2) danner trykregioner rettet mod hinanden og hvilende på en sammenspændt måde på sidefladerne af en modsat lægte (22) fastgjort til en isolering (23), og vingerne (7) er støttet på isoleringen (23), der er tilvejebragt mellem den modsatte lægte (22) og rafterne (24).
- 15 2. Anvendelse ifølge krav 1, **kendetegnet ved at** mindst et af de gennemgående skruehuller (3) tvinger en fastgørelsesskrue (4) der skal skrues i en tagrafte (24) indrettet under den modsatte lægte, i en spidsvinklet orientering.
- 20 3. Anvendelse ifølge krav 2, **kendetegnet ved at** to gennemgående skruehuller (3) er tilvejebragt som er beregnet til skruning i skruer (4) som peger skråt væk fra hinanden i udstrækningsretningen af den modsatte lægte (22).
4. Anvendelse ifølge et hvilket som helst af de foregående krav, **kendetegnet ved at**
25 i hvert tilfælde to sidedele (2) er tilvejebragt på de langsgående kanter af skrudedelen.
5. Anvendelse ifølge et hvilket som helst af de foregående krav, **kendetegnet ved at** skrudedelen (1) er en skrueplade, der er en bærer til en fastgørelsesindretning (9) for mindst del af tagstrukturen (25).
- 30 6. Anvendelse ifølge et hvilket som helst af de foregående krav, **kendetegnet ved en** adapter (15) der kan indsættes ind i modtagerummet (6) og er beregnet til at reducere den lyse bredde af modtagerummet (6).

1/25

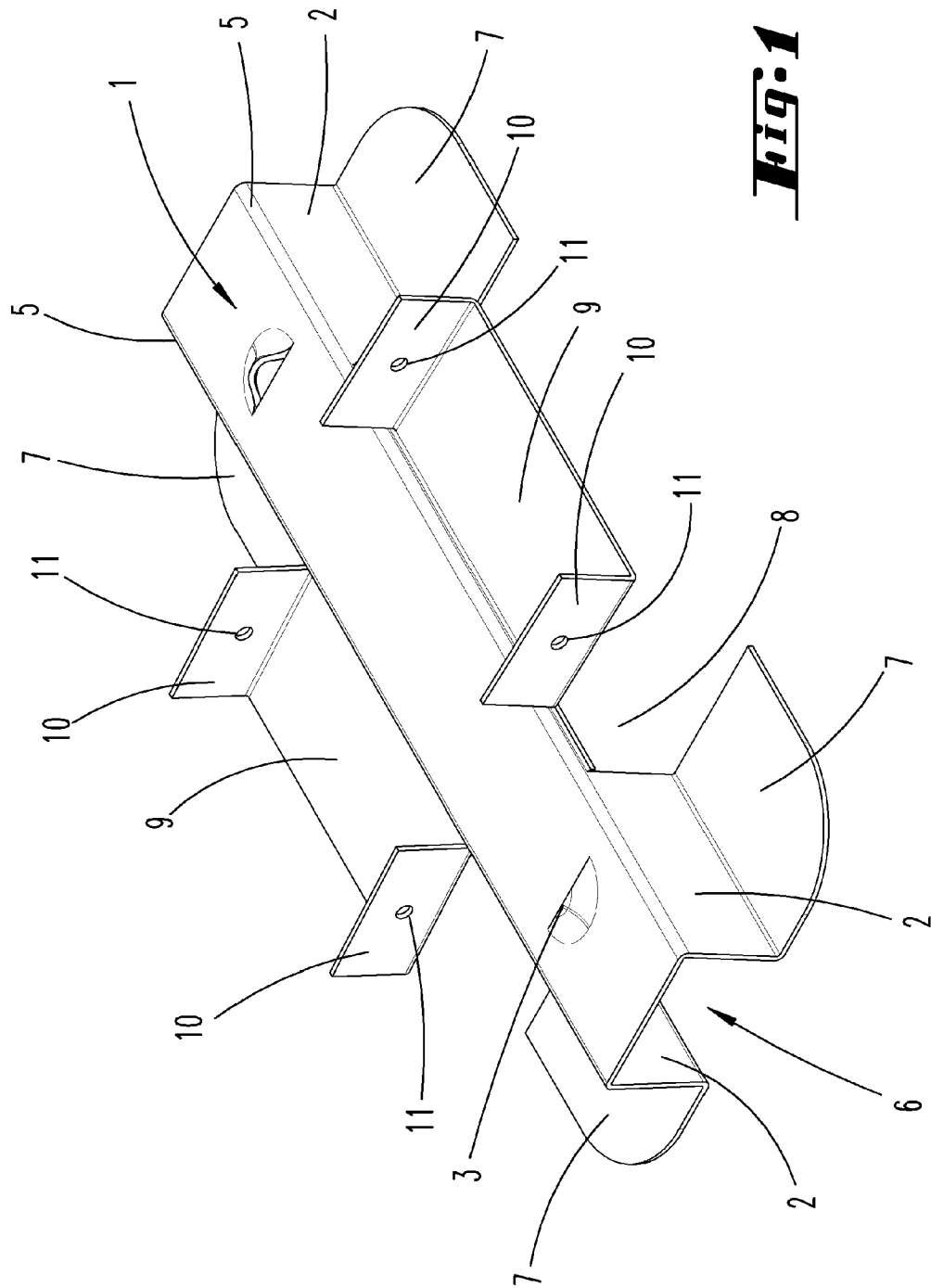
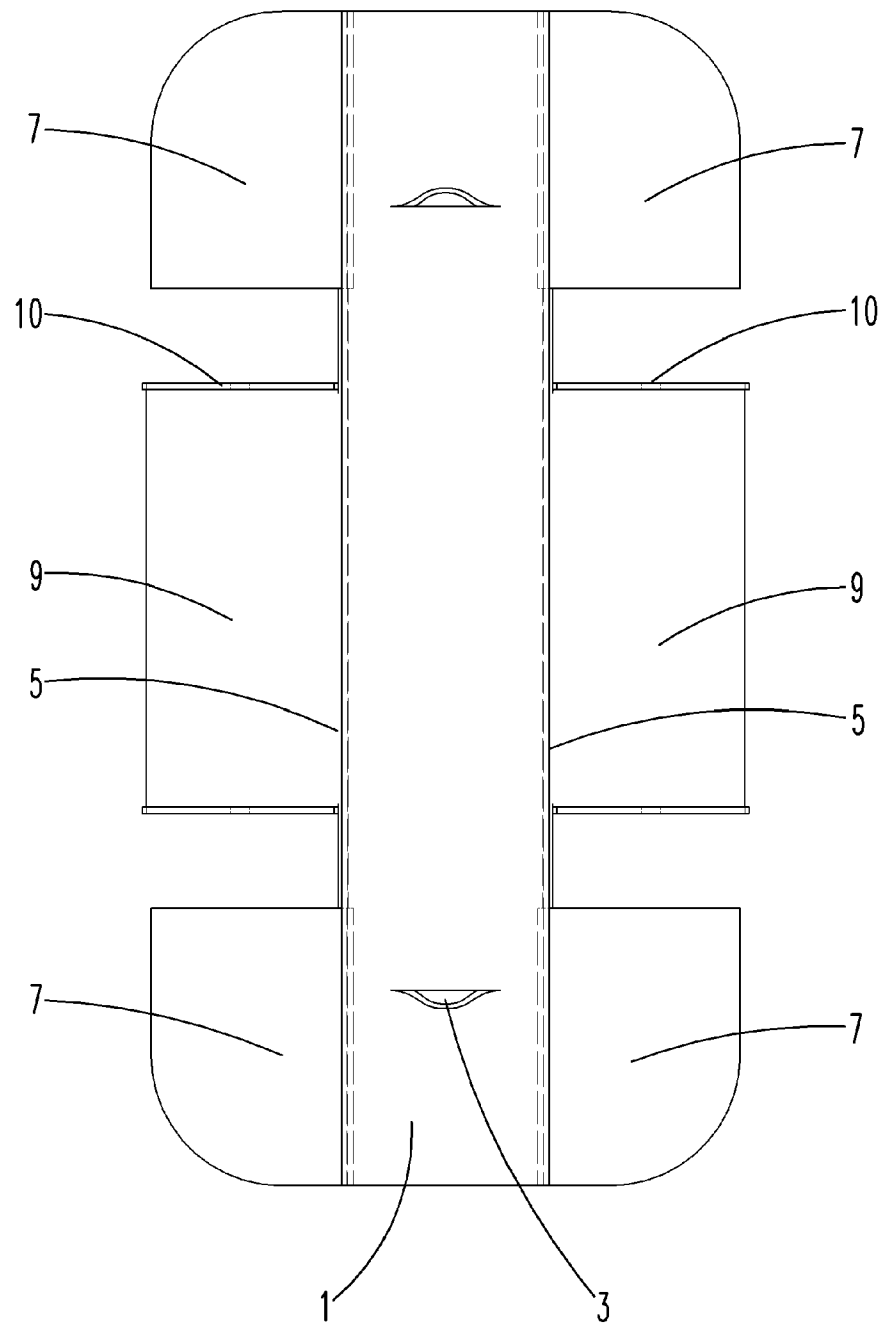


Fig. 1

2/25
Fig. 2



3/25
Fig. 3

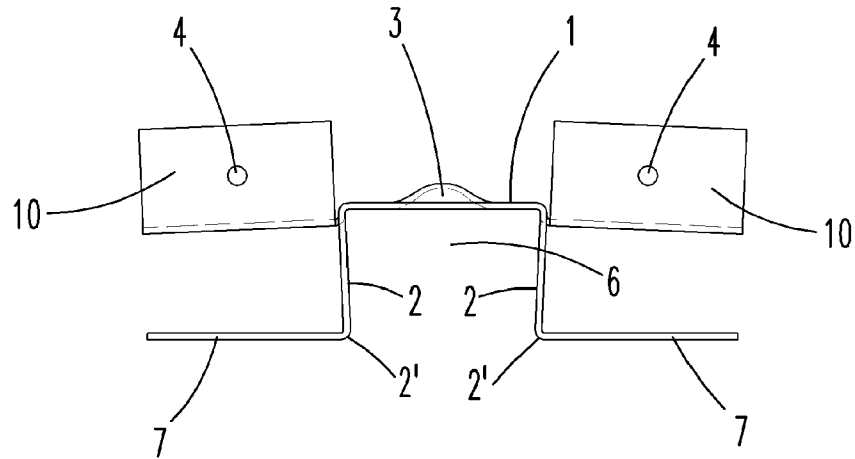


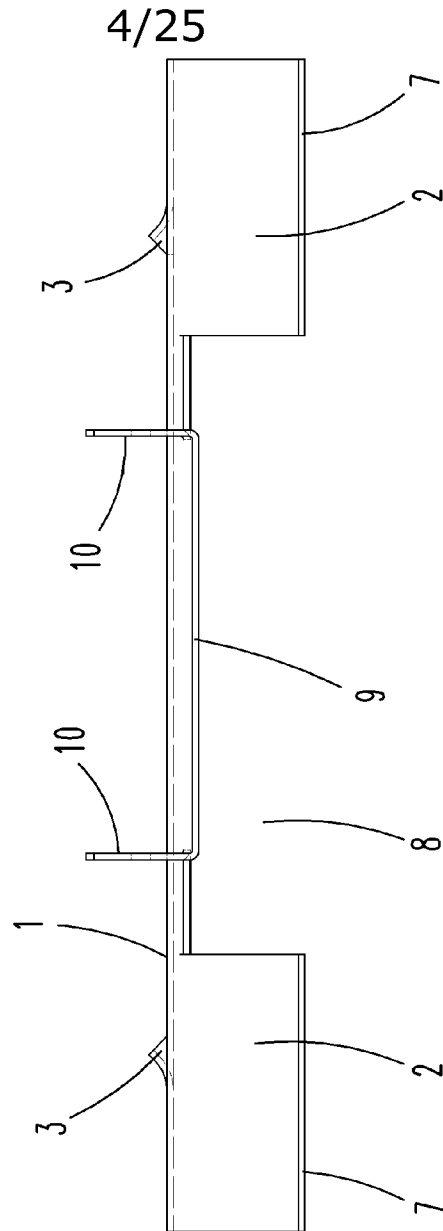
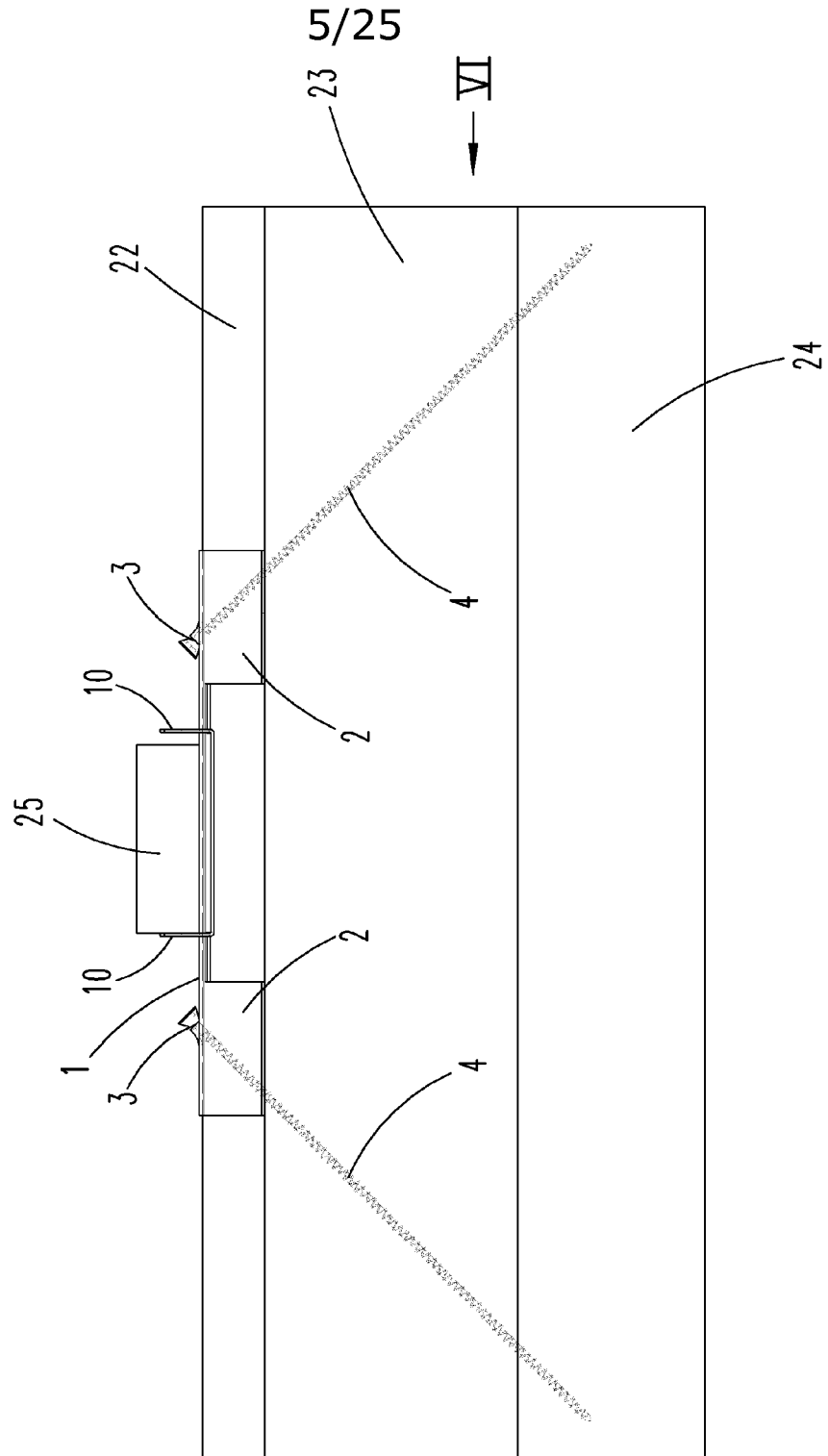
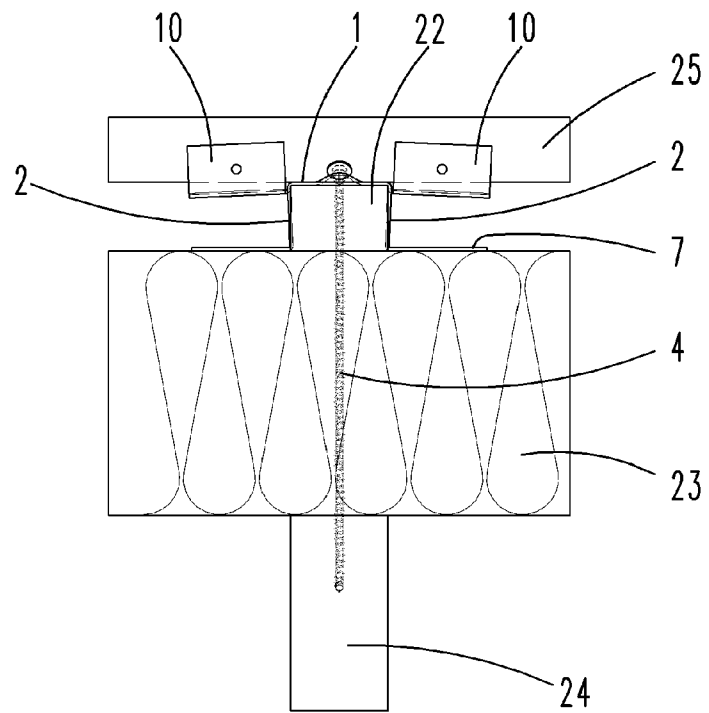
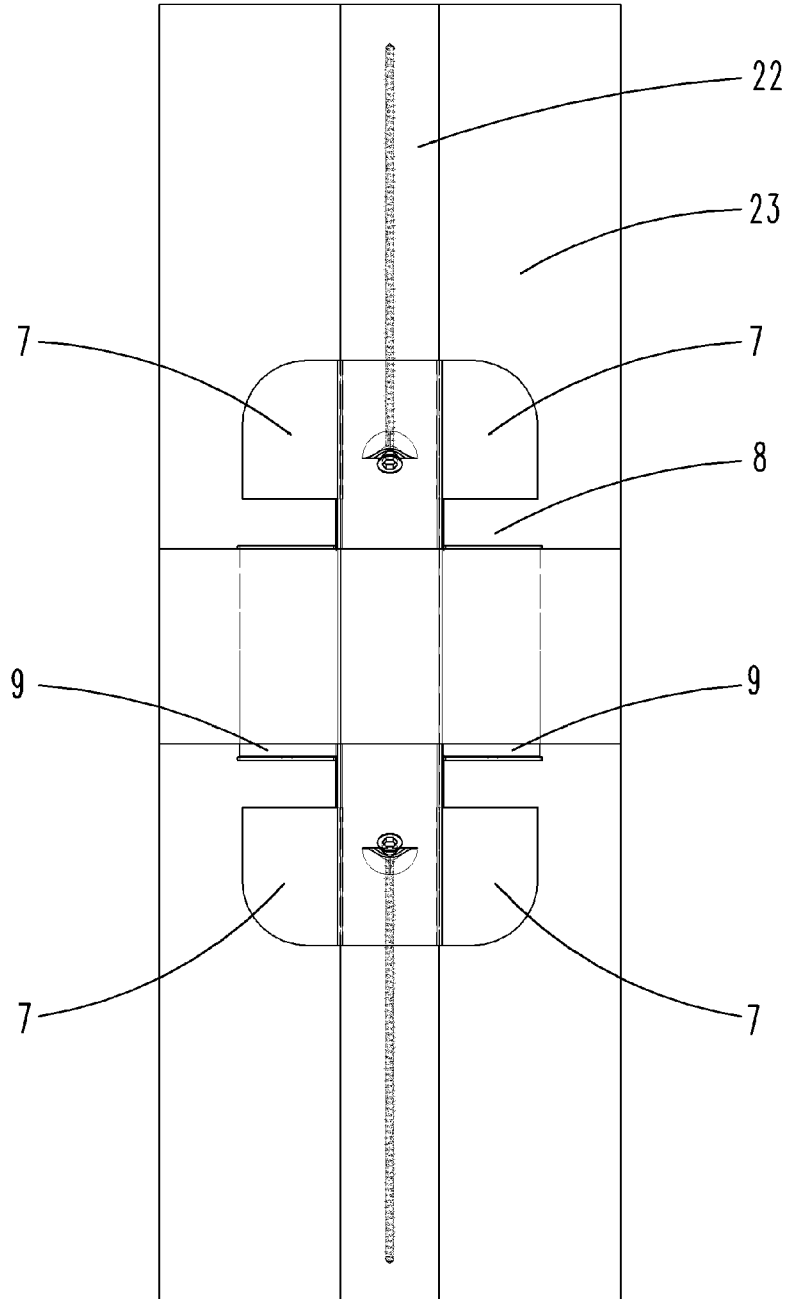
Fig. 4

Fig. 5

6/25
Fig. 6



7/25
Fig. 7



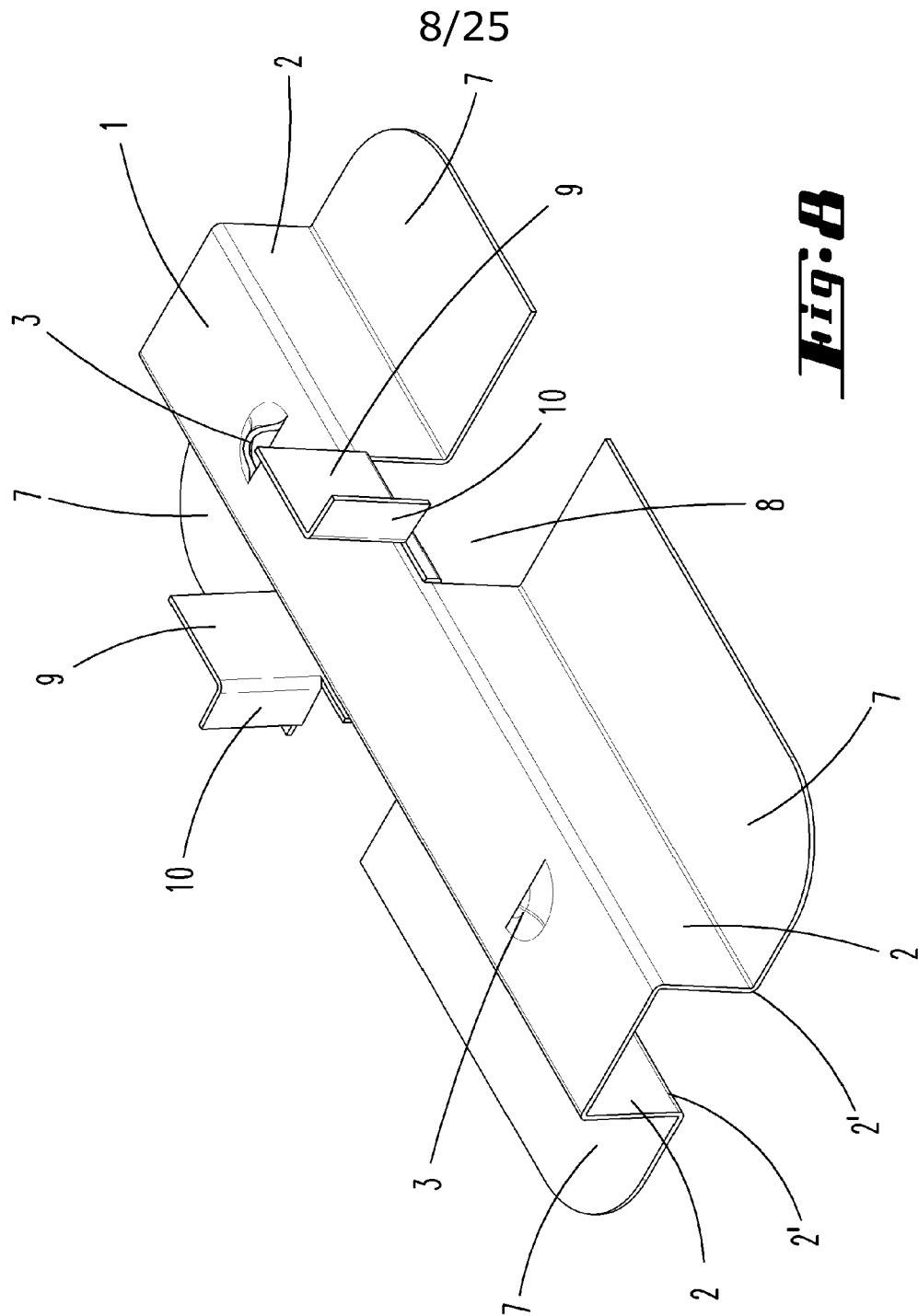
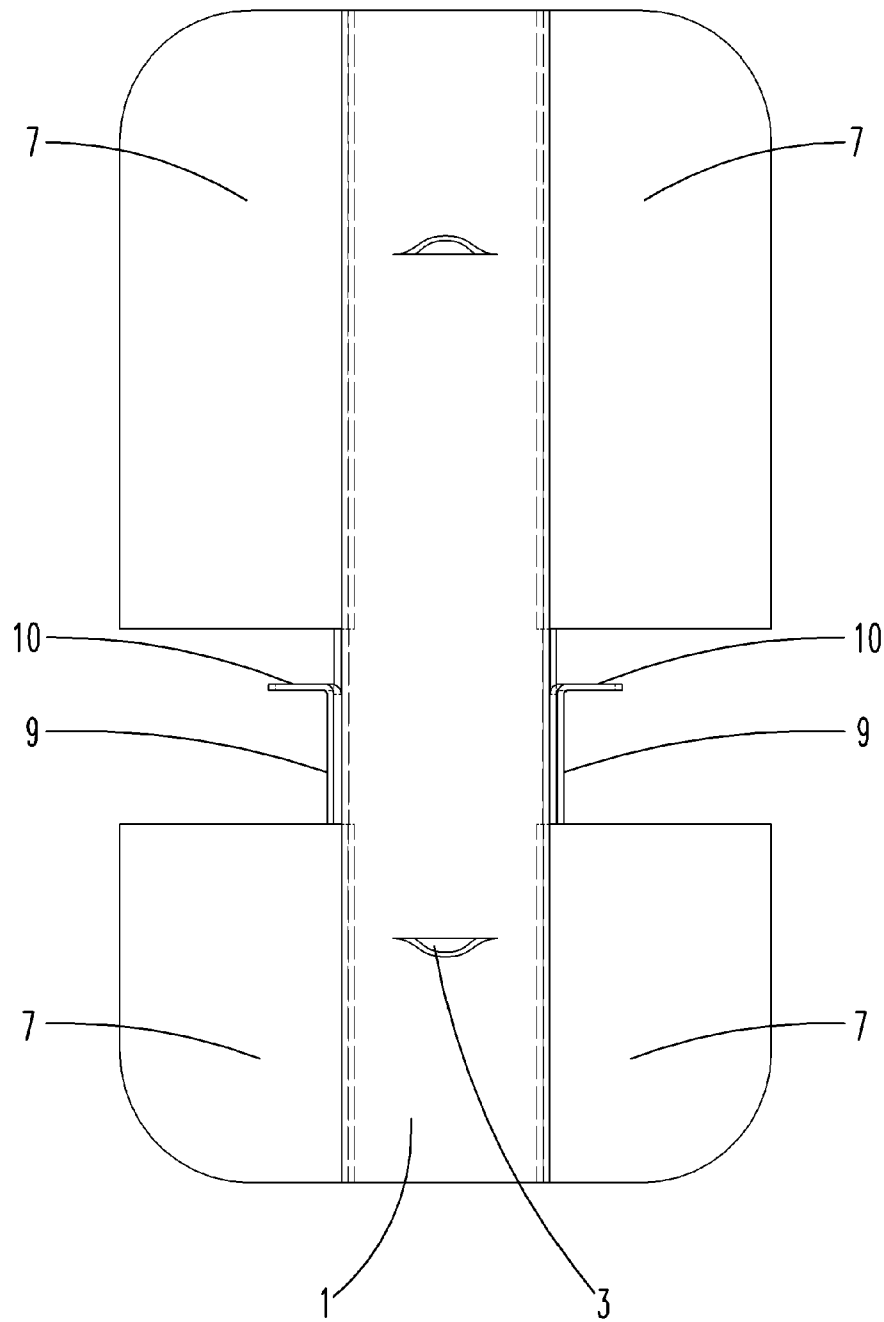
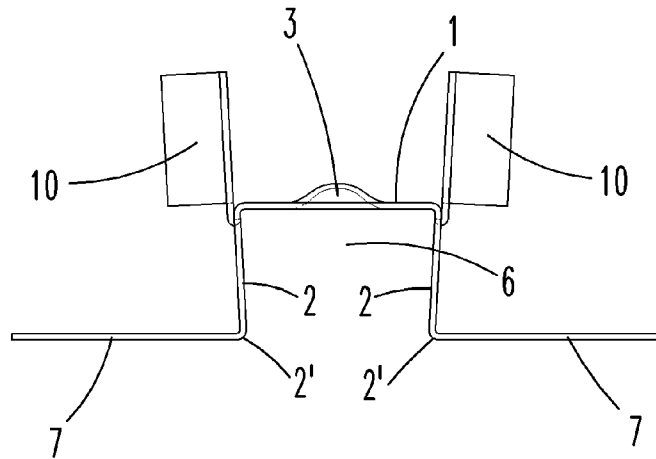


Fig. 8

9/25
Fig. 9



10/25
Fig. 10



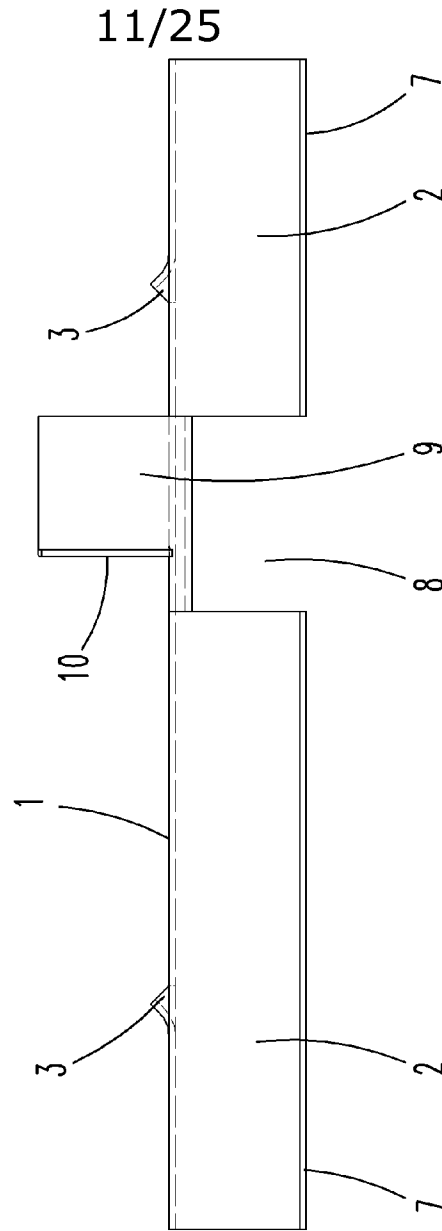
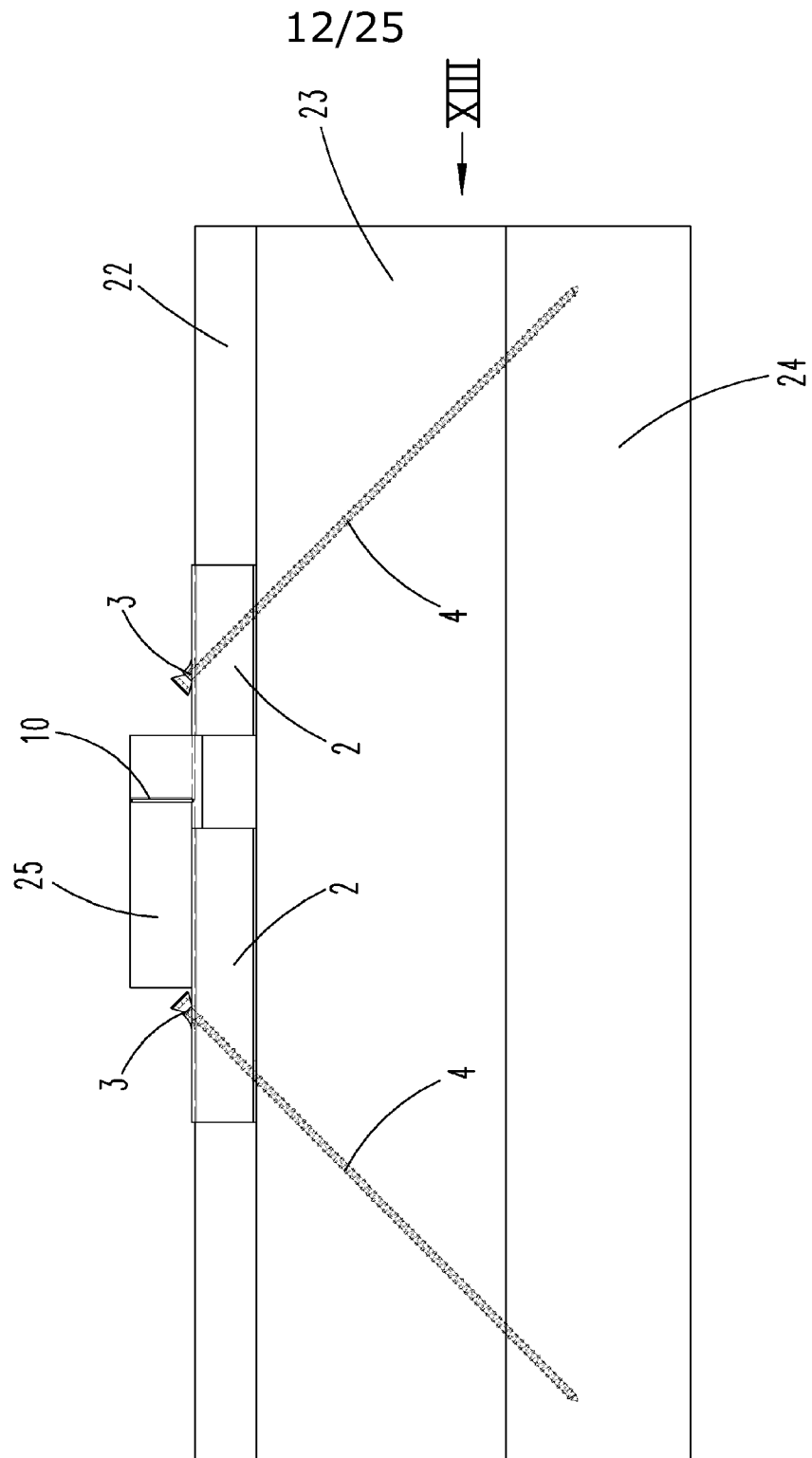
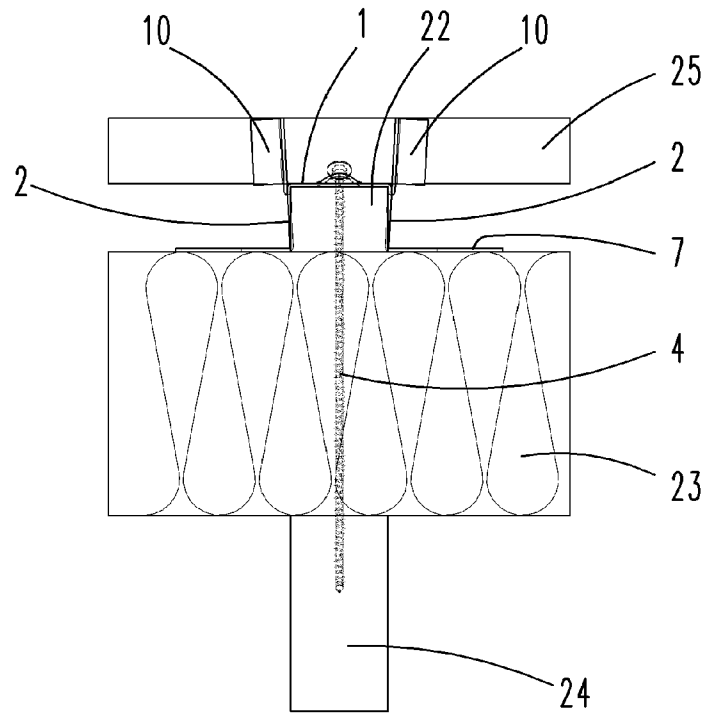
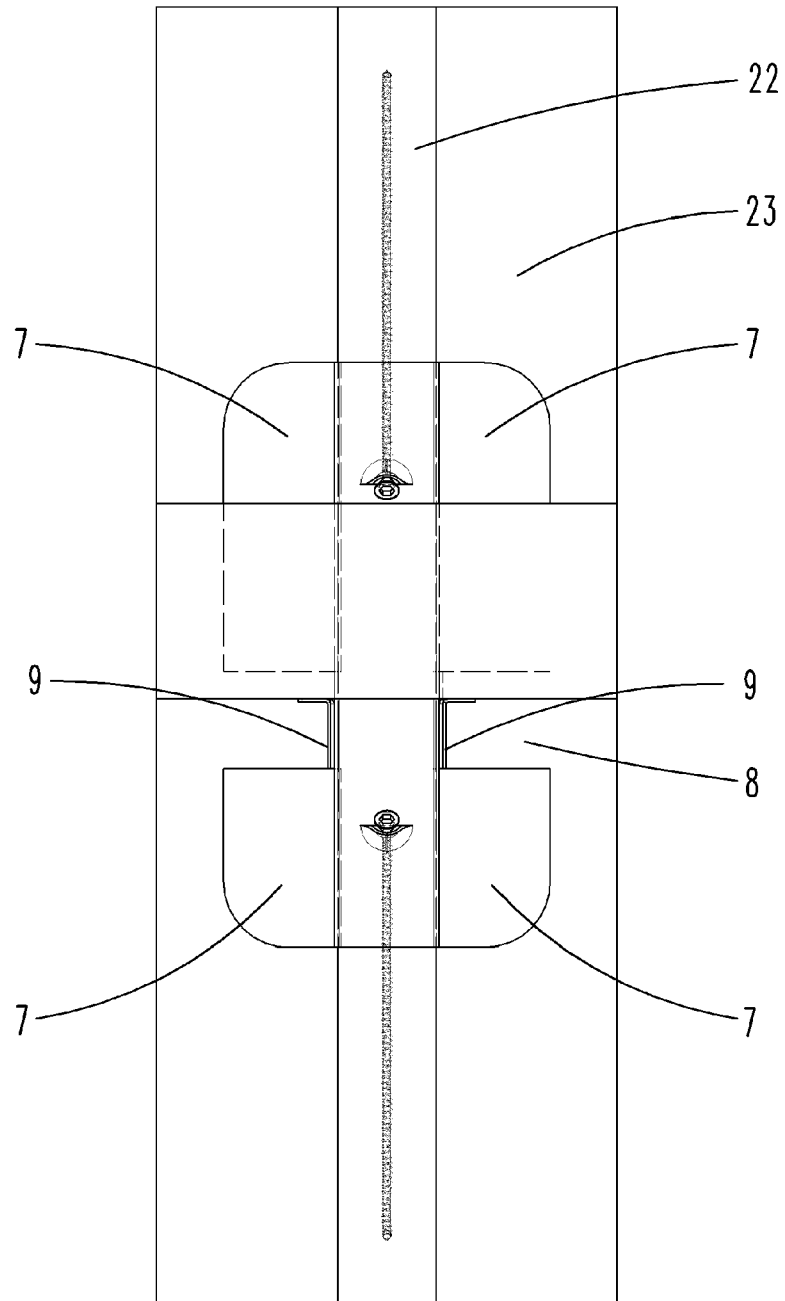
***Fig. 11***

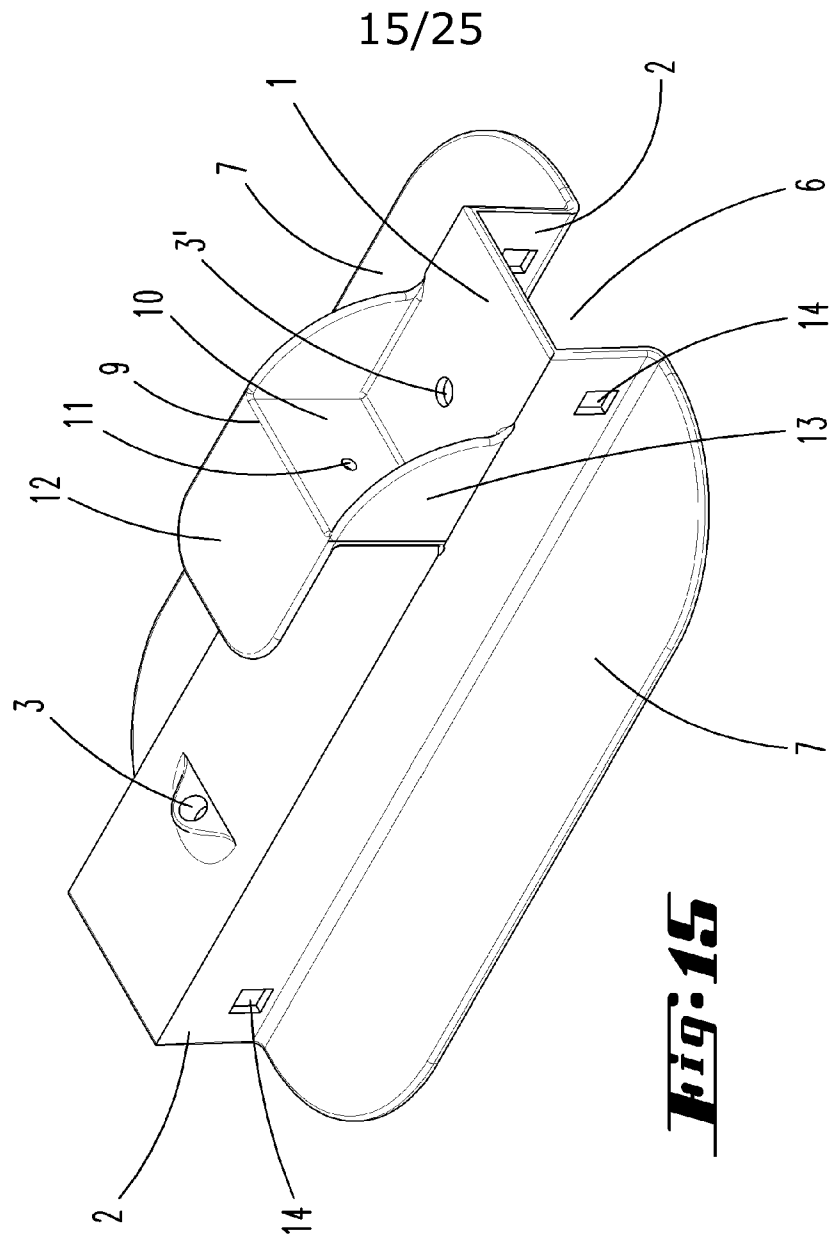
Fig. 12

13/25
Fig. 13

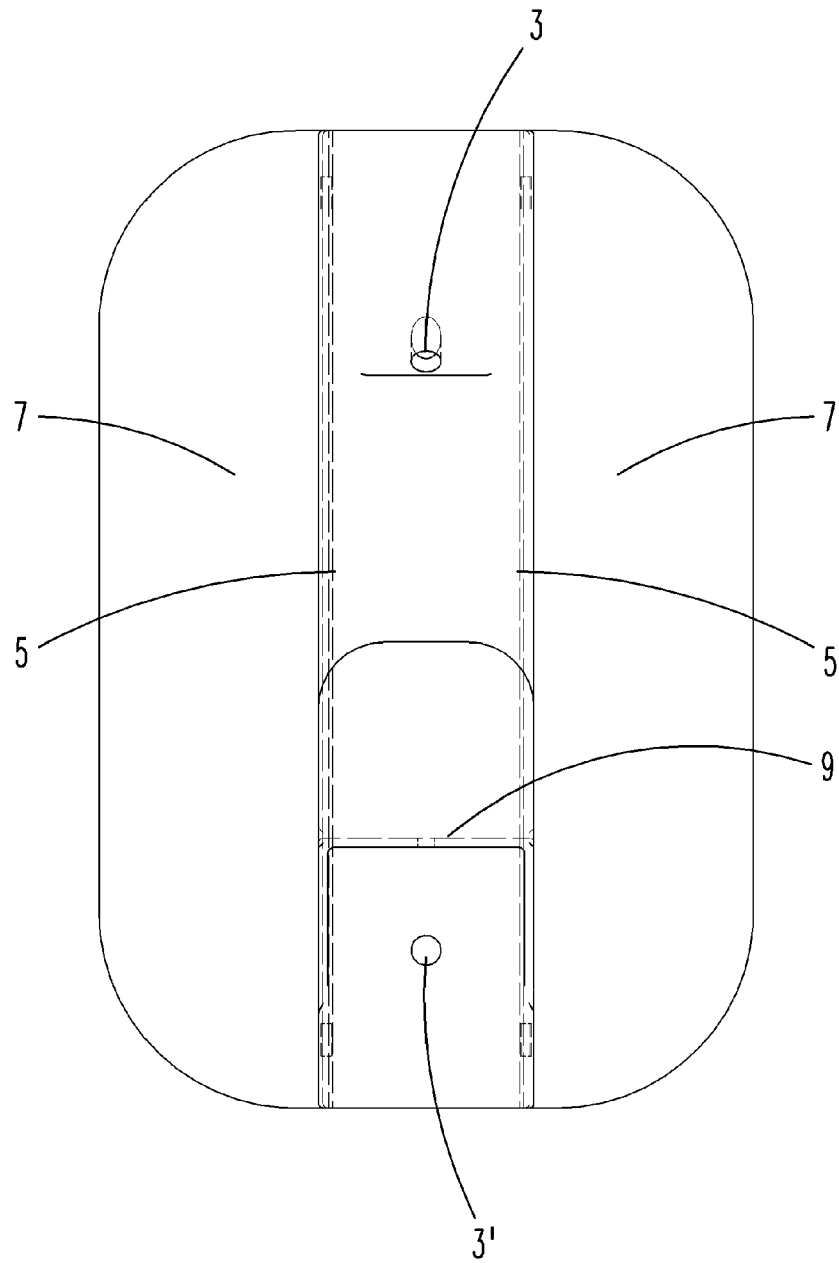


14/25
Fig. 14

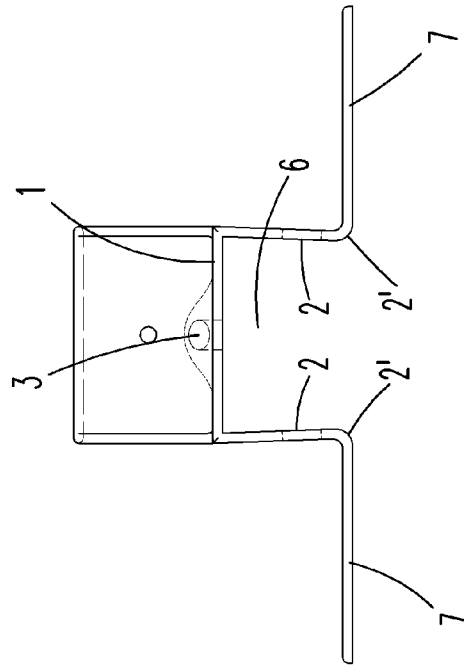




16/25
Fig. 16



17/25

Fig. 17

18/25

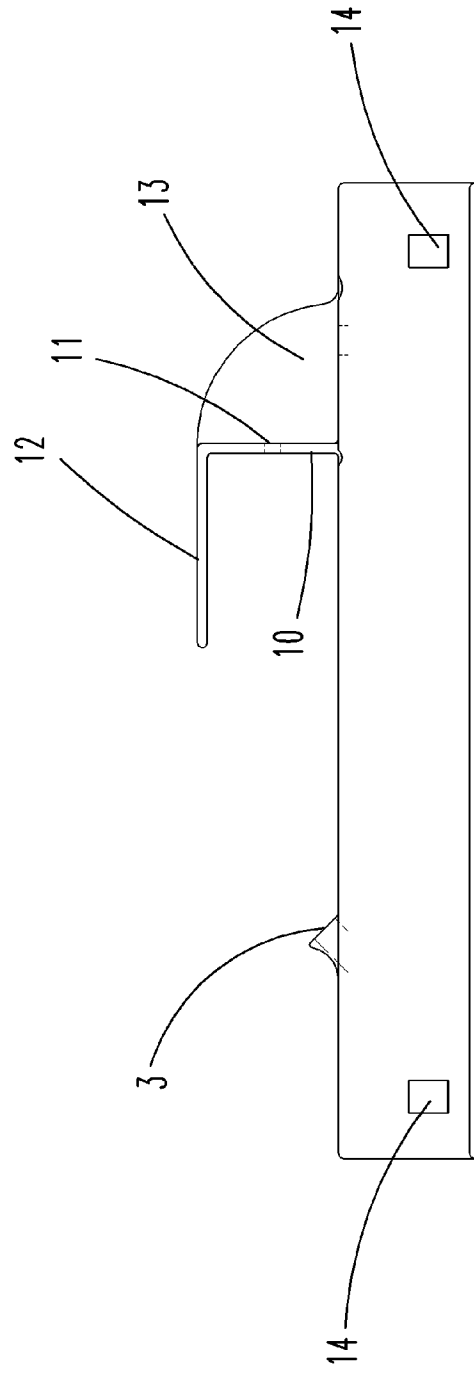
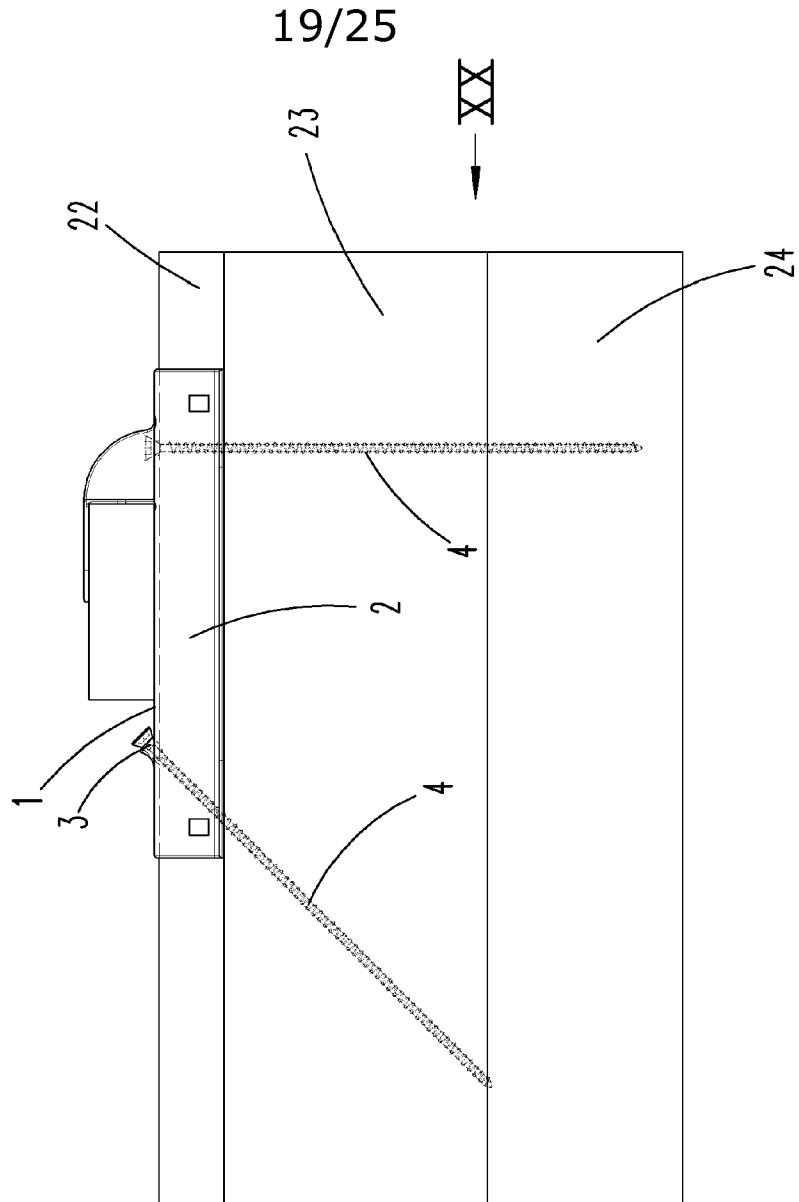
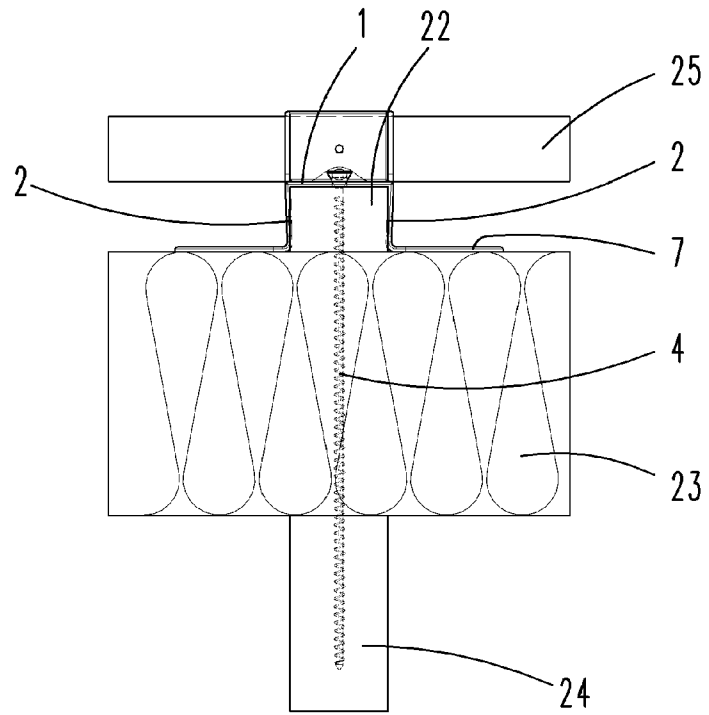
Fig. 18

Fig. 19

20/25
Fig. 20



21/25
Fig. 21

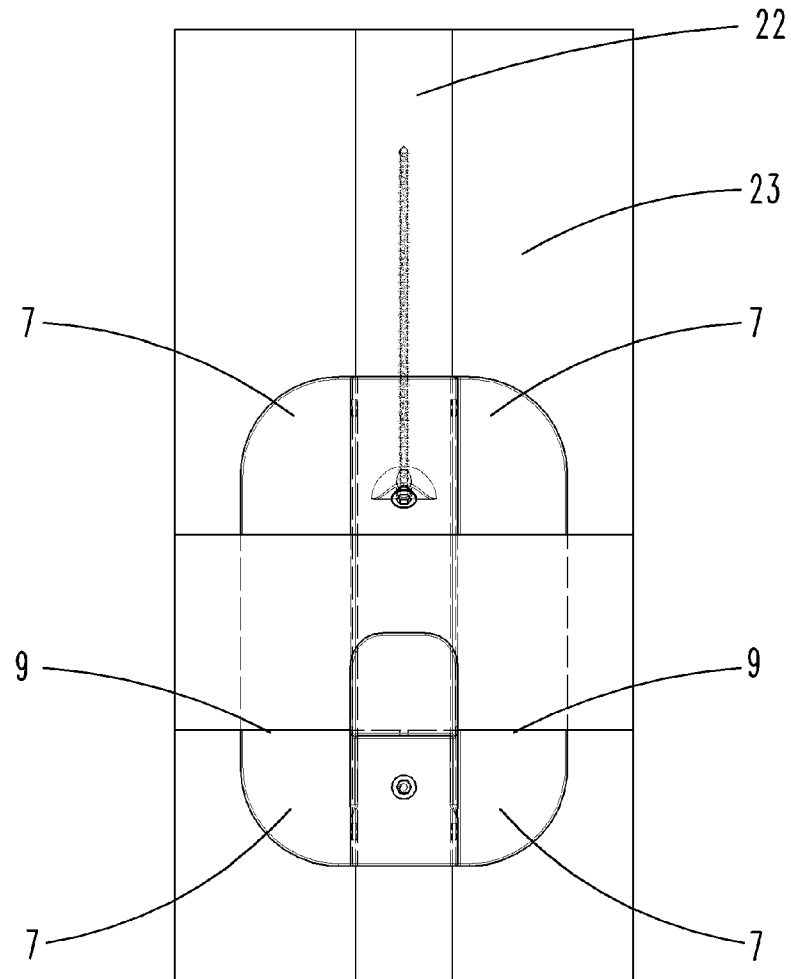
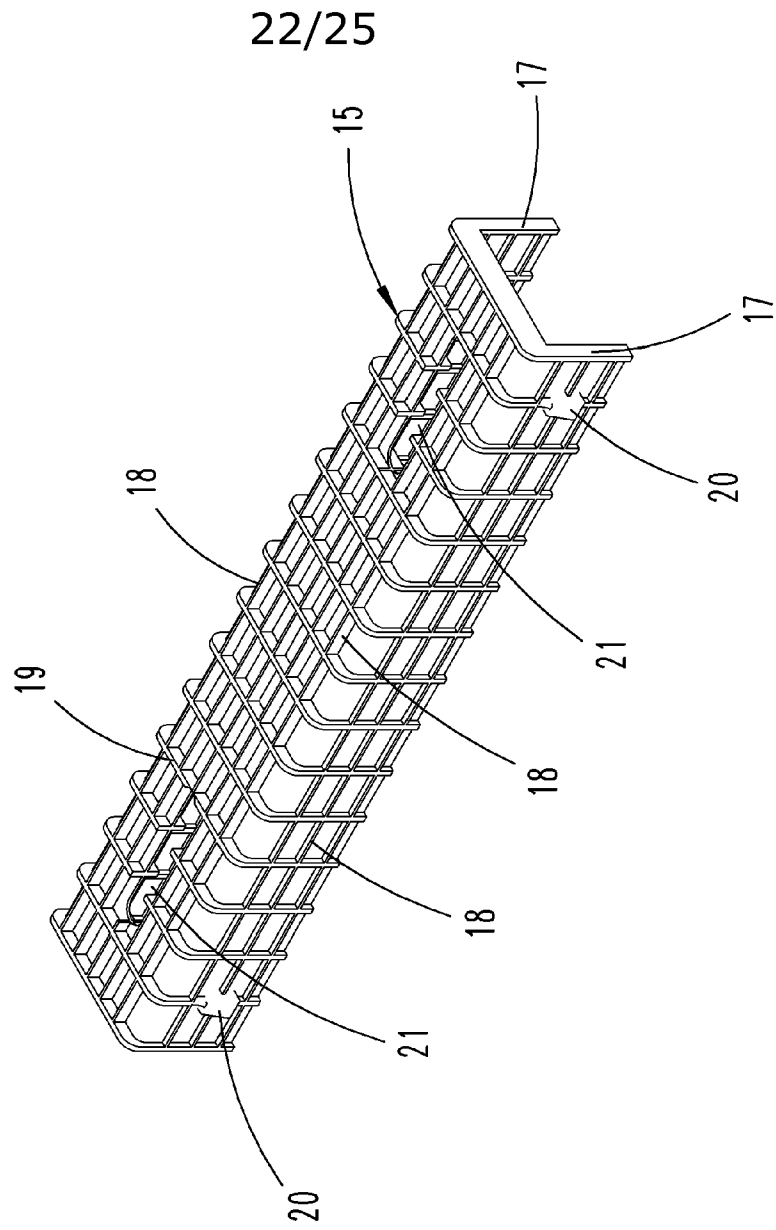
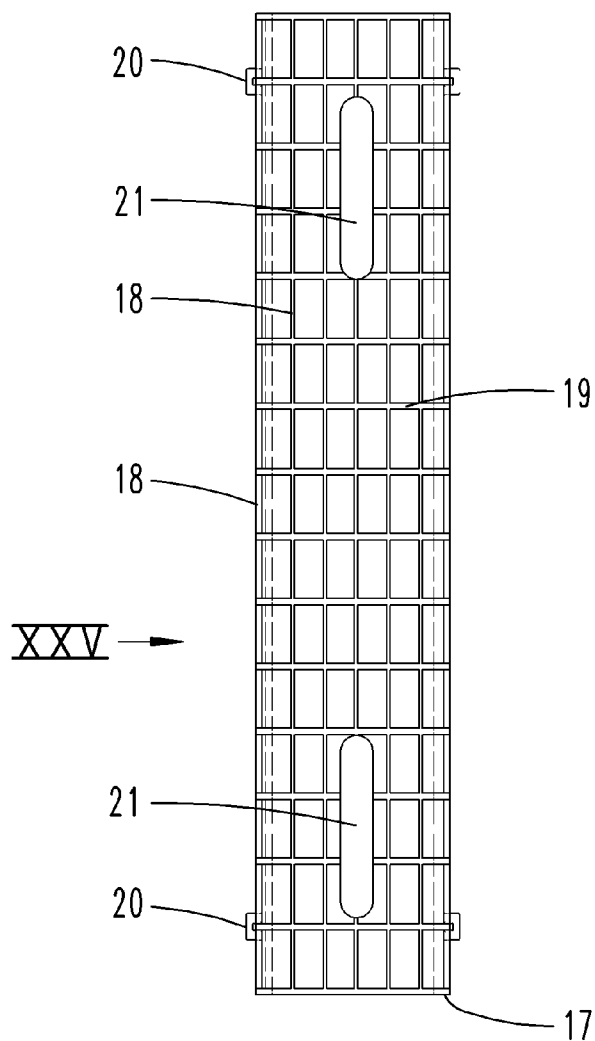


Fig. 22



23/25

Fig. 23



XXIV

Fig. 24

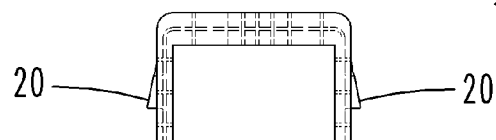
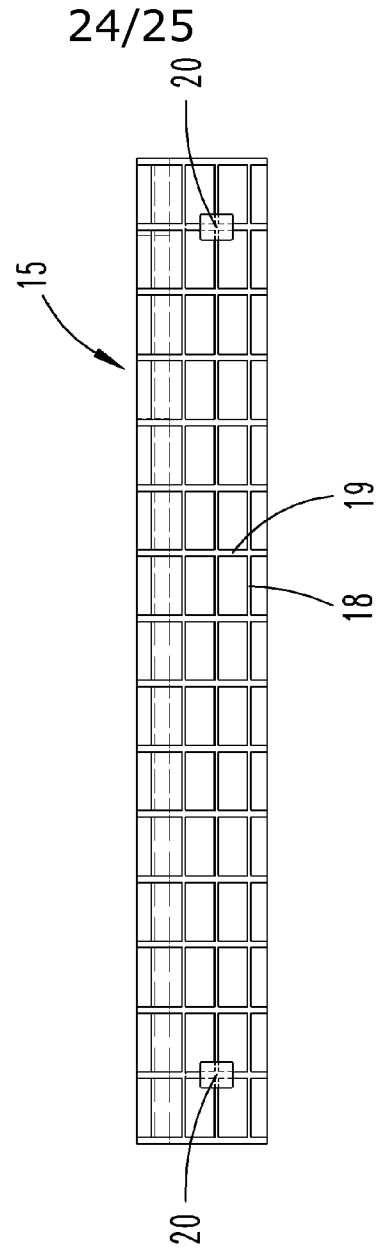


Fig. 25

25/25
Fig. 26

