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(54) Title: VANDALISM RESISTANT OUTDOOR CABINET WITH IMPROVED OUTER APPEARANCE

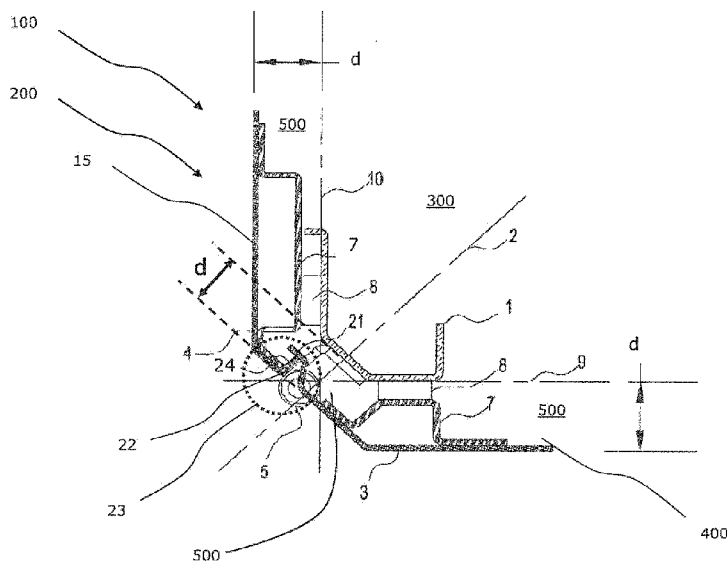


Fig. 1

(57) Abstract: A vandalism resistant outdoor cabinet for storage of electronic devices such as telecom or power devices comprising: a housing defining a chamber with an opening, a frame defining an inner structure of the housing, a first and second outer panel enclosing at least partially the frame and the chamber and defining at least partially an outer structure of the housing, the first outer panel comprising a cover part, the cover part being arranged spaced a distance apart from the frame thereby defining a buffer space between the cover part and the frame, a second outer panel comprising an engaging part and the second outer panel being capable of moving between a closed position and an open position relative to the opening of the housing, the second outer panel engaging the first outer panel in the closed position, and wherein the engaging part abuts and overlaps the cover part in the closed position of the second outer panel.

WO 2014/075730 A1

VANDALISM RESISTANT OUTDOOR CABINET WITH IMPROVED OUTER  
APPEARANCE

FIELD OF THE INVENTION

5

The present invention relates to outdoor cabinets for storage of electronic devices such as telecom or power devices.

10 BACKGROUND OF THE INVENTION

It is common to deploy the telecom and power outdoor cabinet within residential or business areas, located on the pavement or beside buildings. For this reason the appearance of the cabinet becomes more important and the customer is becoming more rigorous about the quality of cabinet visual appearance. Also, outdoor cabinet are sometimes subject to burglary and expensive equipment stolen. Again sometimes they are accidentally damaged by slow moving vehicles such as road sweepers and lawn movers leading to increased maintenance costs and need for frequent replacement of such cabinets.

The vertical gap between the cabinet door and panels determines the visual appearance of the cabinet and provide a first sign of cabinet build quality. Also, the vertical gap can be the first point of attack in cases of vandalism or burglary.

30 In the designing of a typical outdoor cabinet the size of gap between the panels and door depend on the manufacturing technique process used i.e. small, precise and consistent gaps between the panels rely on precision tooling and also typically requires jigging setups to

ensure tolerances are kept on a satisfactory level. For larger sheet metal cabinets tolerance control becomes even more difficult or very expensive due to the large tooling parts. Therefore gaps between panels can be inconsistent leaving weak points near the gaps. Alternative solutions to cabinets with gaps between panels may include thicker material or additional structures around the gaps to strengthen the vulnerable points.

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Furthermore, it is common for the roadside cabinets to be damaged by parking cars and service vehicles such as mowers. A conventional outdoor cabinet typically may need to be completely replaced even when only damaged in a small area. If the frame is on the outside of the structure this can be irreparably damaged if hit even at slow speeds.

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#### DISCLOSURE OF THE INVENTION

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On this background, it is an object of the present application to provide a vandalism resistant outdoor cabinet with improved resistance to vandalism or burglary whilst maintaining a desirable outer visual appearance and at the same time lower maintenance costs of the cabinet.

25

This object is achieved by providing a vandalism resistant outdoor cabinet for storage of electronic devices such as telecom or power devices comprising: a housing defining a chamber with an opening, a frame defining an inner structure of the housing, a first and second outer panel enclosing at least partially the frame and the chamber and defining at least partially an outer

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structure of the housing, the first outer panel comprising a cover part, the cover part being arranged spaced a distance apart from the frame thereby defining a buffer space between the cover part and the frame, a  
5 second outer panel comprising an engaging part and the second outer panel being capable of moving between a closed position and an open position relative to the opening of the housing, the second outer panel engaging the first outer panel in the closed position, and wherein  
10 the engaging part abuts and overlaps the cover part in the closed position of the second outer panel, the engaging part being arranged in the buffer space between the cover part and the frame in the closed position of the second outer panel.

15

By providing a panel on frame solution for the cabinet with panels overlapping each other may provide a solution which leaves no gap between panels visible to the exterior of the cabinet. This improves not only the  
20 visual appearance of the cabinet as the panels overlap without a gap, but it also makes it more difficult to find weak points along the intersection between the panels and therefore prevents vandalism or burglary by means of tools such as screwdrivers, knives, pliers,  
25 crowbars etc. thereby enhancing the anti-vandalism aspect. By arranging the cover part distanced apart from the frame the engaging part may engage the cover part on an inner surface of the cover part in the buffer space. This has the advantage of a good mechanical solution in  
30 order to provide a snug fit between the cover part and the engaging part in the closed position of the second outer panel comprising the engaging part. Furthermore, by placing the cover part distanced apart from the frame the overlapping panels provides a buffer or crumple zone on

the frame. The vertical edges of the cabinet may from time to time be hit e.g. by moving vehicles such as service vehicles lawn mowers etc.. With the cover part distanced apart from the frame such slow impact may

5 damage the panels but should leave the frame undamaged. If the frame is undamaged the repair of the cabinet may be executed by replacement of the damaged panels only and not the frame, which seriously diminishes the costs of such an operation. Also since such cabinets are often

10 used to enclose highly complex electronic equipment which is typically suspended in mechanical suspension to the frame, the buffer or crumple zone may avoid damages to equipment far more expensive than the cabinet structure.

15 The overlap of adjacent panels provides at least four beneficial effects. There is no or nearly no visible gap between the panels so the visual appearance of the cabinet is improved; the overlap makes attempts of unwanted entries more difficult. The panels may fully

20 envelop the structural frame, thereby assisting in the protection against water ingress by providing a deflective barrier to the seal and sealing surface and furthermore helps to protect the structural frame in the event of a low speed impacts e.g. from moving vehicles

25 since the distance between the cover part and the frame may act as a buffer or crumple zone, the overlapping panels provide such a zone.

In one embodiment the first outer panel may further

30 comprise a second engaging part.

In one embodiment the cover part abuts and overlaps the engaging part in the closed position of the second outer panel, the engaging part being arranged in the buffer

space between the cover part and the frame in the closed position of the second outer panel.

5 In one embodiment the second outer panel comprises an engaging part and a cover part.

In one embodiment the first and the second outer panel enclose the frame.

10 In one embodiment the engaging part is capable of operably engaging the cover part.

In one embodiment the engaging part interacts with the cover part to form a tight seal of the cabinet.

15

In one embodiment the engaging part interacts with the cover part to form a substantially invisible gap between them.

20 In one embodiment the cover part and engaging part are of matching shapes such as male and female to provide a snug fit between the cover part and engaging part when the second outer panel is in the closed position.

25 The engaging part may also comprise a joggle bend and abuts the cover part in a joggle joint in the closed position of the second outer panel. By placing a joggle bend in the engaging part for receiving the cover part in the closed position of the second outer panel a very  
30 tight connection may be provided with little visual appearance. Also joggle bends are cheap to produce and optimal to provide snug fits between sheet materials often used in the production of outdoor cabinets.

Also, the second outer panel may be hinged to the housing by a hinge such that the second outer panel is able to alternately open and close the opening by rotation of the second outer panel around the hinge. For continuous opening and closing of the second outer panel such as would be typical e.g. in modern switch boxes easy access to the inside chamber of the cabinet may be improved by hinging the second outer panel to the frame or alternatively to the first outer panel.

10

The cover part and engaging part may advantageously be of complementary shapes such as male and female to provide an improved snug fit between the cover part and engaging part when the second outer panel is in the closed position. A second outer panel comprising a joggle bend and a plate shaped cover panel are an example of such complementary shapes, but even more complex complementary shapes such as various tongue and groove shapes may additionally improve the tightness of the gap between the cover part and the engaging part, thus providing a very small gap between them making it very difficult for any water to get in.

20

The cabinet may furthermore comprise a plurality of sealing elements arranged between the first outer panel and the frame and between the second outer panel and the frame for preventing water ingress when the second outer panel is in the closed position. When making efforts in preventing water ingress into the cabinet even a perfect mechanical snug fit between the cover part and the engaging part may be insufficient to completely prevent water ingress. This may be solved by placing a plurality of water tight sealing element between the first outer panel and the frame and between the second outer panel

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and the frame for preventing water ingress in the closed position of the second outer panel.

5 In an embodiment of the invention the first and second outer panels may comprises a plurality of bracing structures arranged in the buffer space. Since the cover part is distanced apart from the frame by a buffer space it's possible to provide a plurality of bracing structures in the buffer space. The buffer structures may  
10 be part of either the first or second outer panels or both. Since outdoor panels are typically produced from sheet materials such as sheet metals the sheets are advantageously braced on the inside to provide a stronger cabinet. The stronger the outer panels are constructed  
15 the more energy will be transferred to the inner frame structure during an impact on the outer panels, therefore the bracing of the outer panel may be a tradeoff between the buffer ability of the cabinet due to impacts and the strength of the outer panels.

20

Also, the cabinet may comprise a plurality of third outer cover panels, the first, second and third outer panels enclosing the frame and the chamber. The plurality of third outer panels may comprise bottom plates, top  
25 plates, flanges, windows etc..

In an embodiment of the invention the first and second outer panels are opposite ends of an outer panel section.

30 In an embodiment of the invention the first and second outer panels are made from a sheet metal such as sheets comprising steel, galvanized steel, stainless steel aluminum and/or zinc.

In an embodiment of the invention the cabinet may comprise a plurality of openings in the housing and a plurality of second outer panels, each second outer panel being arranged to operably open and close one opening.

5

A joggle joint is meant in the present context to be conceived as a joint between two parts in which a part or projection on one part fits into a bend or a recess in another part. The term joggle bend reflects the bend of one part making it suitable for a joggle joint with another part.

10

Further objects, features, advantages and properties of the engine and method of operating an engine according to the present disclosure will become apparent from the detailed description.

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#### BRIEF DESCRIPTION OF THE DRAWINGS

In the following detailed portion of the present description, the invention will be explained in more detail with reference to the exemplary embodiments shown in the drawings, in which:

20

Fig. 1 is a sectional view of a corner section of a cabinet according to an example embodiment of the invention,

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Fig. 2, is a sectional view of a side portion of a cabinet comprising two openings according to an example embodiment of the invention, and

30

Fig. 3 is a sectional view of a cabinet according to an example embodiment of the invention.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

Fig. 1 shows a sectional view of a corner section of a cabinet 100. The cabinet comprises as shown a housing 200 defining a chamber 300 with an opening 400. The chamber provides a protected space for the containment of electronic equipment such as telecom or power devices. The chamber is protected by the housing which comprises a frame 1 defining an inner structure of the housing, and a plurality of outer panels 3,4 enclosing at least partially the frame 1 and the chamber 300 thereby defining at least partially an outer structure of the housing. The housing 200 comprises a first 4 and second outer panel 3, the first outer panel 4 comprising a cover part 15. The cover part 15 is the outermost part of the first outer panel 4 which is visible from the outside of the cabinet 100. The cover part 15 is arranged spaced a distance  $d$  apart from the frame 1 in order to define a buffer space 500 between the cover part 15 and the frame 1. The buffer space 500 ensures that the frame 1 is protected from collateral damage from exterior impacts on the outer panels by providing a buffer or crumble zone, such that the outer panels may crumble into the buffer space 500 without damaging the frame. The frame will remain un-affected until the outer panels reach an outer surface of the frame indicated by the lines 9 and 10 in Fig. 1. Furthermore the cabinet comprises a second outer panel 3 comprising an engaging part 21. The second outer panel 3 is capable of moving between a closed position and an open position relative to the opening of the housing 200 to prevent access or to gain access to the chamber, respectively. The second outer panel 3 engages the first outer panel 4 in the closed position by abutting and overlapping the cover part 15 in the closed

position of the second outer panel 3. In the closed position of the second outer panel 3 the engaging part 21 is arranged in the buffer space 500 between the cover part 15 and the frame 1. Since the engaging part 15 both  
5 abuts and overlaps the cover part access to the chamber becomes nearly impossible even when using tools such as knives, screwdrivers etc. since there is no gap directly towards the inside of the chamber 300.

10 As shown in Fig. 1 the cabinet 100 may comprise an engaging part comprising a joggle bend 22 such that the engaging part may abut the cover part in a joggle joint 23 in the closed position of the second outer panel 3. The joggle joint 23 has the advantage of providing a very  
15 tight fit between sheet shaped materials by providing a joggle bend in one of the adjoining sheets. Joggle bends are easily and cheaply provided in a sheet material by conventional production techniques like bending or roll forming, techniques which are present in most modern  
20 production facilities processing sheet materials.

In some cabinets frequent access to the chamber 300 of the cabinet 100 is required, and therefore easy access is very important. To ensure easy and quick access to the  
25 chamber through the opening 400 the second outer panel may be hinged to the housing by a hinge 5 such that the second outer panel is able to alternately open and close the opening by rotation of the second outer panel 3 around the hinge 5. One problem of hinging outer panels  
30 to the housing of an outdoor cabinet 100 in conventional outdoor cabinets may be that may be that the hinged connection leaves a gap open to the exterior, which may even with very small gaps constitute a weak point in the cabinet and an obvious point for breaking in entry into

the cabinet. However, as shown in Fig. 1 a hinged connection is perfectly compatible with the invention since the second outer panel may rotate around the hinge 5 such that the engaging part 15 only abuts and overlaps the cover part when the second outer panel 3 is in the closed position, whereas when the second outer panel 3 rotates towards an open position, the engaging part 15 rotates away from the cover part leaving free space for opening the second outer panel and thereby the opening to the exterior of the cabinet. Due to the extension and position of the hinge 5, the cover part may comprise a protruding part 24 reaching towards the engaging part 15 on the side of the hinge facing the cover part. The protruding part 24 could be more extensive (not shown) if the hinge was required to be even further concealed in the cabinet or on the opposite the protruding part 24 could be less extensive or even absent if the hinge was to be arranged in a more exterior position close to an exterior surface of the cabinet (also not shown).

Around the chamber there are typically four locations where there is an outward facing beveled face on the frame 1 and a corresponding beveled face to the outer panels 3, 4. The panels overlap between the vertically aligned hinges 5 and leave a gap between the outer panels and the frame. This gap d acts as a buffer zone. This part of the cabinet is typically the most vulnerable. If the panels are only slightly deformed due to impacts from the exterior of the cabinet in this area there is a good chance that the frame 1 will remain intact and any ingress of water will be prevented due to the seals 8 between the outer panels and frame and thus the cabinet will maintain its integrity until the damaged panel may be replaced.

When two or more chambers are present in a cabinet different scenarios may be possible e.g. no hinge, one hinge or two hinges depending on the needed level of access to the cabinet. As shown in Fig. 2 the third panel 14 is designed to accommodate one hinge 5, for two hinges the third outer panel 14 would be symmetrical (not shown) as the right hand side of the third outer panel 14; for no hinges the third outer panel would be symmetrical (not shown) as the left hand side of the third outer panel 14.

As shown in Fig. 1 the first and second outer panels may furthermore comprise a plurality of bracing structures 7 arranged in the buffer space 500 in order to brace the outer panels made from sheet materials. Construction of the outer panels from sheet materials may be supported by bracing structures 7 if the sheet material profile is not strong enough in itself. The seals 8 may be placed between the bracing structure 7 and the frame 1 or between the outer panels 3, 4 and the frame in the absence of bracing structures.

Fig. 2 shows an intersection between two neighboring chambers 300 within one cabinet 100. In order to provide a plurality of chambers in one cabinet the frame 1 surrounding each chamber 300 may be adjoined using an intermediary part 11 fixedly connected to the frame surrounding each chamber. Using intermediary parts 11 allows bigger cabinets 100 to be constructed using standard spare parts from 1-chamber cabinets. Alternatively means for attaching adjacent frames may be provided directly in the frame structure. As shown in Fig. 2 a third outer panel 14 may be used in the intersection between two neighboring chambers 300 to

facilitate the use of the same type of outer panels 3, 4 in intersections as well as corner sections. The frame profile as well as the size of the intermediary part 11 may determine the distance between neighboring chambers  
5 d2.

As shown in Fig. 2 the cabinet may further comprise a plurality of third outer panels 14. In this embodiment of the invention the third outer panels 14 have the function  
10 of linking together the first and second outer panels across an intersection between neighboring chambers, such that the standard first and second outer panels may be used without modification. Other types of third outer panels (not shown) may comprise windows, flanges,  
15 ventilation grates etc. to increase the functionality of the cabinet or simply a top or bottom outer panel, such that the combination of a plurality of first, second and third outer panels 4, 3, 14 may enclose the entire frame 1 and the chamber 300.

20 To improve the resistance towards vandalism or burglary the cover part 15 and engaging part 21 may be manufactured having complementary shapes in the area where they abut when the second outer panel 4 is in the closed position such as male and female shape like tongue  
25 and groove to provide a more intrusion resistant gap between the first and the second outer panel when the second outer panel is in the closed position.

30 It is typically very important when constructing outdoor cabinets for storage of electronic equipment that the chamber 300 is protected towards ingress of water to ensure a dry environment in the chamber inside cabinet. Accordingly the cabinet may furthermore comprise a

plurality of sealing elements arranged between the first outer panel (4) and the second outer panel (3) for preventing water ingress when the second outer panel (3) is in the closed position.

5

The term "comprising" as used in the claims does not exclude other elements or steps. The term "a" or "an" as used in the claims does not exclude a plurality. The single processor, device or other unit may fulfill the functions of several means recited in the claims.

10

The reference signs used in the claims shall not be construed as limiting the scope.

15

Although the present invention has been described in detail for purpose of illustration, it is understood that such detail is solely for that purpose, and variations can be made therein by those skilled in the art without departing from the scope of the invention.

20

CLAIMS:

1. Vandalism resistant outdoor cabinet (100) for storage  
of electronic devices such as telecom or power devices  
5 comprising:

a housing (200) defining a chamber (300) with an  
opening (400),

10 a frame (1) defining an inner structure of the  
housing,

a first (4) and second outer panel (3) enclosing at  
least partially said frame (1) and the chamber (300)  
15 and defining at least partially an outer structure  
of the housing,

said first outer panel (4) comprising a cover part  
(15), the cover part (15) being arranged spaced a  
20 distance (d) apart from the frame thereby defining a  
buffer space (500) between the cover part (15) and  
the frame (1),

said second outer panel (3) comprising an engaging  
25 part (21) and the second outer panel (3) being  
capable of moving between a closed position and an  
open position relative to the opening of the housing  
(200), the second outer panel (3) engaging the first  
outer panel (4) in the closed position, and

30 wherein said engaging part (21) abuts and overlaps the  
cover part (15) in the closed position of the second  
outer panel (3), the engaging part (21) being arranged in  
the buffer space (500) between the cover part (15) and

the frame (1) in the closed position of the second outer panel (3).

2. A cabinet according to claim 1, wherein the engaging part comprises a joggle bend (22) and abuts the cover part in a joggle joint (23) in the closed position of the second outer panel (3).

3. A cabinet according to claim 1 or 2, wherein the second outer panel is hinged to the housing by a hinge (5) such that the second outer panel is able to alternately open and close the opening by rotation of the second outer panel (3) around the hinge (5).

4. A cabinet according to any of claims 1-3, wherein the cover part (15) and engaging part (21) are of complementary shapes such as male and female to provide a snug fit between the cover part and engaging part when the second outer panel is in the closed position.

5. A cabinet according to any of claims 1-4, wherein the cabinet furthermore comprises a plurality of seals (8) arranged between the first outer panel (4) and the frame 1 and between the second outer panel (3) and the frame 1 for preventing water ingress when the second outer panel (3) is in the closed position.

6. A cabinet according to any of claims 1-5, wherein first and second outer panels comprises a plurality of bracing structures (7) arranged in the buffer space.

7. A cabinet according to any of claims 1-6, comprising a plurality of third outer cover panels (14), the first

(4), second (3) and third (14) outer panels enclosing the frame (1) and the chamber (300).

5 8. A cabinet according to any of claims 1-7, wherein the outer panels are made from sheet metal.

10 9. A cabinet according to any of claims 1-8, comprising a plurality of openings (400) in the housing (200) and a plurality of second outer panels (3), each second outer panel being arranged to operably open and close one opening (400).

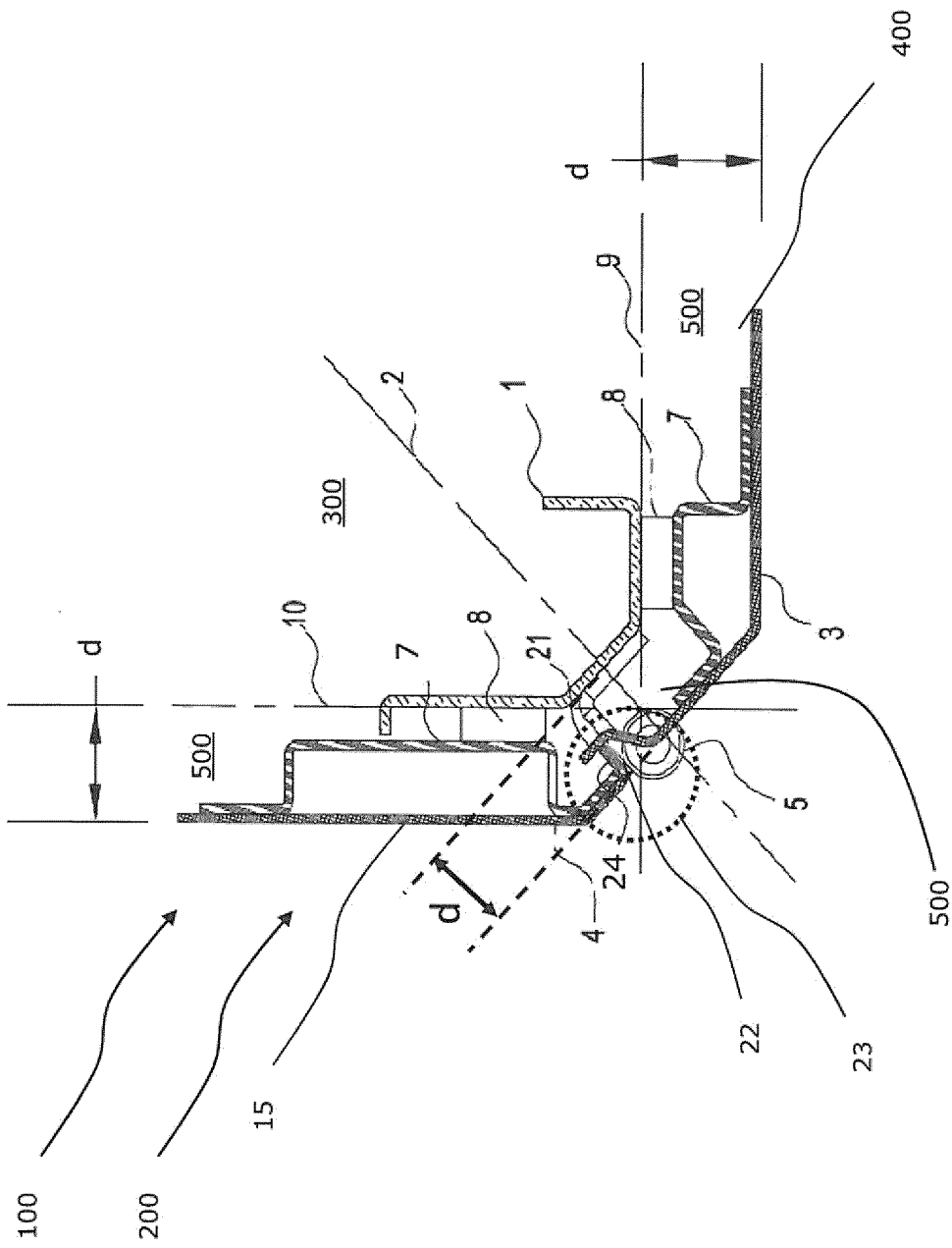


Fig. 1

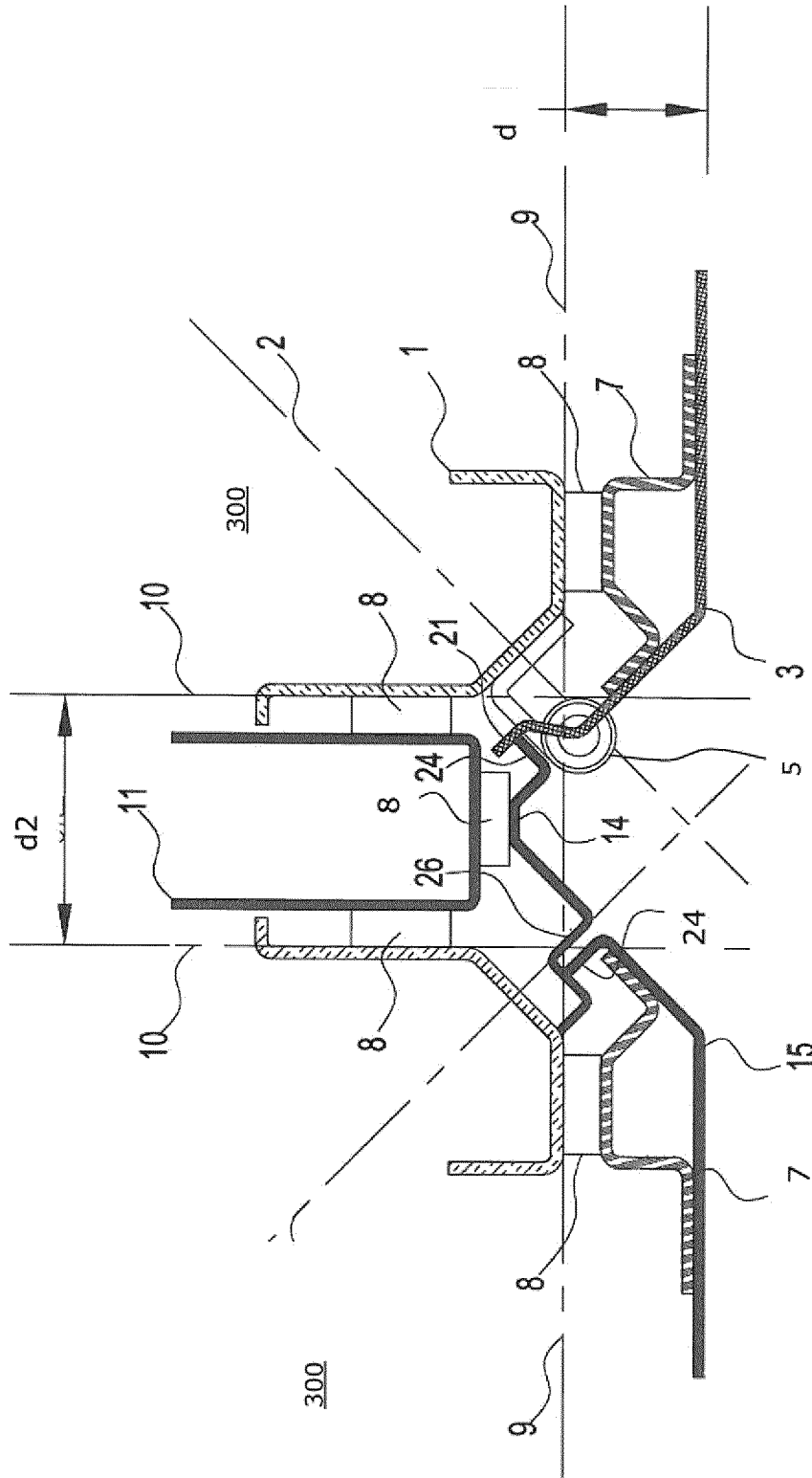


Fig. 2

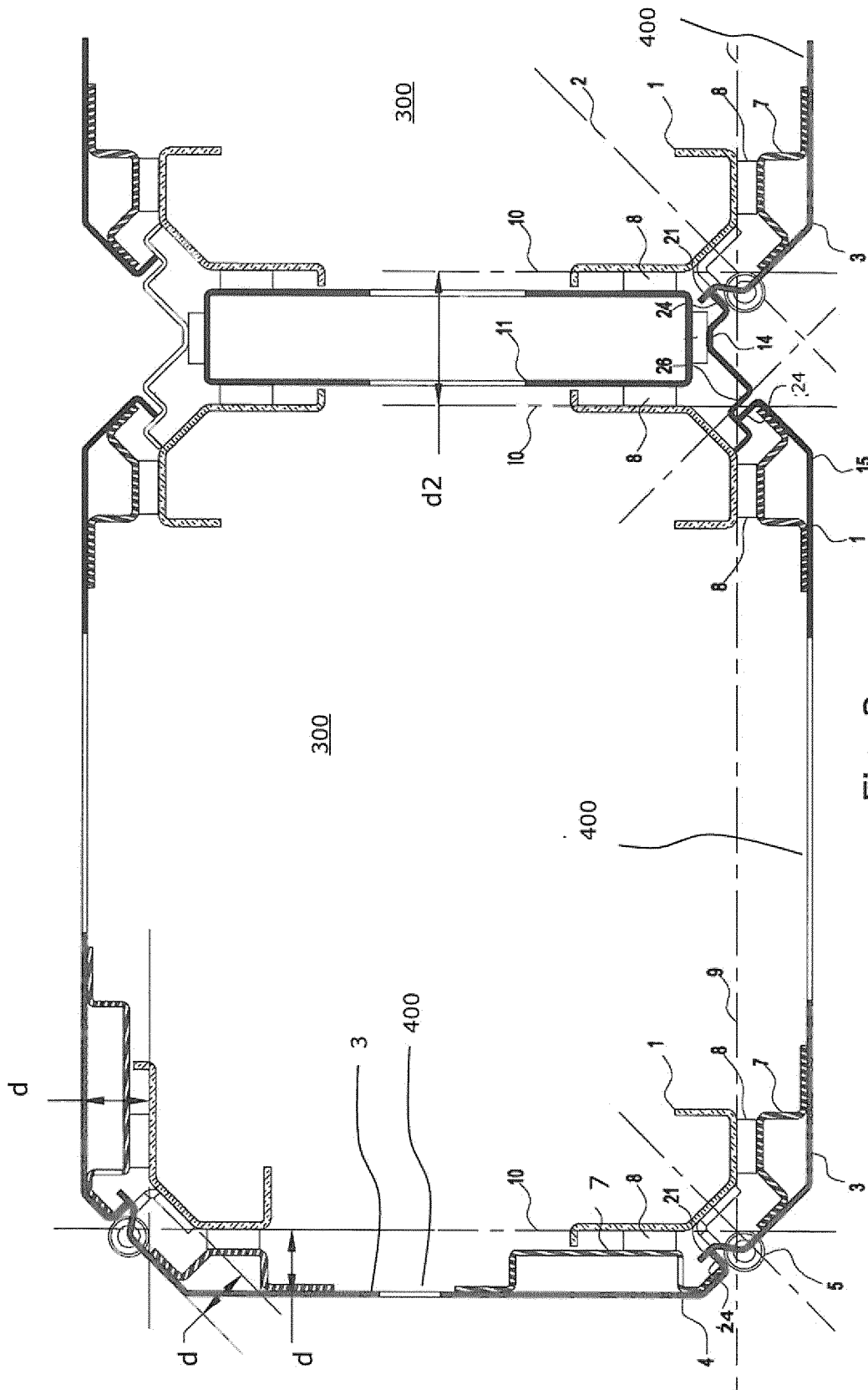


Fig. 3

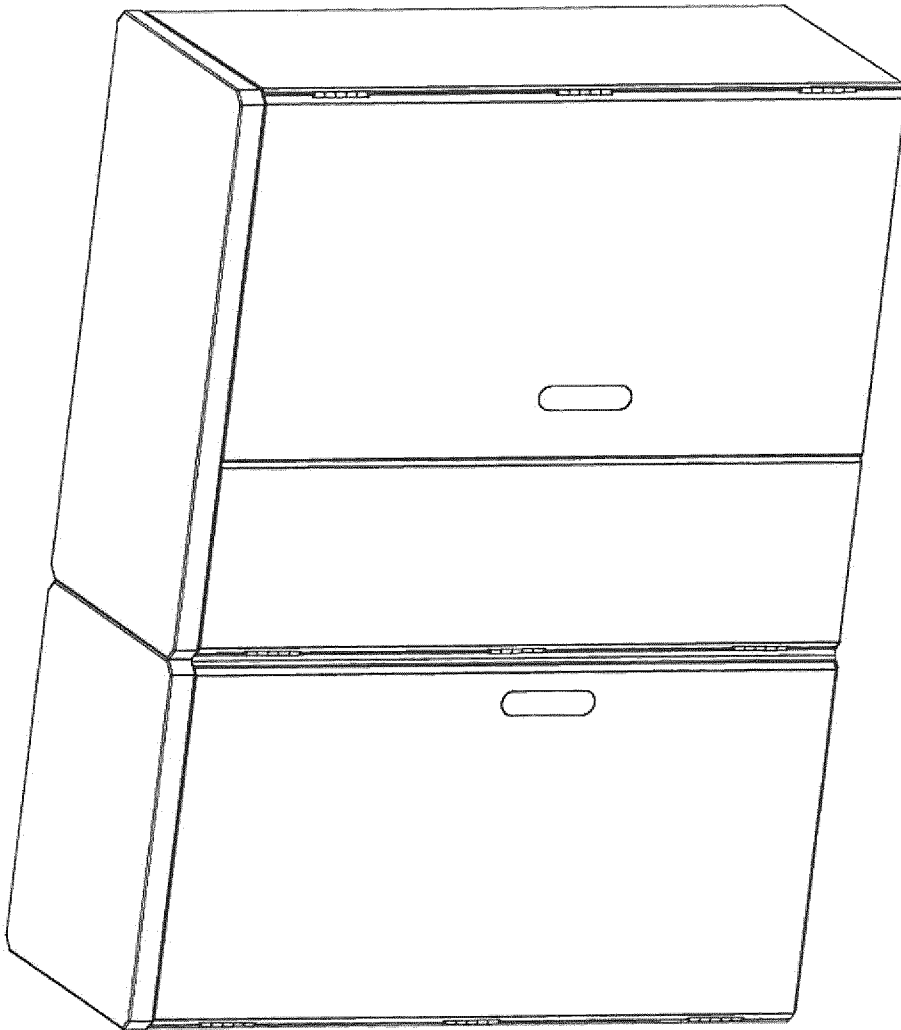


Fig. 4

100

INTERNATIONAL SEARCH REPORT

International application No  
PCT/EP2012/072778

A. CLASSIFICATION OF SUBJECT MATTER  
INV. H02B1/30 H02B1/38  
ADD. H02B1/01

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)  
H02B

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

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 101 13 935 C1 (RITTAL RCS COMM SYSTEMS GMBH & [DE]) 10 October 2002 (2002-10-10) figure 1	1-9
A	DE 33 10 688 A1 (LOH KG RITTAL WERK [DE]) 4 October 1984 (1984-10-04) figures 1,3	1-9
X	WO 91/18436 A1 (TRANSRACK [FR]) 28 November 1991 (1991-11-28)	1
A	figures 1,4,6	2-9
X	DE 196 09 704 C1 (LOH KG RITTAL WERK [DE]) 7 May 1997 (1997-05-07)	1
A	figure 2	2-9
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Further documents are listed in the continuation of Box C.

See patent family annex.

\* Special categories of cited documents :

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier application or patent but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
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- "P" document published prior to the international filing date but later than the priority date claimed

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"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

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Date of the actual completion of the international search  5 August 2013	Date of mailing of the international search report  13/08/2013
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Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Authorized officer  Overdijk, Jaco
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## INTERNATIONAL SEARCH REPORT

International application No  
PCT/EP2012/072778

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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A	figures 1a,3,4,7 -----	2-9
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Information on patent family members

International application No

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