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(54) **A GROUND SURFACE ACCESS ASSEMBLY WITH A COVER THAT CAN BE ADJUSTED TO PIVOT ABOUT MORE THAN ONE AXIS**

(57) A ground surface access assembly comprising a frame member and a grating or cover member; where the frame member has three pairs of frame slots/apertures and the grating/cover member has three pairs of engagement slots/apertures; each engagement slot/aperture being configured to be able to operably engage a pivot shaft; such that in use said grating/ cover member is pivotally connected to said frame using: just one pair of frame slots/apertures; one pair of engagement slots/apertures; and a pair of pivot shafts. By selection of appropriate slots/apertures the grating or cover member can pivot about one of three selectable axes, without altering the orientation of the grating/cover member relative to the frame member.

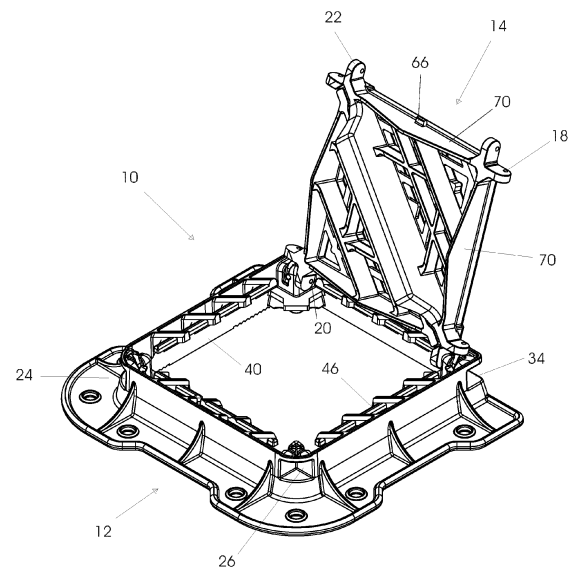


Figure 1

Description

Technical Field

[0001] This invention relates to a ground surface access assembly having a pivotally mounted cover; where the user may select one of two or three possible axes about which the cover will in normal use pivot, to allow access thereunder.

Background Art

[0002] Roadsides typically have kerbside drainage systems etc., that include a ground surface access assembly that may house a gully or grating through which rainwater may pass and then drain away via connected underground channels. Occasionally, such assemblies have a pivotally mounted gully or grating to facilitate access for servicing and cleaning and also to help prevent loss (through theft etc.) of the gully or grating. The axis about which the gully or grating pivots is typically determined by the direction of road traffic, and for safety reasons this is normally such that if a vehicle accidentally hits an open gully or grating the resulting impact will safely close the gully or grating. The required pivotal direction therefore varies; for example from country to country according to the side of the road on which vehicles are required to drive. Also, sometimes it is desirable to have an assembly where the gully or grating pivots about an axis parallel the road kerbside and as close to the kerb as possible. This means that a manufacturer of such ground surface access assemblies typically needs to stock up to three different versions in order to accommodate possibly differing user requirements.

Disclosure of Invention

[0003] An aim of the present invention is to provide a ground surface access assembly that has an opening hinged portion; wherein during installation the installer may select one of three possible pivot axes. Another aim is to provide such apparatus wherein the desired pivot axis of the grating/cover member relative to the frame member may be varied without altering the orientation of the grating/cover member relative to the frame member. A further aim is to provide such apparatus wherein after installation the pivot axis may be readily changed owing to the easy accessibility of the pivot members

[0004] In one aspect the invention comprises a ground surface access assembly comprising a frame member and a grating or cover member; said assembly having two or three pairs of pivot means such that in use said grating/cover member is pivotally connected to said frame member using just one pair of pivot means, so as to pivot relative to the frame member about a pivot axis; wherein each pivot means comprises a slot/aperture in said frame, an engagement slot/aperture in said grating/cover member and at least one pivot shaft that oper-

ably engages both the frame slot/aperture and the grating/cover slot/aperture; and wherein the pivot axis of the grating/cover member relative to the frame member may be changed by selecting an appropriate pair of pivot means, without altering the orientation of the grating/cover member relative to the frame member. Preferably, the frame member and the complete grating/cover member are rectangular (in plan view) and the pair of slots/apertures comprising said pair of pivot means are located near adjacent corners of these rectangular members (rather than on opposite corners).

[0005] In another aspect the invention comprises a ground surface access assembly having a frame member and a grating or cover member; wherein said frame member has three pairs of frame slots/apertures located within said frame member and the grating or cover member has three pairs of engagement slots/apertures; each engagement slot/aperture being configured to be able to operably engage a pivot shaft; such that in use said grating or cover is pivotally connected to said frame using just one pair of frame slots/apertures and just one pair of engagement slots/apertures and at least one pivot shaft; one end of said at least one pivot shaft engaging an engagement slot/aperture and passing through said frame slots/apertures.

[0006] In another aspect the invention comprises a ground surface access assembly having a frame member and a grating or cover member wherein said grating or cover member comprises three pairs of engagement slots/apertures located within said grating or cover member; each engagement slot/aperture being configured to operably engage a pivot shaft; and the frame member has three pairs of frame slots/apertures; such that in use said grating or cover is pivotally connected to said frame using just one pair of frame slots/apertures and just one pair of engagement slots/apertures and a pair of pivot shafts; one end of each pivot shaft engaging an engagement slot/aperture of said just one pair of engagement slots/apertures.

[0007] In another aspect the invention comprises a ground surface access assembly having a frame member and a grating or cover member; further comprising two pivot shafts that: operably engage with part of the frame member; or extend from the frame member; and where said pivot shafts may engage either a first pair; a second pair or a third pair of slots/apertures in said grating or cover member so that the grating or cover member may be operably adjusted to pivot about just one of three possible/different axes.

[0008] In another aspect the invention comprises a ground surface access assembly having a frame member and a grating or cover member; further comprising two pivot shafts that: operably engage with part of the grating or cover member; or extend from the grating or cover member; and where said pivot shafts may engage either a first pair; a second pair or a third pair of slots/apertures in said frame so that the grating or cover member may be operably adjusted to pivot about just one of three pos-

sible/different axes.

[0009] In the first three of the above aspects by selection of an appropriate pair of said frame slots/apertures and engagement slots/apertures the grating or cover member preferably pivot about one of three different axes. Preferably, two of the three pivot axes are parallel and both are perpendicular to remaining pivot axis.

[0010] In the first, fourth and fifth of the above aspects preferably, two of the three pivot axes are parallel and both are perpendicular to remaining pivot axis.

[0011] In the first three of the above aspects the frame slots/apertures or engagement slots/apertures are preferably arcuate or non-circular shaped.

[0012] In the first three of the above aspects the grating or cover member preferably has three pairs of substantially parallel extension arms wherein said engagement slots/apertures are located

[0013] In the first three of the above aspects the ground surface assembly frame member preferably has four corner recesses each comprising a pair of recess walls that are mutually perpendicular and wherein a frame slot/aperture is located in at least one said recess wall.

[0014] In all of the above aspects the grating or cover member preferably comprises two portions that are operably loosely connected and where each of said two portions is in use supported at just three points by said frame. Preferably, each portion is supported by a plurality of corner base plates that extent inwardly from the sidewalls of said frame in a plane that is generally perpendicular to the planes of said sidewalls.

[0015] In all of the above aspects preferably; the frame further comprises a curved face portion, located above and proximal at least one roof portion of a corner recess thereof; and a stay pin located in an unused engagement slot/aperture or a further slot/aperture within said gully/grating member and proximal one of the two engagement slots/apertures currently engaging a pivot shaft; such that in use as the gully/grating member is opened a curved end face of said stay pin is lifted over said curved face portion of the frame member so that when the gully/grating member is fully open said curved face is seated in a "recess" that is formed in part by a trailing edge of said curved face and in part by an adjoining planar or curved surface. Preferably, the engagement slots/apertures are located within three pairs of substantially perpendicular arms that each extend from a corner of the grating or cover member.

[0016] In another aspect the invention comprises a ground surface access assembly having a frame member that houses a pivotably mounted grating or cover member wherein the grating or cover member may operably adjusted to pivot about just one of three possible/different axes. Preferably, the desired pivot axis of the grating/cover member relative to the frame member may be varied without altering the orientation of the grating/cover member relative to the frame member.

[0017] In another aspect the invention comprises a ground surface access assembly having a frame member

that houses a pivotably mounted grating or cover member wherein said grating or cover member comprises three pairs of engagement slots/apertures located within said grating or cover member; each slot/aperture being configured to operably engage a pivot shaft; and the frame member has three pairs of frame slots/apertures; such that in use said grating or cover is pivotally connected to said frame using just one pair of frame slots/apertures and just one pair of engagement slots/apertures and one or a pair of pivot shafts; one end of each pivot shaft engaging an engagement slot/aperture of said just one pair of engagement slots/apertures; and wherein the grating or cover member may operably adjusted to pivot about just one of three possible/different axes.

[0018] In all of the above aspects the ground surface access assembly frame member and the gully/grating member are preferably rectangular in plan view. Preferably, said pair of pivot means comprise a pair of slots/apertures located near adjacent corners of said rectangular frame member and the rectangular gully/grating member.

[0019] In another aspect the invention comprises a method of pivotally mounting a grating/cover member within the frame member of a ground surface access assembly; said assembly having two or more pairs of pivot means wherein each pivot means comprises a slot/aperture in said frame, an engagement slot/aperture in said grating/cover member and at least one pivot shaft that operably engages both the frame slot/aperture and the grating/cover slot/aperture; wherein the pivot axis of the grating/cover member relative to the frame member may be changed, without altering the orientation of the grating/cover member relative to the frame member, by selecting and using just one pair of pivot means.

[0020] Optionally, said pair of pivot means may share just a single pivot shaft, or each pivot means may have its own individual pivot shaft. Preferably, the frame member and the grating/cover member are rectangular in plan view and where a pair of slots/apertures located near adjacent corners of said rectangular frame member and rectangular grating/cover member comprise said pair of pivot means.

Brief Description of Drawings

[0021] The present invention is illustrated by the following diagrammatic figures in which:

Figure 1 shows a ground surface access assembly comprising a frame and a pivotably mounted grating configured so that it pivots about an axis proximal the kerbside face of the frame, with the grating in the open position;

Figure 2 shows a plan view of the ground surface access assembly of Figure 1 with the grating in the open position;

Figure 3 shows a rear end view of the ground surface access assembly of Figure 1 with the grating in the open position;

Figure 4 shows an underside view of the ground surface access assembly of Figure 1 with the grating in the closed position;

Figure 5 shows a plan view of the ground surface access assembly of Figure 1 with the grating in the closed position and also four corresponding side/end views;

Figure 6 shows a perspective view of the two portions of the grating and the means by which they are in use connected;

Figures 7(a) to 7(c) show details of the pivot shaft, the frame slot/aperture and the grating cover when the grating cover is closed, partially open, and fully open respectively;

Figure 8 shows a perspective view of the underside of the frame and grating cover when closed, and in particular details of the snap-fit closure arrangement;

Figure 9 shows a perspective view of the ground surface access assembly of Figure 1 with the grating in the closed position and configured so that it pivots about an axis proximal the left hand side of the frame; and

Figure 10 shows a perspective view of the ground surface access assembly of Figure 1 with the grating in the open position and configured so that it pivots about an axis proximal the right-hand side of the frame.

Detailed Description

[0022] A preferred embodiment of the present invention will now be described in detail by reference to Figures 1 to 10. Figures 1 to 3 show a perspective view; a plan view; and a rear end view respectively of a ground surface access assembly, in an open position, suitable for installation adjacent to the kerb of a road, and in these illustrations configured to open by pivoting about an axis X-X' (see Figure 2) parallel to the kerb, and close to the kerb.

[0023] The ground surface assembly (10) essentially comprises a frame member (12) and a pivotally mounted gully/grating member (14). Alternatively, this pivotally mounted member (14) may be a cover or lid. The gully/grating member comprises a plurality of interconnected support beams configured to provide gaps (G - see Figure 3) that in use allow rainwater to drain there through. It is important that the gully/grating member has high structural strength, as in use heavy vehicles will periodically drive over it.

[0024] The frame member (12) is generally rectangular in shape (when viewed from above) and comprises four sidewalls (40) and a flange member (42) that extends outwardly from three of the four sidewalls. There is no such flange member portion (42) on that side of the frame member that (in use) will be nearest the road kerb. Each portion of the flange member (42) is also connected to the corresponding sidewall (40) by several gussets (44), and part of the underside of the flange member has rippled surface (R - see Figure 4) to facilitate bedding in mortar etc. Each flange member portion has rolled edge (54) and plurality of fixing holes (56) with donut shaped edges.

[0025] Each corner portion of frame member (12) is curved (when viewed from above) and has a corner recess (24) comprising: two rectangular walls (26) that are mutually perpendicular; a base portion (34) and roof portion (36 - see Figure 5) that are both quadrant shaped.

[0026] The frame member (12) has three pairs of frame slots/apertures (16) located in appropriate sidewalls (40) of neighbouring corner recesses (24) - these frame slots/apertures (16) are typically arcuate or shaped (see Figures 3 and 7) so as to allow lateral (as well as pivotal) movement of a pivot shaft (20) within each frame slot/aperture (16) as the gully/grating is pivoted from a closed to an open position (see Figures 7a-7c) and vice-versa. Each corner of inside of frame member (12) has a gully support plate (32).

[0027] Inside the frame there are four side grill portions (46) that extend from the inside of each sidewall (40) and are positioned between adjacent rectangular walls (26) of each pair of adjacent corner recesses (24). Each side grill portion (46) comprises a plurality of angled support members (48) each of which is fixed to and extends at the same angle (approximately 45°) from the inside of each sidewall (40). These angled support members (48) are connected by an elongate support member (50) that is positioned parallel to the corresponding sidewall (40). The support members (48, 50) are arranged in an open structure (to allow drainage). Three of the elongate support members (50) are connected to all of the corresponding angled support members (48). One of the elongate support members (50a) is shorter and is attached (at one end) to only one angled support member (48a) and has a protrusion (52) at the other end that in use engages the gully/grating and thereby operably locks it in the closed position. The singular connection of this shorter elongate support member (50a) to the angled support member (48a) allows a degree of deflection of the shorter elongate member (50a) during closure of the gully/grating member and so provides a snap-shut action.

[0028] The outer face of one sidewall of the gully/grating (14) has a wedge-shaped protrusion (66) that in use snap-fit engages (see Figure 8) the protrusion (52) from a side of the shorter elongate support member (50a). In use, the gully/ grating member (14) is separated from the protrusion (52) using a crowbar, or the like.

[0029] The gully/grating member (14) typically com-

prises first and second portions (28, 30) each approximately triangular (when viewed from above - see Figure 3). These two portions (28, 30) are connected, but not rigidly - so that each portion can move (to a limited degree) independently thereby allowing a corner of each portion (28, 30) to rest on and be supported by the gully support plate (32). The gully/grating member (14) is generally rectangular (when viewed from above). It has four pairs of extension arms (22) extending outwardly and perpendicularly from sidewalls (70) of the gully/grating member portions (28, 30). Each extension arm (22) may have an engagement slot/aperture (18) configured to tightly hold and retain one end of a pivot shaft (20) or stay pin (74).

[0030] The first and second portions (28, 30) of the gully/grating member (14) are loosely connected (see Figure 6) by a pair of studs (58) that protrude from the first portion (30), and pass through holes (56) of slightly larger diameter than each stud, in the second portion (28). The studs are held in place within the second portion (thereby loosely connecting the two portions) by a holding washer (60) and clip (62) that engages a bore (72) near the distal end of each stud. In addition to the studs (58), the interface of the first and second portions is largely provided by a first beam (64) within a second beam (68) each beam being approximately I-shaped in cross section. This arrangement allows the first and second portions (28, 30) to move slightly relative to one another. In this way each corner of each portion (28, 30) can advantageously always be supported by an adjacent gully support plate (32.) This would not always be possible if the gully/grating was a single member as it would then need to be simultaneously supported by each of the four support plates (32) and so would be liable to rock/tilt within the frame member (12).

[0031] In use, just one pair of pivot shafts (20) engage just one pair of adjacent engagement slots/apertures (18) within the gully/grating member (14) and also just one pair of frame slots/apertures (16) within the frame member (14); thus allowing the gully/grating member (14) to pivot relative to the frame member (12).

[0032] Advantageously, the gully/grating member (14) can be pivotally mounted within the frame member (12) in one of three possible configurations depending upon which two pairs of frame slots/apertures (16) and engagement slots/apertures (18) are selected. In this way the gully/grating member may pivot about the kerbside edge of the frame (see Figure 1); the left hand side of the frame (see Figure 9); or the right hand side of the frame (see Figure 10). The pivot shaft (20) are preferably inserted and removed as required via the access advantageously provided by each frame corner recess (24). Preferably, the pivot shafts (20) are held tightly within the engagement slots/apertures (18) owing to an interference fit configuration. In this case, they can be inserted within the engagement slots/apertures using a hammer; access being provided via the appropriate corner recess (24).

[0033] Advantageously, when the ground surface access assembly (10) is installed and in use the pivot axis of the gully/grating member (14) within the frame (12) can be readily changed to any of the above described three possible configurations; by simply removing the two pivot shafts (using for example a hammer) and repositioning these shafts as appropriate to select an alternative pivot configuration.

[0034] Figures 7(a) to 7(c) also show a stay pin (74) located in an engagement slot/aperture (18) proximal (nearest to) an engagement slot/aperture currently housing a pivot shaft (20). In use, two such stay pins (74) are so located - one proximal each of the two engagement slots/apertures currently engaging a pivot shaft. As the gully/grating member is opened the curved end face (76) of these stay pins (74) is lifted over a curved face (78) portion of the frame member (12), located above the corner (24) recess roof portion (36). This lifting is possible because of the arcuate etc. (see above) shape of the frame slot/aperture (16). When the gully/grating member (14) is fully open the curved face is seated in a recess 82 that is formed in part by the trailing edge (80) of the curved face (78) and in part by a planar surface (82). The seating of the curved end faces (76) of the stay pins (74) helps keep the gully/grating member (14) in an open position and resists accidental closure - the gully/grating member (14) having to be lifted, relative to the frame, as it is pivoted towards the closure position.

[0035] While it is preferable that the pivot shafts engage a slot/aperture in the gully/grating member; alternatively at least one pivot shaft may be an integral part of the gully/grating member; for example, by extending sideways from a side face of the gully/grating member. Also as an alternative to the above, at least one pivot shaft may extend inwardly from an inner face of the frame member wall. In both of these alternative cases (with just one integral pivot shaft) the second pivot shaft would preferably be detachable; either from an inner face of the frame member wall or from a side face of the gully/grating member; preferably by either being an interference fit within a slot/aperture or by a screw thread attachment thereto. While the frame slots/apertures are preferably located in corner recess sidewalls, they may alternatively be located in the main sidewalls of the frame member. In these latter embodiments the desired pivot axis (one of three possible) could be selected by repositioning the gully/grating member within the frame member; rather than by repositioning the pivot shafts relative to the gully/grating member, as illustrated in the preferred embodiment, described above by reference to Figures 1 to 10.

Claims

1. A ground surface access assembly (10) comprising a frame member (12) and a grating or cover member (14); said assembly having two or three pairs of pivot means such that in use said grating/cover member

- (14) is pivotally connected to said frame member (12) using just one pair of pivot means, so as to pivot relative to the frame member (12) about a pivot axis; wherein each pivot means comprises a slot/aperture in said frame (16), an engagement slot/aperture in said grating/cover member (18) and at least one pivot shaft (20) that operably engages both the frame slot/aperture (16) and the grating/cover slot/aperture (18); and wherein the pivot axis of the grating/cover member (14) relative to the frame member (12) may be changed, without altering the orientation of the grating/cover member (14) relative to the frame member (12), by selecting an appropriate pair of pivot means.
2. A ground surface access assembly (10) according to Claim 1 comprising three pairs of pivot means.
 3. A ground surface access assembly (10) according to Claim 2 where by selection of an appropriate pair of pivot means the grating/cover member (14) may pivot about one of three different pivot axes.
 4. A ground surface assembly according to Claim 3 wherein two of said three pivot axes are parallel and both are perpendicular to remaining pivot axis.
 5. A ground surface assembly according to Claim 1 or 2 where the frame slots/apertures (16) or engagement slots/apertures (18) are arcuate or non-circular shaped.
 6. A ground surface assembly according to Claim 1 or 2 wherein said grating/cover member (14) has three pairs of substantially parallel extension arms (22) wherein said engagement slots/apertures (18) are located
 7. A ground surface assembly according to Claim 1 or 2 where said frame member (12) has four corner recesses (24) each comprising a pair of recess walls (26) that are substantially mutually perpendicular and where a frame slot/aperture (16) is located in at least one recess wall.
 8. A ground surface assembly according to Claim 1 or 2 where the frame member (12) further comprises a curved face (78) portion, located above and proximal at least one roof portion (36) of a corner recess (24) thereof; and a stay pin (74) located in a slot/aperture within said grating/cover member (14) and proximal one of the two engagement slots/apertures (18) currently engaging a pivot shaft; such that in use as the grating/cover member (14) is opened a curved end face (76) of said stay pin (74) is lifted over said curved face (78) portion of the frame member (12) so that when the grating/cover member (14) is fully open said curved face (78) is seated in a "recess" that is formed in part by a trailing edge (80) of said curved face (78) and in part by an adjoining planar or curved surface (82).
 9. A ground surface assembly according to Claim 1 or 2 wherein the engagement slots/apertures (18) of the grating/cover member (14) are located within three pairs of substantially perpendicular arms (22) that each extend from a corner of the grating/cover member (14).
 10. A ground surface access assembly according to any preceding claim where the frame member (12) and the grating/cover member are rectangular in plan view.
 11. A ground surface access assembly according to Claim 10 where a pair of slots/apertures located near adjacent corners of said rectangular frame member (12) and rectangular grating/cover member (14) comprise said pair of pivot means.
 12. A method of pivotally mounting a grating/cover member (14) within the frame member (12) of a ground surface access assembly (10); said assembly having two or more pairs of pivot means wherein each pivot means comprises a slot/aperture in said frame (16), an engagement slot/aperture in said grating/cover member (18) and at least one pivot shaft (20) that operably engages both the frame slot/aperture (16) and the grating/cover slot/aperture (18); wherein the pivot axis of the grating/cover member (14) relative to the frame member (12) may be changed, without altering the orientation of the grating/cover member (14) relative to the frame member (12), by selecting and using just one pair of pivot means.
 13. A method according to Claim 12 wherein said pair of pivot means comprise a single pivot shaft (20) only.
 14. A method according to Claim 12 wherein said pair of pivot means comprises two separate pivot shafts (20).
 15. A method according to Claim 12 where the frame member (12) and the grating/cover member are rectangular in plan view and where a pair of slots/apertures located near adjacent corners of said rectangular frame member (12) and rectangular grating/cover member (14) comprise said pair of pivot means.

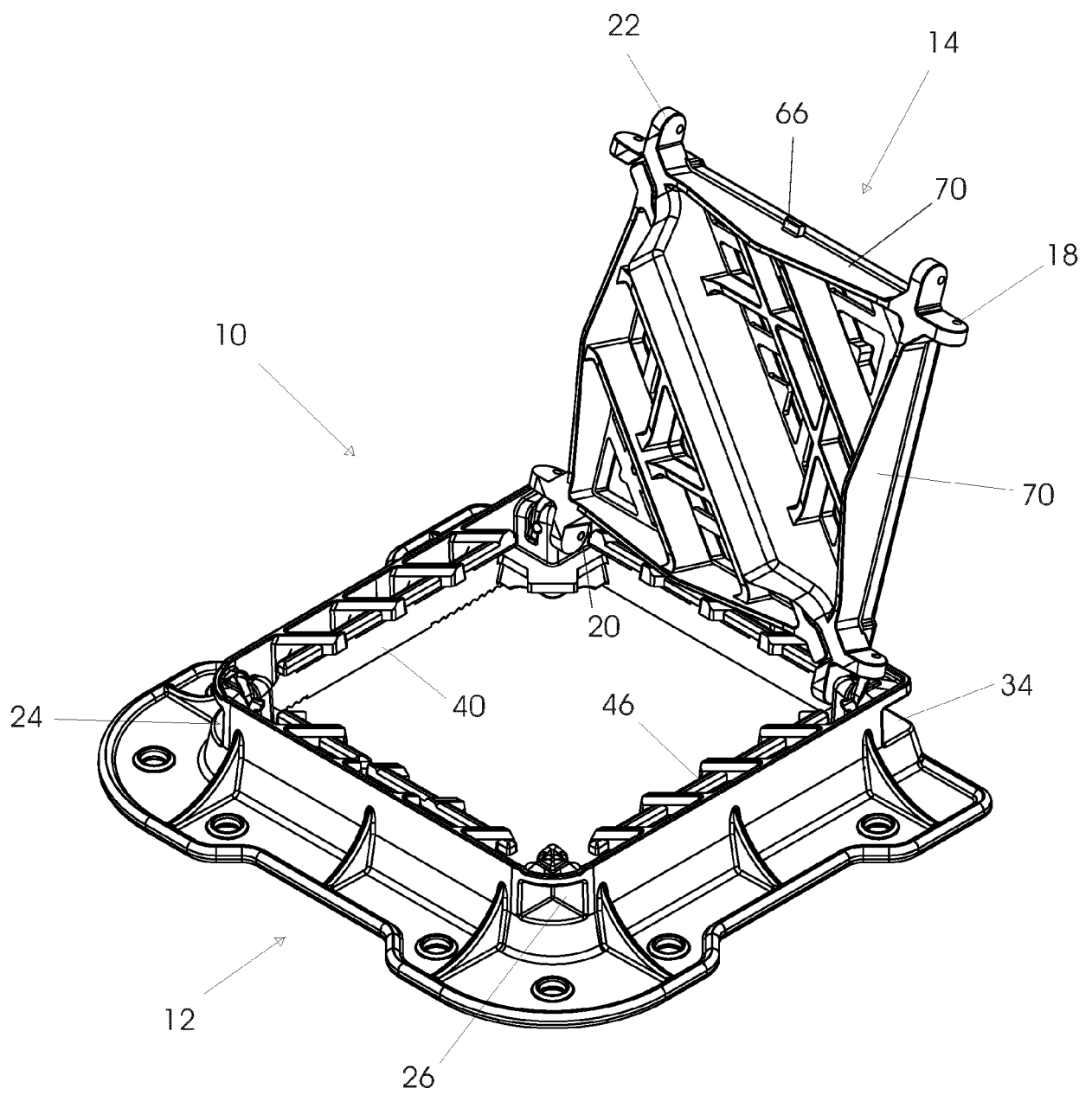


Figure 1

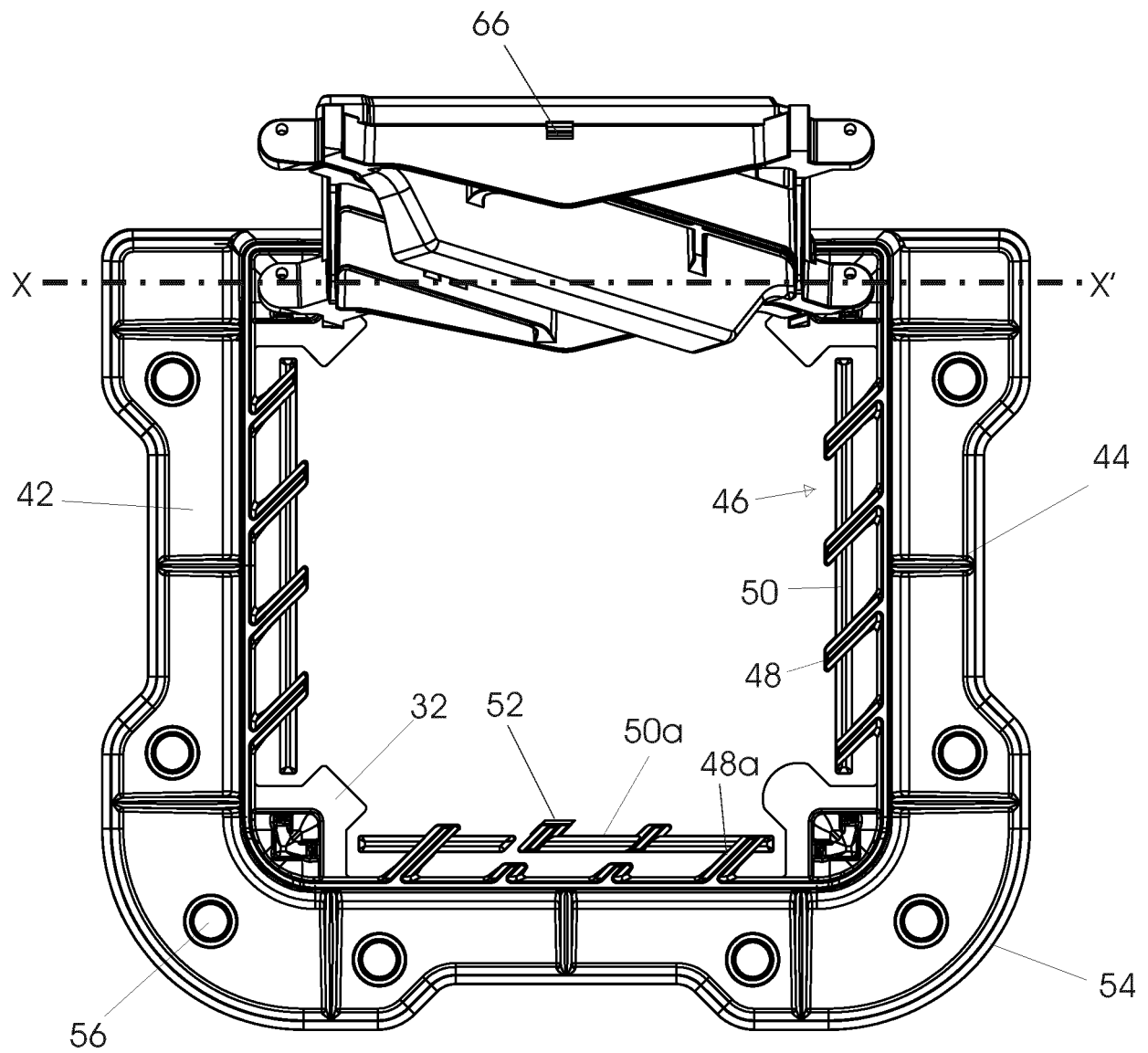


Figure 2

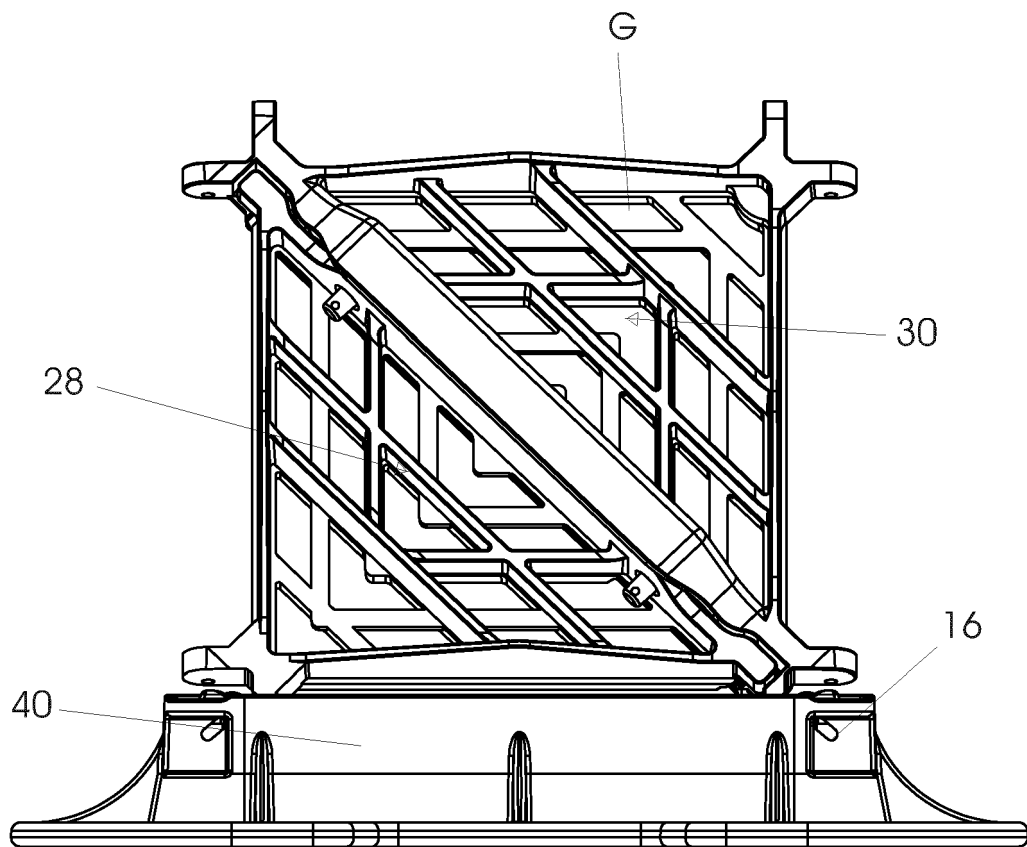


Figure 3

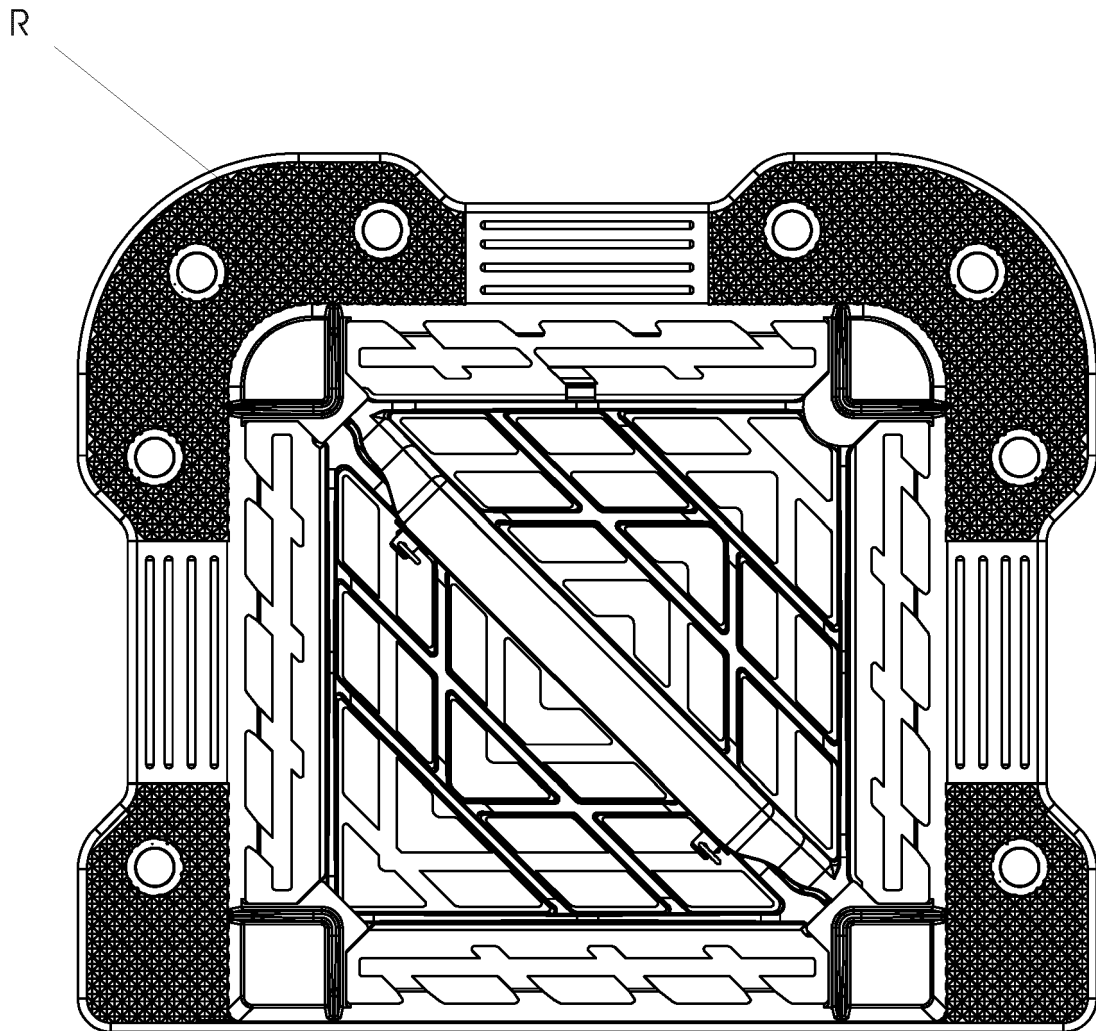


Figure 4

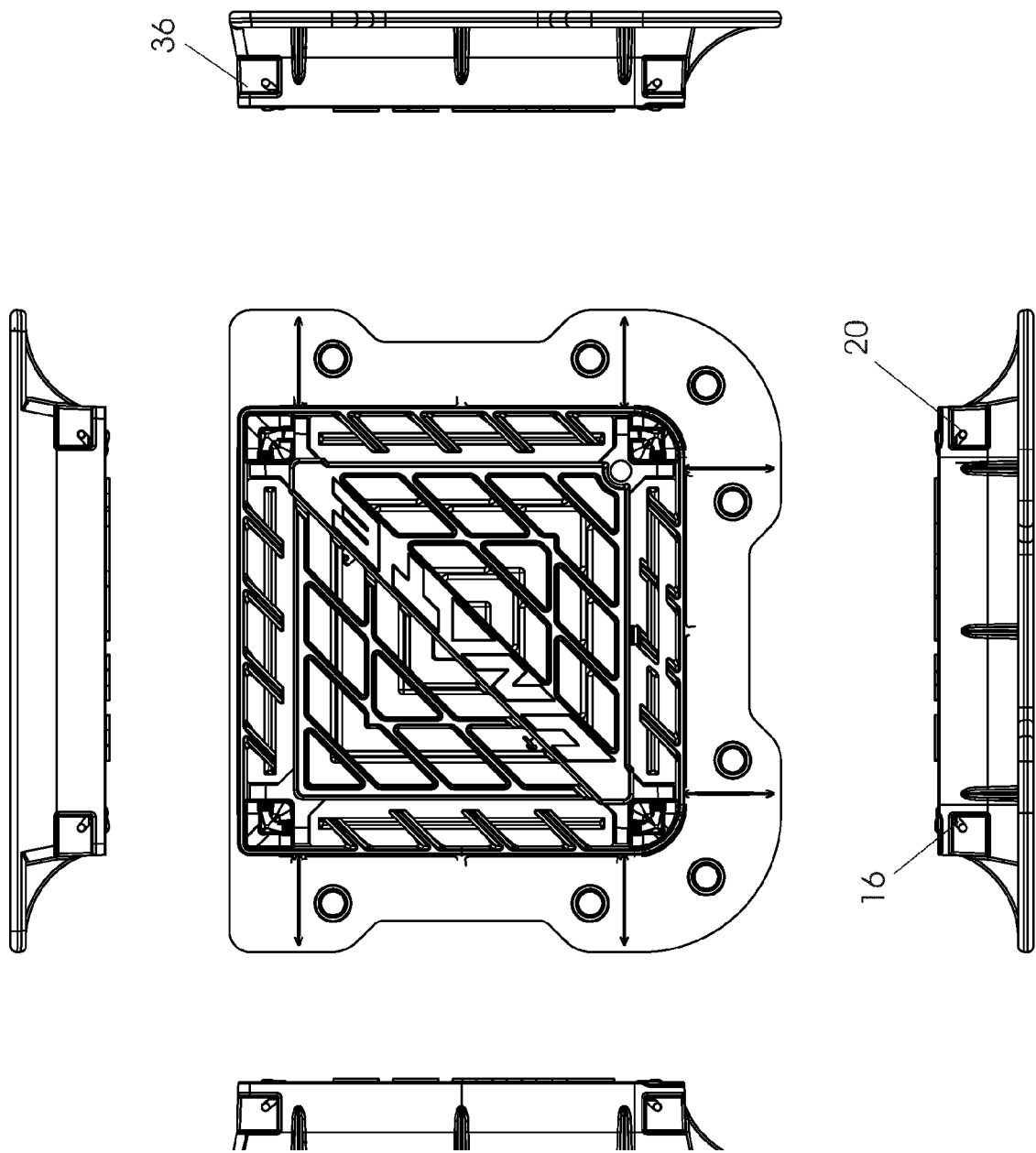


Figure 5

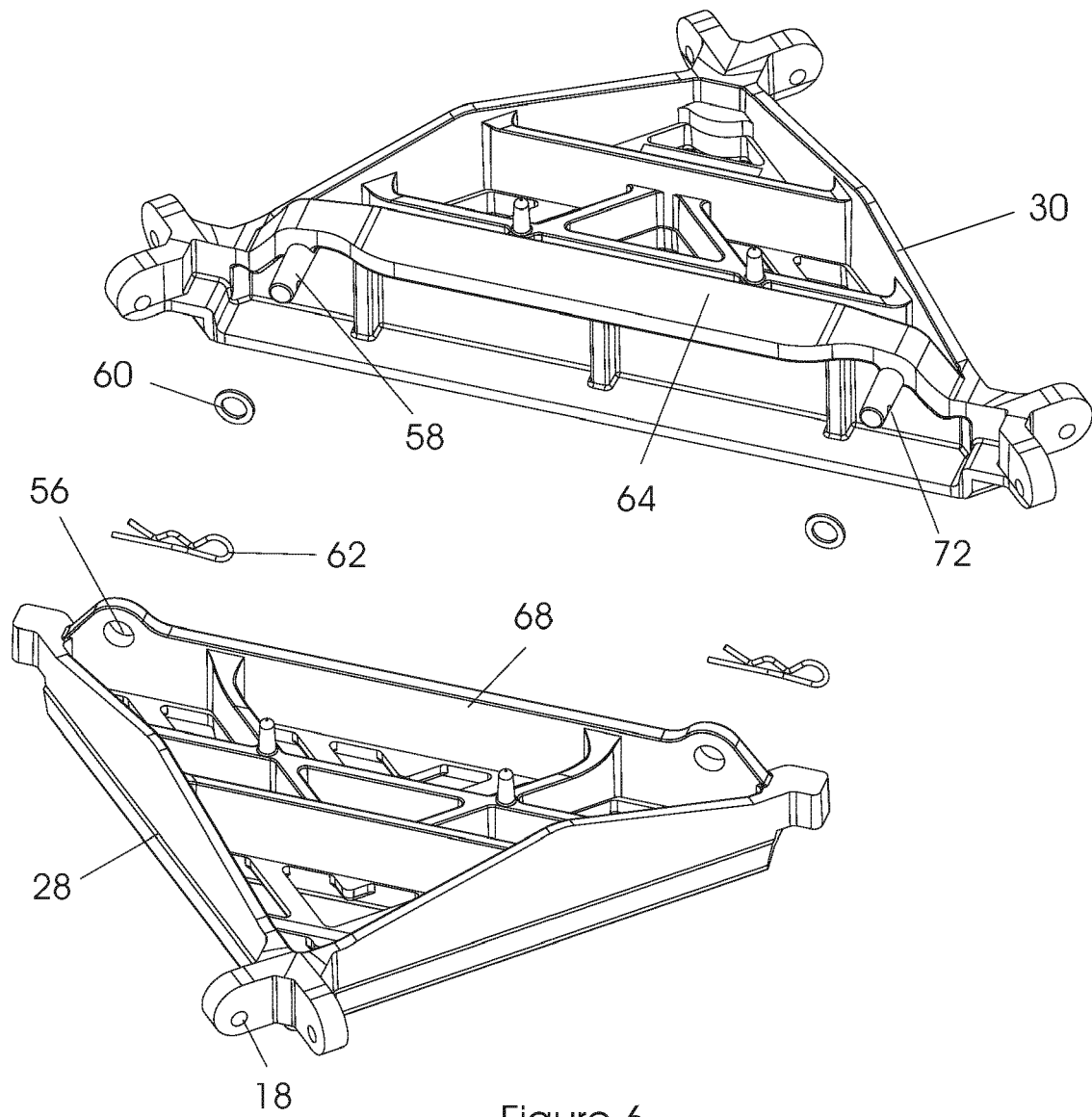


Figure 6

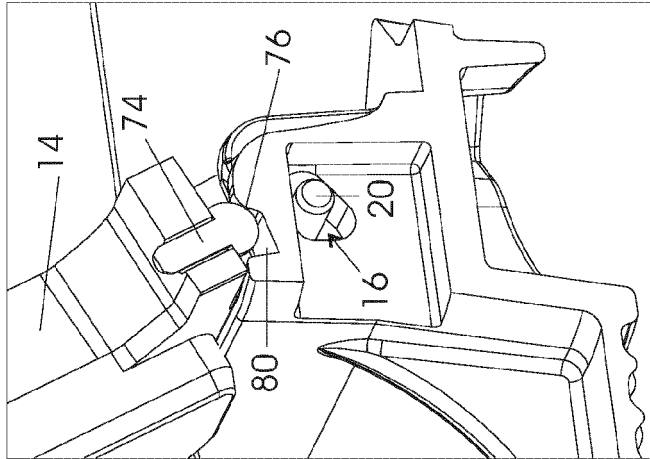


Figure 7(c)

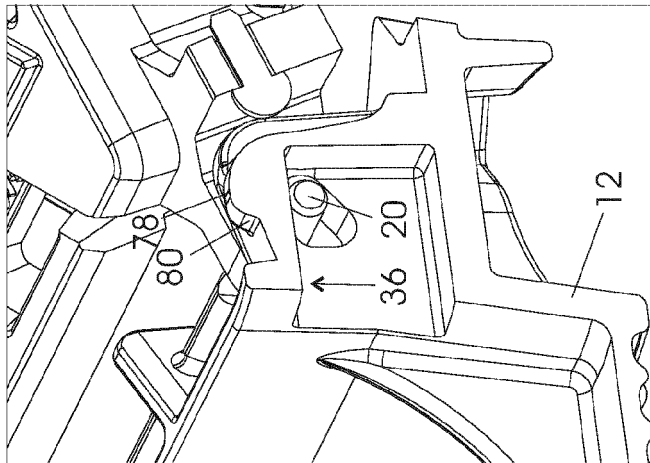


Figure 7(b)

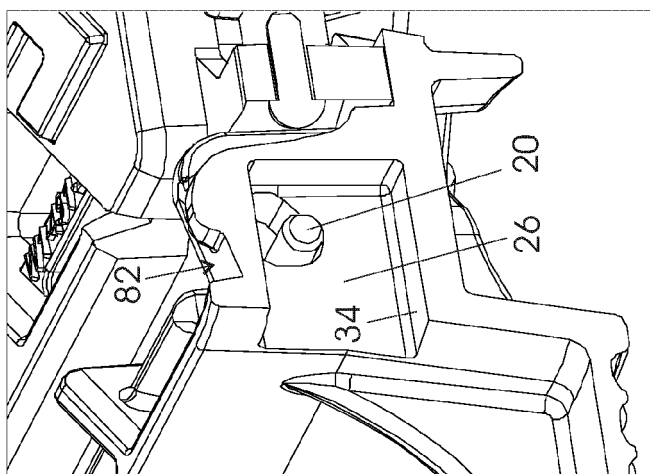


Figure 7(a)

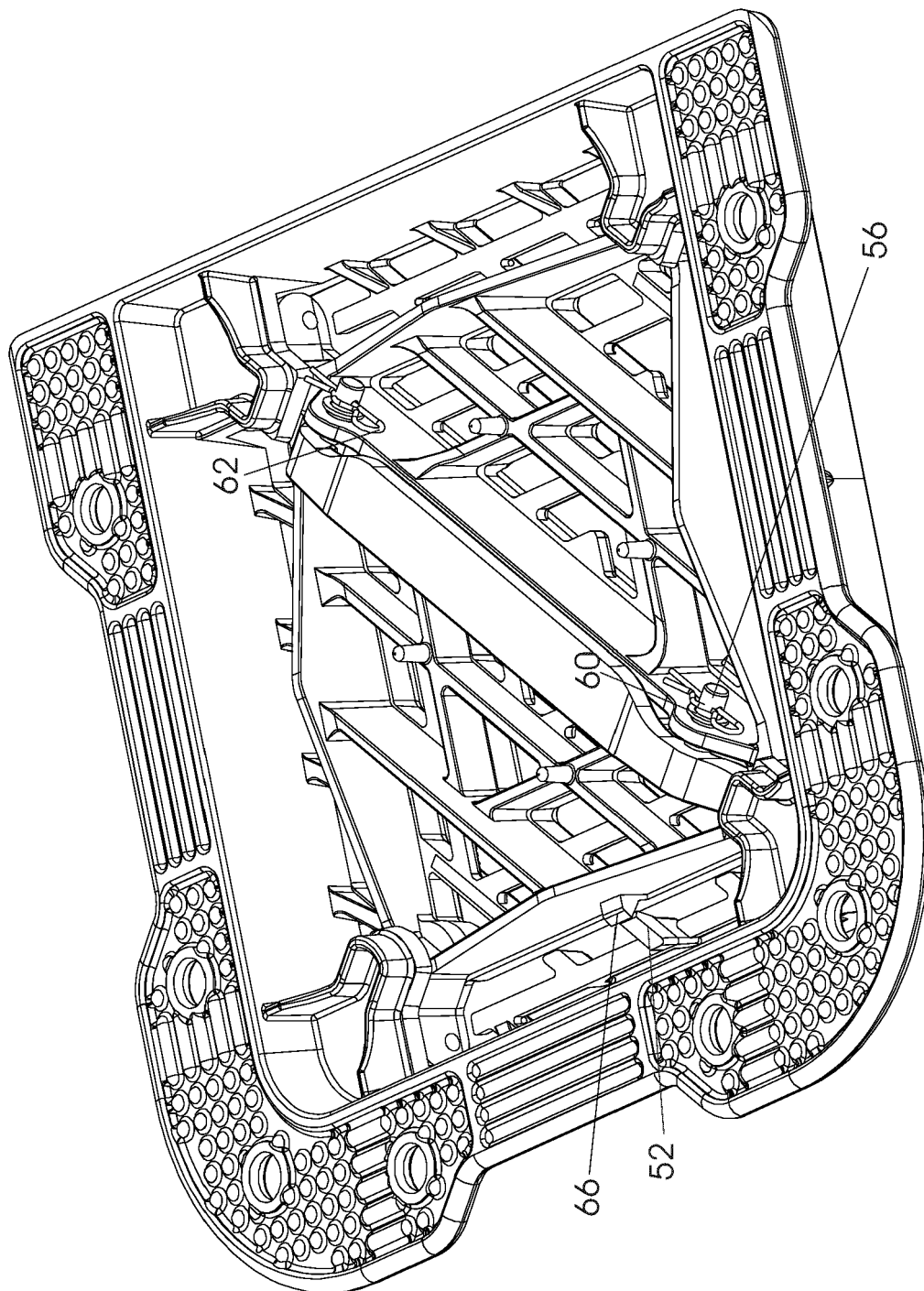


Figure 8

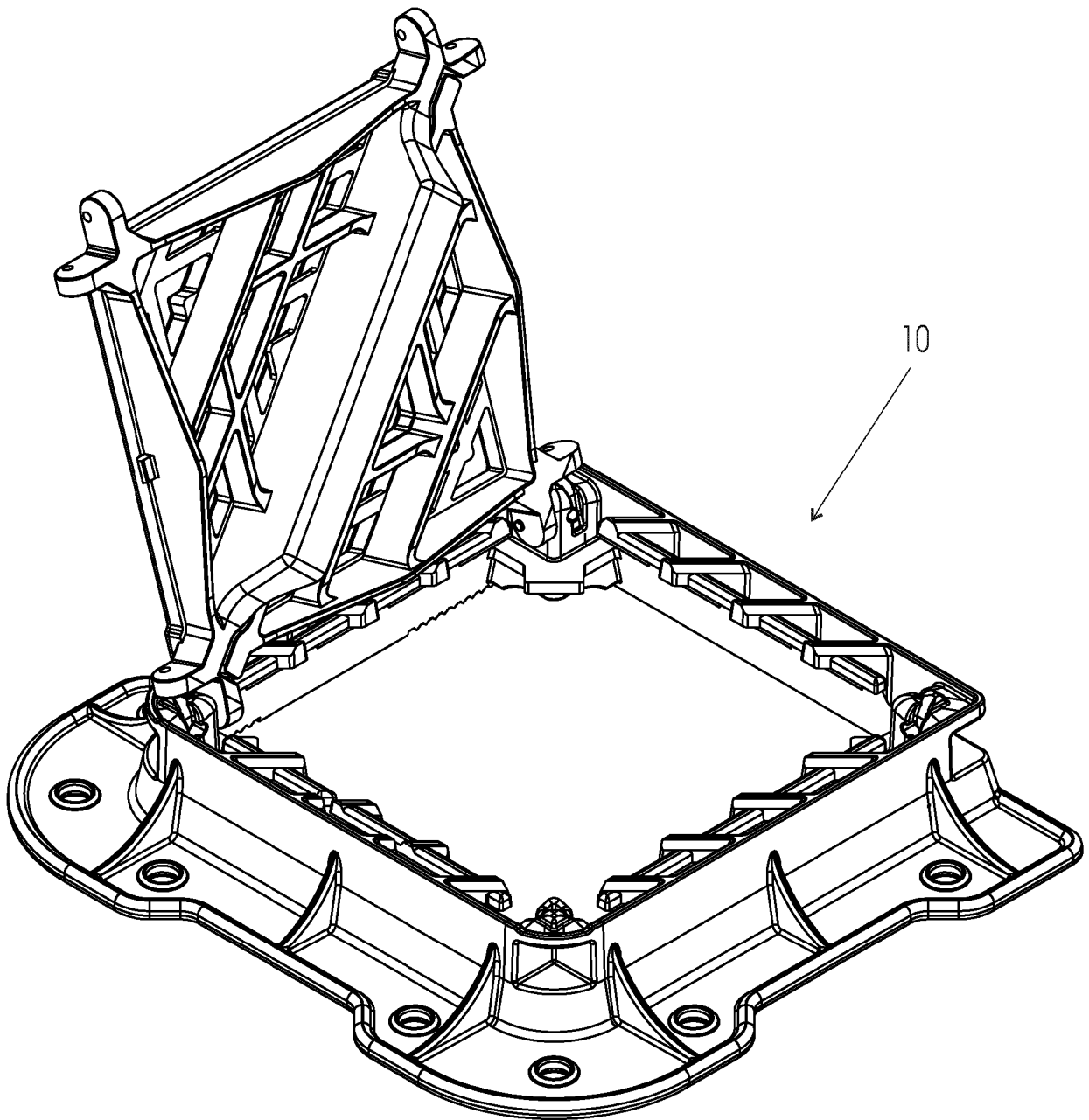


Figure 9

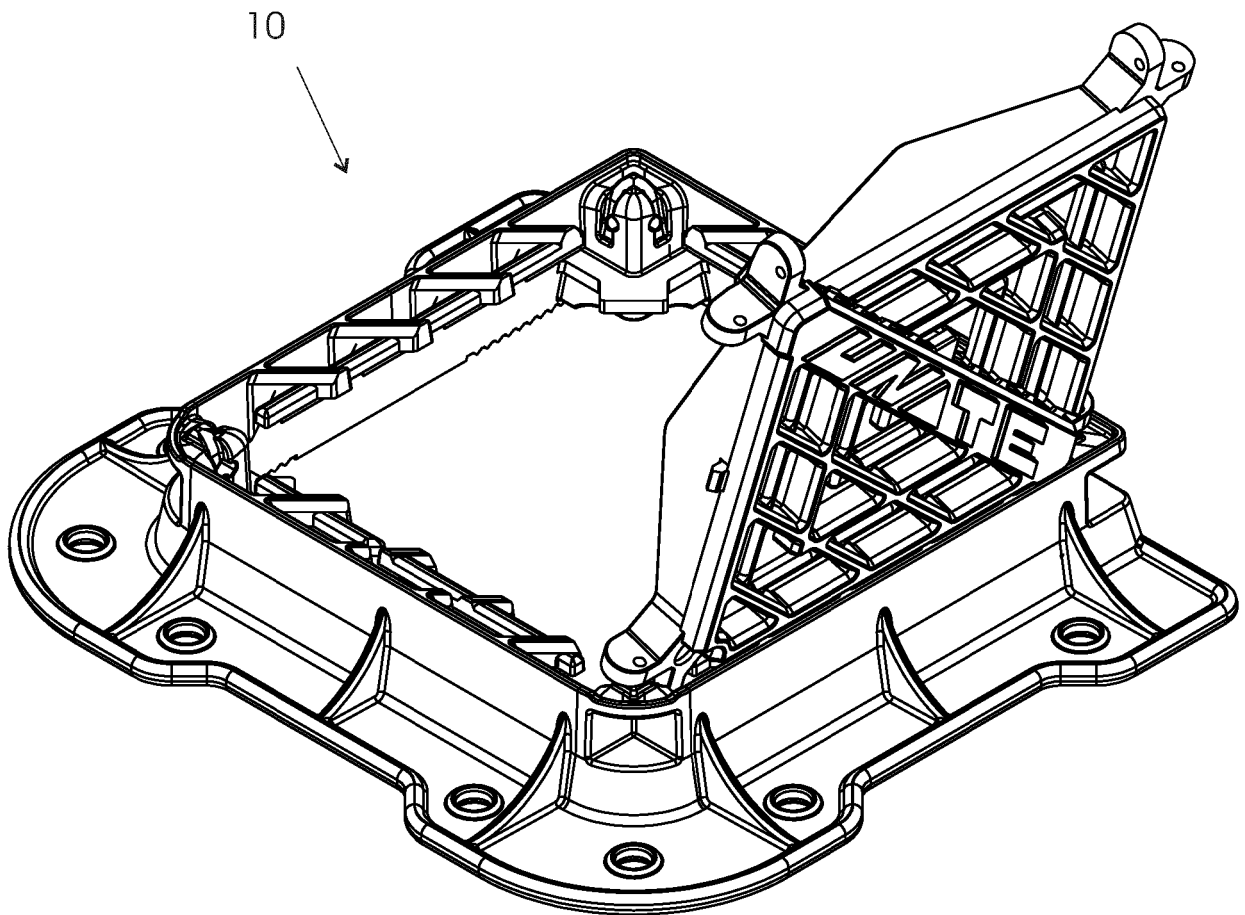


Figure 10



EUROPEAN SEARCH REPORT

Application Number
EP 18 02 0259

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	GB 2 355 037 A (C I S [GB]) 11 April 2001 (2001-04-11)	1,5-8, 10-15	INV. E03F5/06 E02D29/14
A	* figures 1-4,11 *	4	
X	GB 2 355 038 A (C I S [GB]) 11 April 2001 (2001-04-11)	1,5-8, 10-15	
A	* the whole document *	4	
X	GB 2 209 783 A (GLYNWED CONSUMER & BUILDING [GB]) 24 May 1989 (1989-05-24)	1,5-8, 10-15	E03F E02D E01C
A	* the whole document *	4	
X	FR 2 292 804 A1 (SAMBRE & MEUSE USINES [FR]) 25 June 1976 (1976-06-25)	1-3,5-15	
A	* the whole document *	4	
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 6 November 2018	Examiner Valenta, Ivar
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

EPO FORM 1503 03/82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 18 02 0259

5

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

06-11-2018

10

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
GB 2355037 A	11-04-2001	NONE	
GB 2355038 A	11-04-2001	NONE	
GB 2209783 A	24-05-1989	NONE	
FR 2292804 A1	25-06-1976	NONE	

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35

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EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82