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Stormwater or Utilities Pit Assembly

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(71) Applicant(s)
Reln Pty Ltd

(72) Inventor(s)
Nattrass, Luke Nigel;Adams, Steven

(74) Agent / Attorney
Integrated IP, Level 8, 99 Walker Street, North Sydney, NSW, 2060, AU

Abstract

The present invention is broadly directed to a stormwater pit assembly 10 comprising:

1. a plastic pit 12 including a flange rim 14;
2. a reinforcing frame 16 configured for mounting to the flange rim 14;
3. a grate 18 positioned across an entrance 20 of the pit 12 and arranged for retention with the reinforcing frame 16.

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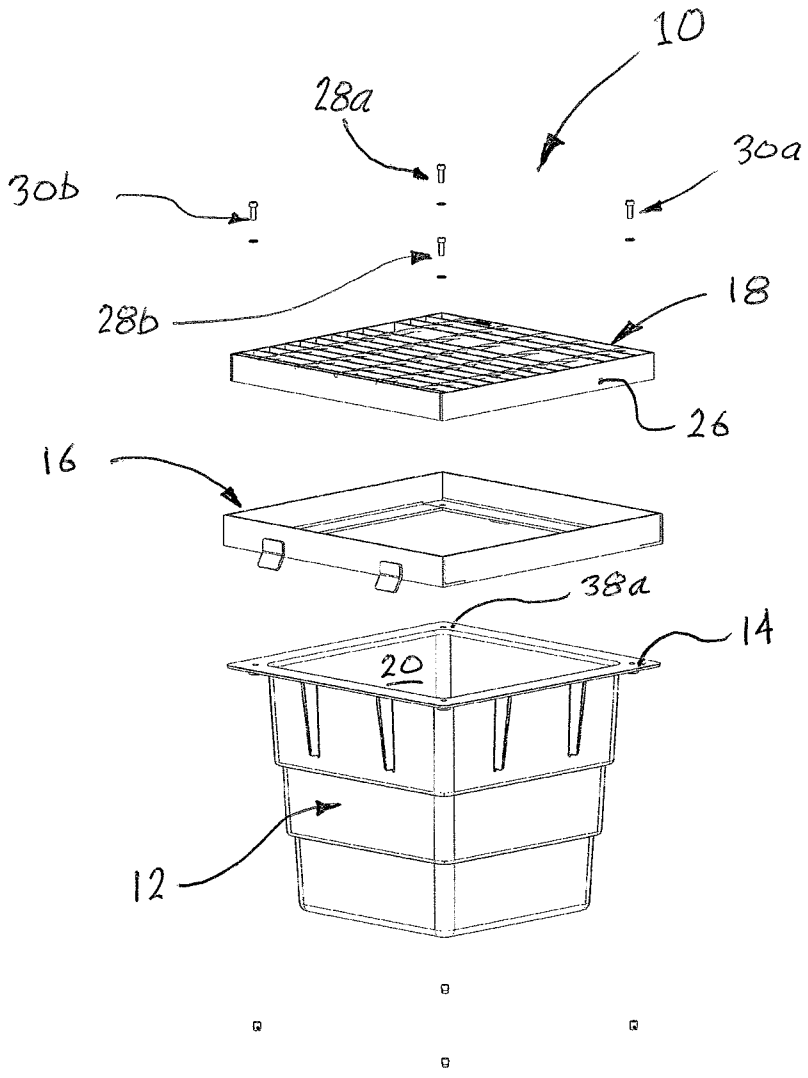

FIGURE 2

STORMWATER OR UTILITIES PIT ASSEMBLY

Technical Field

[0001] The present invention is in alternative aspects broadly directed to a stormwater or utilities pit assembly and a stormwater or utilities pit sub-assembly.

Summary of Invention

[0002] According to a first aspect of the present invention there is provided a stormwater or utilities pit assembly comprising:

a plastic pit or pit riser including a flanged rim;

a reinforcing frame configured for mounting to the flanged rim;

a grate or cover positioned across an entrance of the pit or riser and arranged for retention with the reinforcing frame.

[0003] According to a second aspect of the invention there is provided a stormwater or utilities pit sub-assembly comprising:

a plastic pit or pit riser including a flanged rim;

a reinforcing frame configured for mounting to the flanged rim.

[0004] Preferably the reinforcing frame includes an inner flange configured for seating on the flanged rim, and a perimeter wall connected to and extending upward from the inner flange. More preferably the perimeter wall of the reinforcing frame surrounds the grate or cover for its retention. Even more preferably the perimeter wall is of a height substantially equal to a frame of the grate or cover.

[0005] Preferably the inner flange of the reinforcing frame is sandwiched between the flanged rim of the pit or pit riser, and the grate or cover. More preferably the grate or cover is fastened to the flanged rim of the pit or pit riser via at least a first pair of diagonally opposite fastener arrangements.

[0006] Preferably each of the first pair of fastener arrangements includes a first bolt or screw designed to engage a clamp plate associated with the grate or cover, said bolt or screw passing through a first corner aperture of the reinforcing frame for screwed engagement with the flanged rim of the pit or pit riser. More preferably each

of the first pair of fastener arrangements includes an internally threaded first insert mounted to a corner region of the flanged rim of the pit or pit riser, and aligned for screwed engagement with a corresponding of the first pair of bolts or screws. Even more preferably the clamp plate is connected to an underside of the grate, said clamp plate bridging either neighbouring load-bearing bars of the grate, or at least one of the load-bearing bars and the frame of the grate. Alternatively, the clamp plate bridges a neighbouring pair of the load-bearing bars of the grate across its upper side.

[0007] Preferably the reinforcing frame is directly mounted to the flanged rim of the pit or pit riser independent of fastening of the grate or cover to said flanged rim. More preferably the direct mounting of the reinforcing frame to the pit or pit riser is via a second pair of diagonally opposite fastener arrangements. Even more preferably each of the second pair of fastener arrangements includes a second bolt or screw designed to pass through a second corner aperture of the reinforcing frame for screwed engagement with the flanged rim of the pit or pit riser. Still more preferably each of the second pair of fastener arrangements includes an internally threaded second insert mounted to another corner region of the flanged rim of the pit or pit riser and aligned for screwed engagement with a corresponding of the second pair of bolts or screws.

[0008] Preferably the reinforcing frame includes a plurality of external projections adapted for encasement in a concrete collar surrounding the reinforcing frame and upper region of the pit or pit riser, said projections designed to inhibit floating of the assembly. More preferably each of the projections includes a foot mounted to the perimeter wall of the reinforcing frame, said foot extending downward and outward of the inner flange of said frame.

[0009] Preferably the plastic pit or pit riser is constructed from a relatively high strength recycled plastic.

[0010] Preferably the reinforcing frame is fabricated from metal.

[0011] Preferably the grate or cover is formed from metal.

Brief Description of Drawings

[0012] In order to achieve a better understanding of the nature of the present invention a preferred embodiment of both aspects of the stormwater or utilities pit assembly and stormwater or utilities pit sub-assembly of the present invention will now be described, by way of example only, with reference to the accompanying drawings in which:

Figure 1 is a schematic sectional view of a preferred embodiment of a stormwater pit assembly and sub-assembly of both aspects of the invention shown *in-situ*;

Figure 2 is an exploded isometric view of the preferred embodiment of both aspects of the invention of figure 1;

Figure 3 is an isometric view from above of a reinforcing frame taken from the preferred embodiment of the preceding figures according to both aspects of the invention;

Figure 4 is another isometric view from above of the reinforcing frame of the preferred embodiment of figure 3;

Figure 5 is a plan view of a grate taken from the preferred embodiment of the preceding figures according to the first aspect of the invention;

Figure 6 is an enlarged sectional view of one of the fastener arrangements of the preferred embodiment of the preceding figures according to the first aspect of the invention;

Figure 7 is an enlarged sectional view of an alternative fastener arrangement of a preferred embodiment of the stormwater pit assembly of the first aspect shown in conjunction with an alternative grate; and

Figure 8 is an isometric view from above of an alternative embodiment of a stormwater pit assembly and sub-assembly of both aspects of the invention where a plastic pit riser is nested upon a plastic pit.

Detailed Description

[0013] As seen in figures 1 and 2, there is a stormwater pit assembly 10 of a preferred embodiment of a first aspect of the invention where *in-situ* it is typically encased in a concrete collar 1. This illustration shows alternative installations where the concrete collar 1 is surrounded by either asphalt 2 having an asphalt sub-base 3, or a neighbouring concrete surface layer 4. The asphalt 2/3 or concrete 4 layers have respective of underlying road base 5 or concrete sub-base 6 layers. The road base or concrete sub-base layers 5 and 6 surround a compacted sand/cracker dust bed 8 in which the stormwater pit assembly 10 is embedded. The compacted layer 8 and either of the neighbouring road base layer 5 or the concrete sub-base 6 layer are deposited across native soil 9 at the installation site.

[0014] In this preferred embodiment of the first aspect, the stormwater pit assembly 10 broadly comprises:

1. a plastic pit 12 including a flanged rim 14;
2. a reinforcing frame 16 configured for mounting to the flanged rim 14;
3. a grate 18 positioned across an entrance 20 of the pit 12 and arranged for retention with the reinforcing frame 16.

[0015] It is to be understood that the invention also extends to a utilities pit assembly and a utilities pit sub-assembly (not shown). In these embodiments the plastic pit houses utilities including but not limited to telecommunications assets, or reticulated products or services including electricity, gas, water, or sewerage. In this case the grate of the preferred embodiment is instead a cover for enclosing the plastic pit, the cover in one example being in the form of an enclosed lid. In these embodiments the overall construction is substantially the same as the preferred embodiment where the plastic pit of the utilities pit assembly or sub-assembly includes a flanged rim to which a reinforcing frame is mounted, the cover being arranged for retention with the reinforcing frame.

[0016] Returning to the preferred embodiment and as best seen in figures 3 and 4, the reinforcing frame 16 includes an inner flange 22 configured for seating on the flanged rim 14 of the pit 12. The inner flange 22 is connected to a perimeter wall 24

which extends upward from an outermost edge of the inner flange 22. The perimeter wall 24 of the reinforcing frame 16 surrounds the grate 18 for its retention. In this example, the reinforcing frame 16 is in profile generally square-shaped or rectangular-shaped wherein the inner flange 22 aligns with the flanged rim 14 of the pit 12. The perimeter wall 24 is configured for receipt of the grate 18 and is of a height substantially equal to that of a frame 26 of the grate 18.

[0017] In this embodiment the inner flange 22 of the reinforcing frame 16 is sandwiched between the flanged rim 14 of the pit 12 and the grate 18. As best seen in figures 5 and 6, the grate 18 is fastened to the flanged rim 14 of the pit 12 via first and second pairs of diagonally opposite fastener arrangements 28a/b and 30a/b. Figure 6 depicts one of the first pair of fastener arrangements such as 28a which includes:

1. a bolt or screw 32a having its head designed to engage a clamp plate 34a via a washer 35a, the clamp plate 34a welded or otherwise fixed to the grate 18;
2. an internally threaded insert 36a mounted to a corner region 38a of the flanged rim 14 for screwed engagement with the bolt or screw 32a.

[0018] It will be understood that the bolt or screw 32a passes through aligned apertures 37a and 39a in respective of the clamp plate 34a and the inner flange 22 of the reinforcing frame 16 for screwed engagement with the threaded insert 36a. In this example the corner region of the flanged rim 14 is integrated with an internally-threaded boss 40a. The threaded insert 36a includes an external thread for screwed engagement with the internally-threaded boss 40a for effective anchoring of the grate 18 and reinforcing frame 16 via the fastener arrangement 28a.

[0019] In this embodiment and as best seen in figure 5, the clamp plate of the grate 18 is one of four clamp plates 34a/b and 35a/b connected to an underside of the grate 18 in each of its respective four corner regions. The clamp plate such as 34a bridges one of the load-bearing bars such as 19a of the grate 18 and adjoining walls of its frame 26. Returning to figures 1 to 4, in this embodiment the reinforcing frame 16 includes a plurality of external projections 42a to 42d adapted for encasement in the concrete collar 1 surrounding the reinforcing frame 16 and upper region of the pit 12. It is to be understood that the projections 42a to 42d are designed to inhibit

floating of the stormwater pit assembly 10 wherein the projections such as 42a anchor the reinforcing frame 16 and associated pit 12 to the concrete collar 1. In this embodiment each of the projections such as 42a includes a foot 44a mounted to the perimeter wall 24 of the reinforcing frame 16. The foot such as 44a extends downward and outward of the inner flange 22 of the reinforcing frame 16.

[0020] In an alternative embodiment of the first aspect and as seen in figure 7, the grate 180 is secured to the flanged rim 140 of the pit 120 via second fastener arrangements such as 300a dedicated to diagonally-opposed corners of the grate 180. In this variation the clamp plate is in the form of a saddle 350a which bridges a load-bearing bar 190a and the neighbouring frame 260 of the grate 180. In its other diagonally-opposing corners the reinforcing frame 260 is directly mounted to the flanged rim 140 of the pit 120 via the aperture 390a in its inner flange 220. This direct mounting is effected using the first pair of diagonally opposite fastener arrangements (not shown) which are substantially identical to the first and second fastener arrangements of the preferred embodiment. In this instance the first bolt or screw passes through a first corner aperture of the reinforcing frame for screwed engagement with the flanged rim of the pit. This screwed arrangement is enabled via internally threaded first inserts of the same construction as the second inserts such as 370a and likewise mounted to corner regions of the flanged rim 20 of the pit 120.

[0021] It is to be understood that transportation of both the preferred and alternative embodiments of the stormwater pit assembly 10 and sub-assembly typically occurs without the grate 18 but with the reinforcing frame 16 fastened or releasably secured to the flanged rim 14 of the pit 12 via either or both of the first and second pairs of fastener arrangement such as 28a/b and 30a/b. The grate 18 may be transported separately where for example it is provided by the plumber of other contractor at the site of installation. In this scenario the first and/or second pair of fastener arrangements 28a/b and 30a/b temporarily anchor the reinforcing frame 16 to the pit 12. Once installation and plumbing of the sub-assembly is complete, the first and/or second pair of fastener arrangements 28a/b and 30a/b are removed and reinstalled as set out above according to either the preferred or alternative embodiment to effect anchoring of the grate 18 to the pit 12 wherein the reinforcing frame 16 is sandwiched between the grate 18 and the flanged rim 14 of the pit 12.

[0022] In the preferred and alternative embodiments of the second aspect of the invention the stormwater pit sub-assembly is substantial identical to the first aspect without the grate such as 18. Relying on the component numbering for the first aspect, the stormwater pit sub-assembly of the second aspect broadly comprises:

1. the plastic pit 12;
2. the reinforcing frame 16 configured for mounting to the flanged rim 14 for reinforcement of said rim 14.

[0023] As seen in figure 8, the stormwater pit assembly 50 in an alternative form may according to both aspects comprise a plastic pit riser 13 with which the reinforcing frame 16 and grate 18 are associated. In this form of the invention the pit riser 13 (has its base removed) nests with the pit 12 of the preceding embodiment thereby increasing the depth at which the pit 12 is set. The stormwater pit assembly 50 and sub-assembly of this form of the invention are otherwise of a substantially identical construct to the preceding embodiment.

[0024] In the preferred and alternative embodiments the plastic pit such as 12 or pit riser 13 is constructed from a relatively high strength recycled plastic. The recycled plastic is UV stabilised and typically injection moulded. The reinforcing frame such as 16 is in this example fabricated from metal, typically galvanised steel. The grate 18 of this example is formed from metal, typically galvanised steel.

[0025] Now that preferred embodiments of both aspects of the invention have been described it will be apparent to those skilled in the art that the stormwater pit assembly and sub-assembly have at least the following advantages:

1. they are suited to civil and contractor markets typically in medium to large load-bearing applications in trafficable areas where the reinforcing frame strengthens the flanged rim of the plastic pit for distributing load from the grate to the surrounding concrete collar;
2. the plastic pit or pit riser is of a relatively lightweight construction, typically enabling safe lifting (without the grate) with one or two persons;

3. they are of a modular construct where the fastener arrangements facilitate transportation and installation of the pit together with the reinforcing frame and thereafter securement of the grate to the pit *in-situ*;
4. they are of a modular construct where the same sized pit and associated reinforcing frame can be matched with a compliant load-rated grate depending on the application and associated loads.

[0026] Those skilled in the art will appreciate that the invention as described herein is susceptible to variations and modifications other than those specifically described. The reinforcing frame may depart from right-angle section construct of the described embodiments provided it strengthens the flanged rim of the pit and enables retainment of the associated grate or cover. For example, the reinforcing frame may in its simplest form be limited to the inner flange (without the perimeter wall) where retention of the grate or cover is provided by the fastener arrangements associated with the grate or cover and underlying flanged rim of the pit or riser. The reinforcing frame of the preferred embodiment may include handles on opposing sides which provide manual lifting points and function to anchor the frame and associated pit to the concrete collar surround. The reinforcing frame and thus the associated pit may in its profile shape depart from the rectilinear shapes described and for example be oval-shaped.

[0027] All such variations and modifications are to be considered within the scope of the present invention the nature of which is to be determined from the foregoing description.

Claims

1. A stormwater or utilities pit assembly comprising:
a plastic pit or pit riser including a flanged rim;
a reinforcing frame configured for mounting to the flanged rim;
a grate or cover positioned across an entrance of the pit or riser and arranged for retention with the reinforcing frame.

2. A stormwater or utilities pit assembly as claimed in claim 1 wherein the reinforcing frame includes an inner flange configured for seating on the flanged rim, and a perimeter wall connected to and extending upward from the inner flange.

3. A stormwater or utilities pit assembly as claimed in claim 2 wherein the perimeter wall of the reinforcing frame surrounds the grate or cover for its retention.

4. A stormwater or utilities pit assembly as claimed in claim 3 wherein the perimeter wall is of a height substantially equal to a frame of the grate or cover.

5. A stormwater or utilities pit assembly as claimed in any one of claims 2 to 4 wherein the inner flange of the reinforcing frame is sandwiched between the flanged rim of the pit or pit riser, and the grate or cover.

6. A stormwater or utilities pit assembly as claimed in claim 5 wherein the grate or cover is fastened to the flanged rim of the pit or pit riser via at least a first pair of diagonally opposite fastener arrangements.

7. A stormwater or utilities pit assembly as claimed in claim 6 wherein each of the first pair of fastener arrangements includes a first bolt or screw designed to engage a clamp plate associated with the grate or cover, said bolt or screw passing through a first corner aperture of the reinforcing frame for screwed engagement with the flanged rim of the pit or pit riser.

8. A stormwater or utilities pit assembly as claimed in claim 7 wherein each of the first pair of fastener arrangements includes an internally threaded first insert mounted to a corner region of the flanged rim of the pit or pit riser, and aligned for screwed engagement with a corresponding of the first pair of bolts or screws.

9. A stormwater or utilities pit assembly as claimed in claim 8 wherein the clamp plate is connected to an underside of the grate, said clamp plate bridging either neighbouring load-bearing bars of the grate, or at least one of the load-bearing bars and the frame of the grate.

10. A stormwater or utilities pit assembly as claimed in claim 8 wherein the clamp plate bridges a neighbouring pair of the load-bearing bars of the grate across its upper side.

11. A stormwater or utilities pit assembly as claimed in any one of claims 7 to 10 wherein the reinforcing frame is directly mounted to the flanged rim of the pit or pit riser independent of fastening of the grate or cover to said flanged rim.

12. A stormwater or utilities pit assembly as claimed in claim 11 wherein the direct mounting of the reinforcing frame to the pit or pit riser is via a second pair of diagonally opposite fastener arrangements.

13. A stormwater or utilities pit assembly as claimed in claim 12 wherein each of the second pair of fastener arrangements includes a second bolt or screw designed to pass through a second corner aperture of the reinforcing frame for screwed engagement with the flanged rim of the pit or pit riser.

14. A stormwater or utilities pit assembly as claimed in claim 13 wherein each of the second pair of fastener arrangements includes an internally threaded second insert mounted to another corner region of the flanged rim of the pit or pit riser and aligned for screwed engagement with a corresponding of the second pair of bolts or screws.

15. A stormwater or utilities pit assembly as claimed in any one of claims 2 to 13 wherein the reinforcing frame includes a plurality of external projections adapted for encasement in a concrete collar surrounding the reinforcing frame and upper region of the pit or pit riser, said projections designed to inhibit floating of the assembly.

16. A stormwater or utilities pit assembly as claimed in claim 15 wherein each of the projections includes a foot mounted to the perimeter wall of the reinforcing frame, said foot extending downward and outward of the inner flange of said frame.

17. A stormwater or utilities pit assembly as claimed in any one of the preceding claims wherein the plastic pit or pit riser is constructed from a relatively high strength recycled plastic.

18. A stormwater or utilities pit assembly as claimed in in any one of the preceding claims wherein the reinforcing frame is fabricated from metal.

19. A stormwater or utilities pit assembly as claimed in any one of the preceding claims wherein the grate or cover is formed from metal.

20. A stormwater or utilities pit sub-assembly comprising:

a plastic pit or pit riser including a flanged rim;

a reinforcing frame configured for mounting to the flanged rim.

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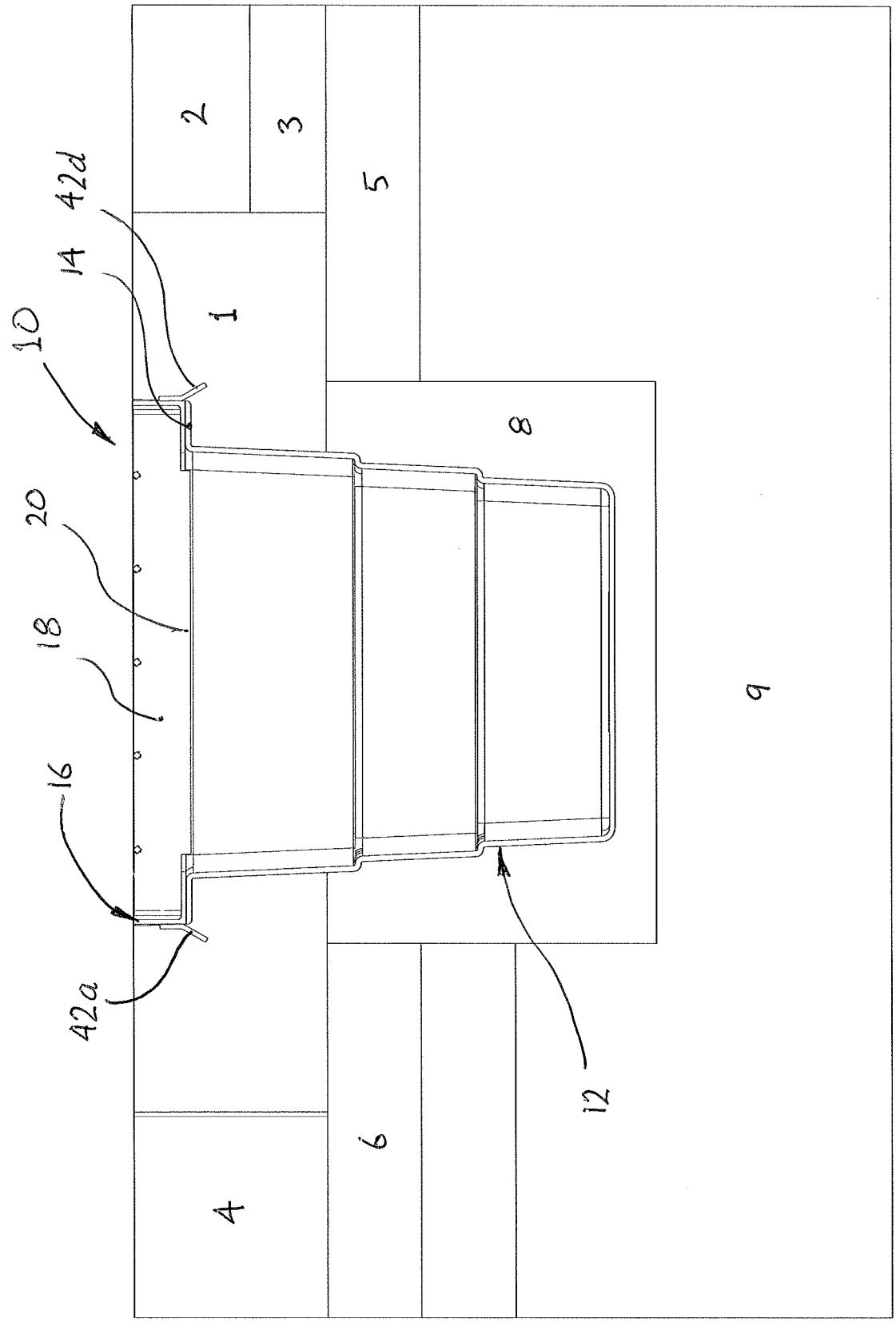

FIGURE 1

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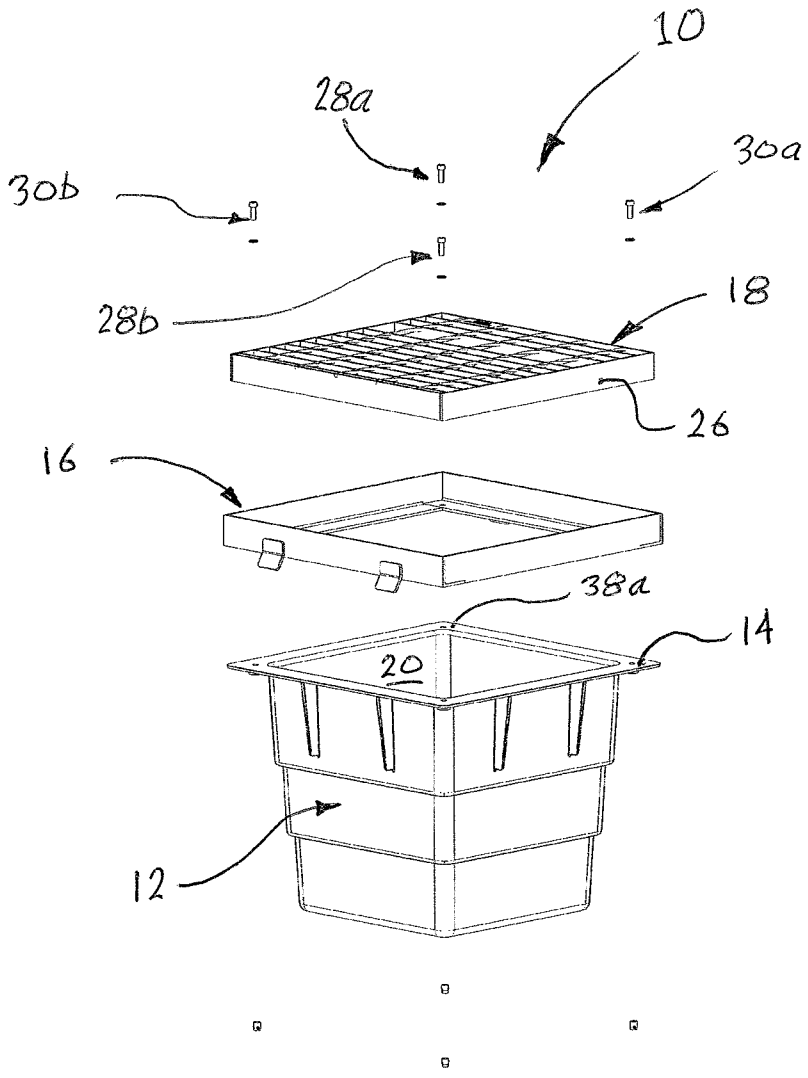

FIGURE 2

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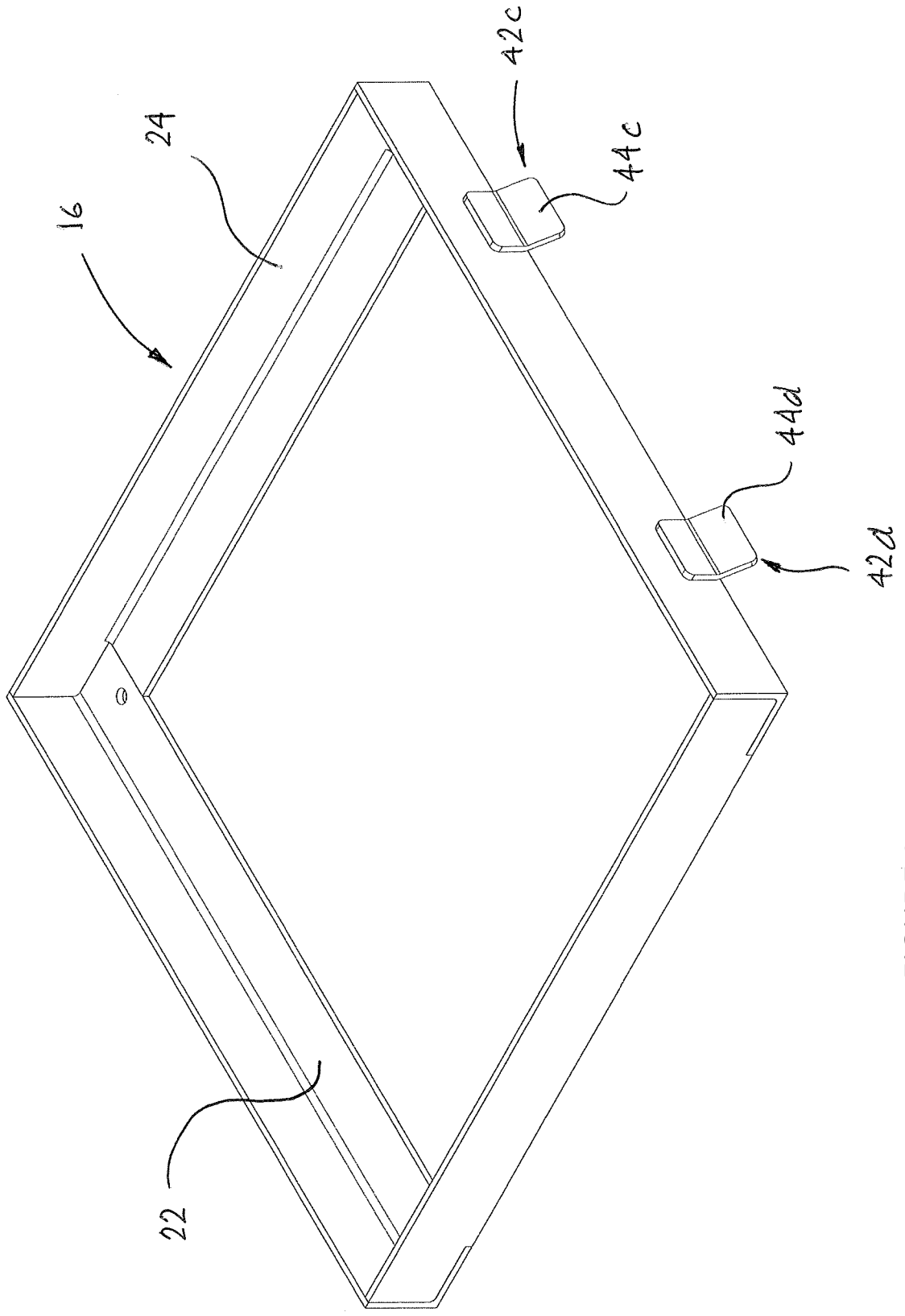

FIGURE 3

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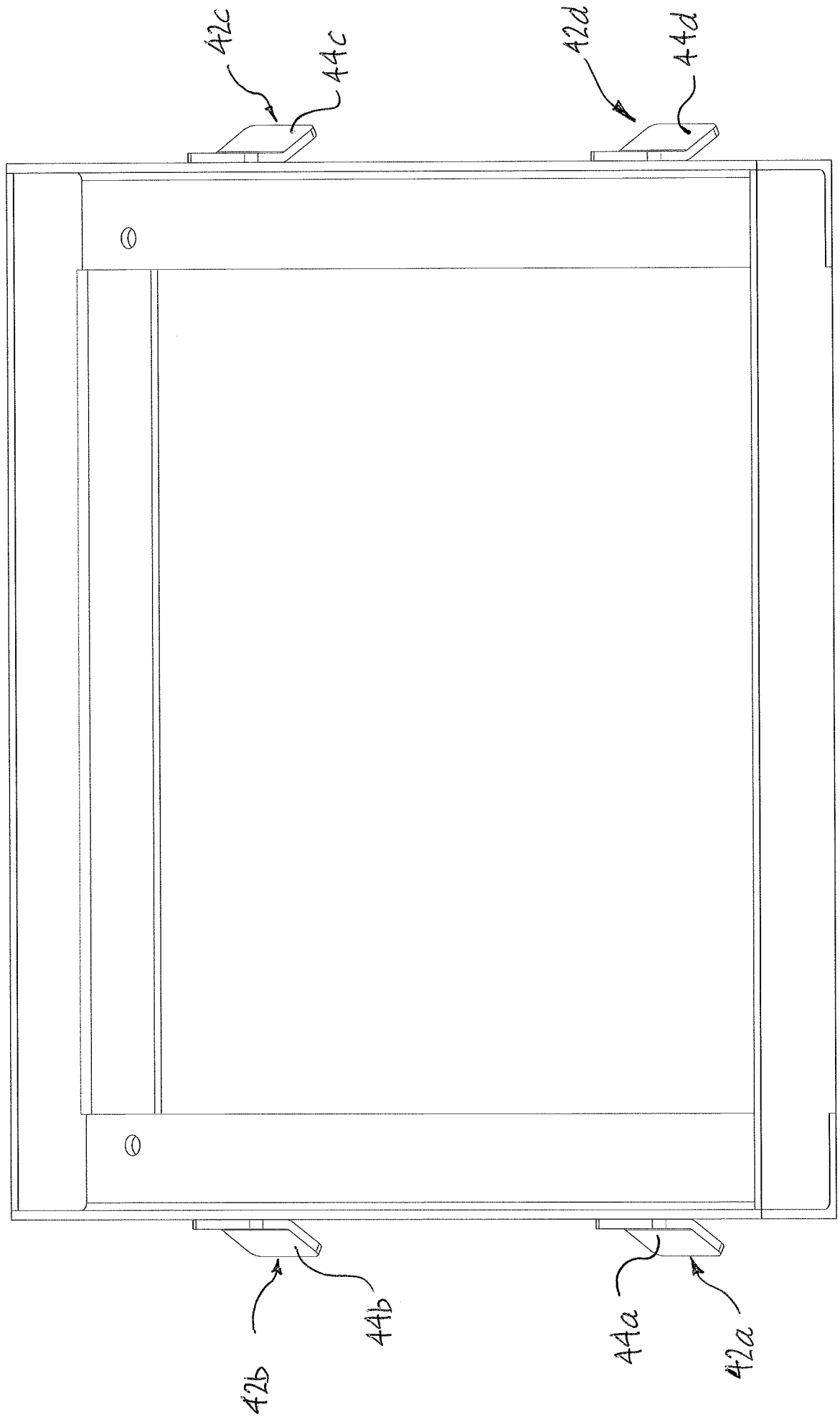

FIGURE 4

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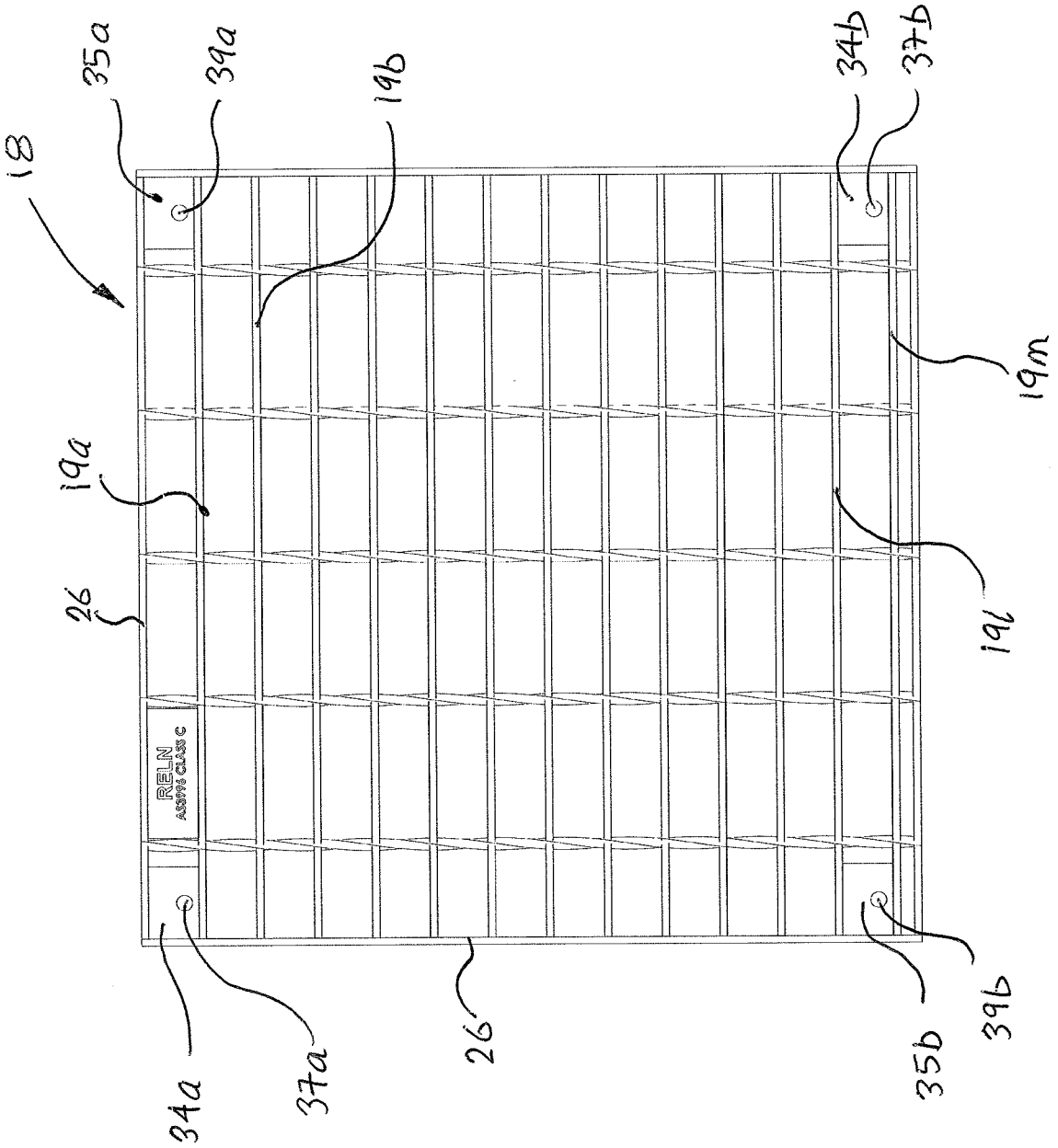

FIGURE 5

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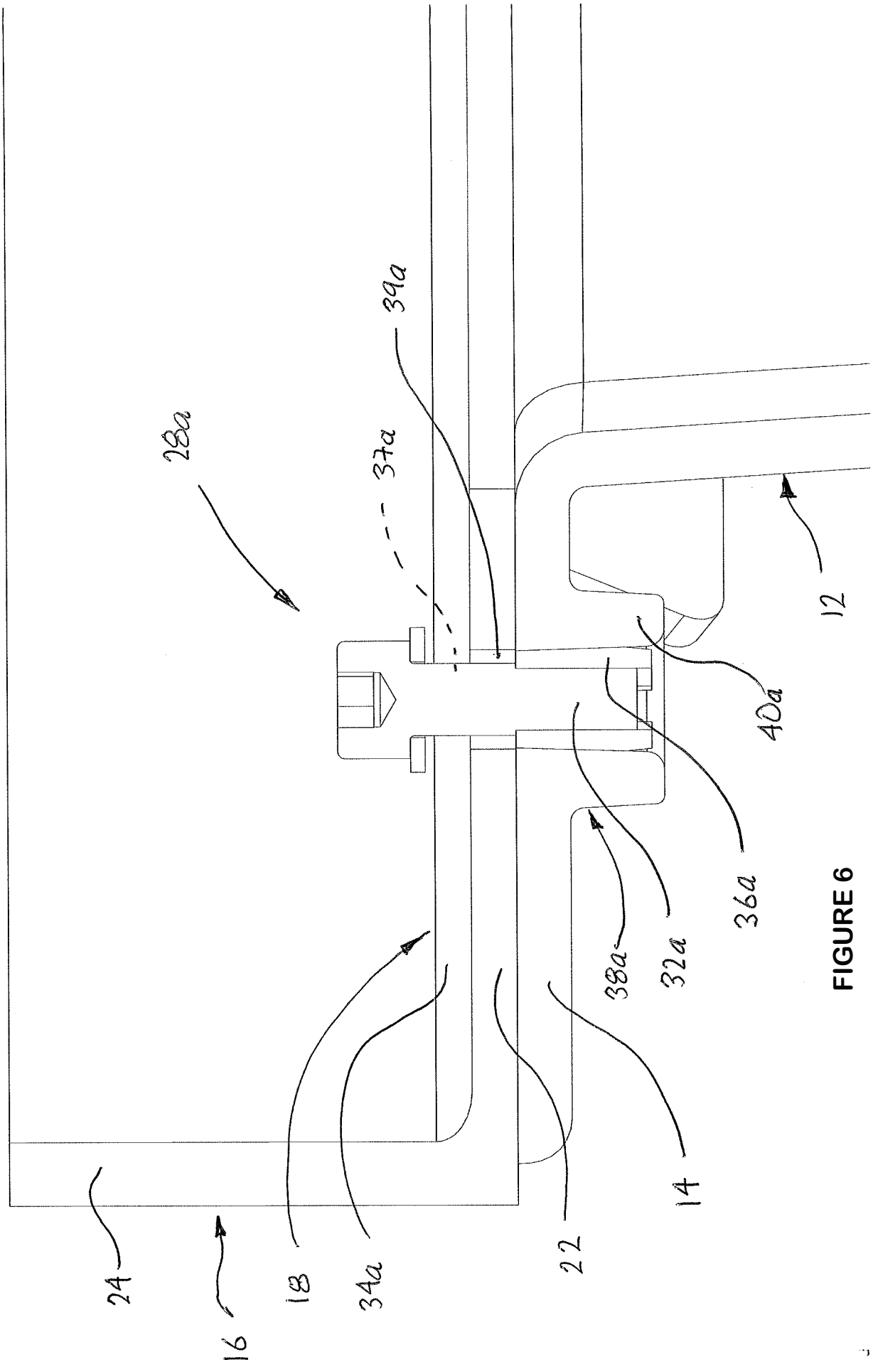

FIGURE 6

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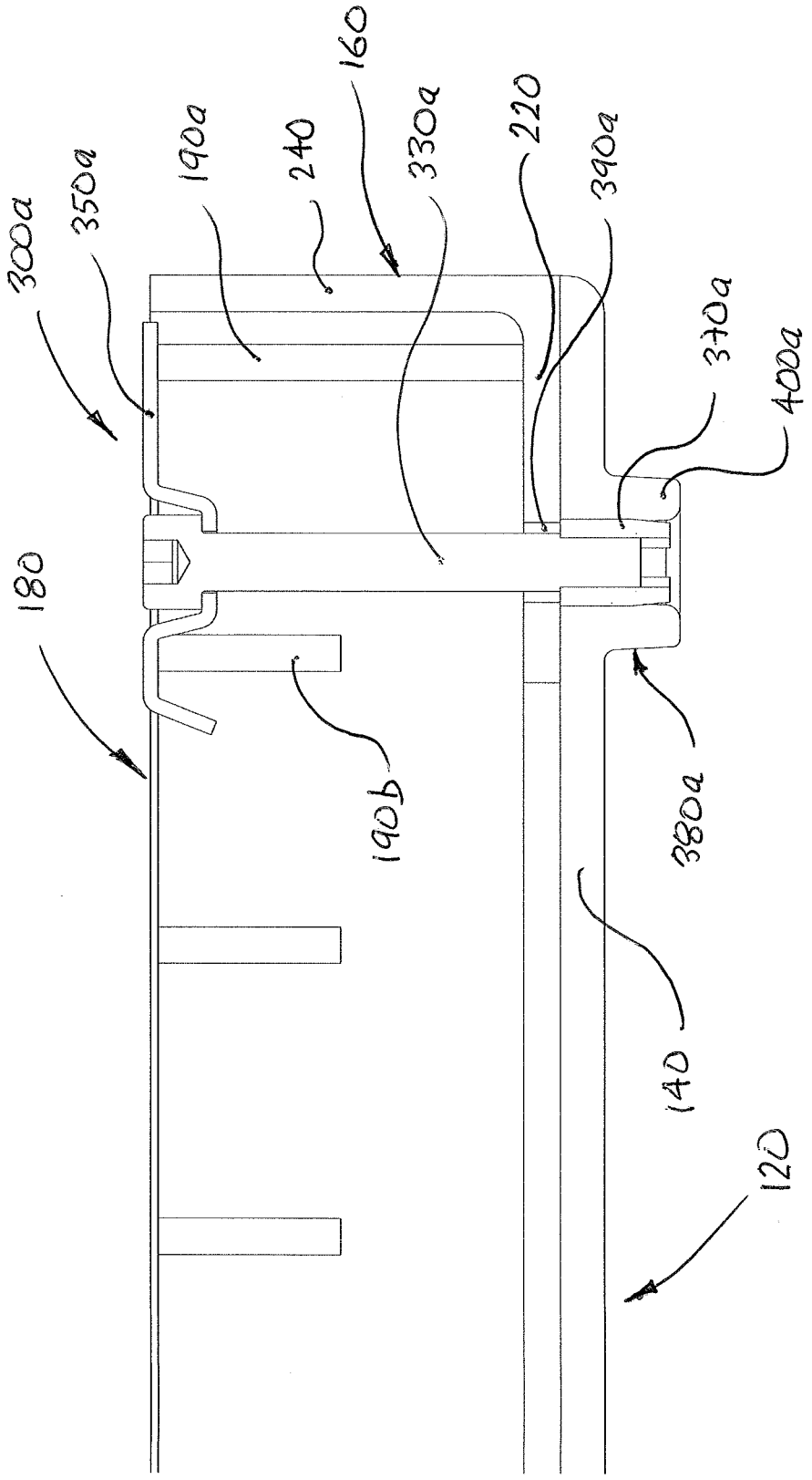

FIGURE 7

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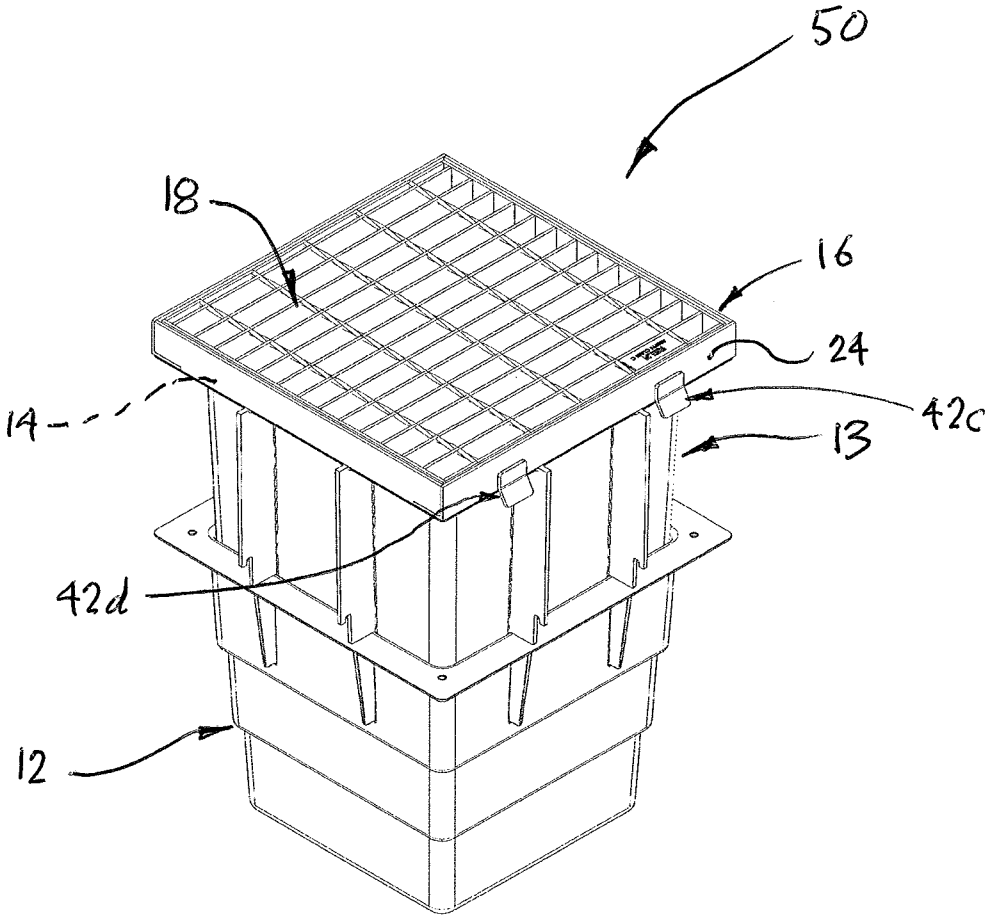

FIGURE 8