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(54) **FUEL STORAGE APPARATUS FOR FORESTRY MACHINES**

(57) A fuel storage apparatus (10) for forestry machines comprises a fuel storage tank (14) and an outer housing (12) configured to house the fuel storage tank (14) therein. The outer housing (12) is constructed from a metallic material. The fuel storage tank (14) is constructed from a plastic material. The fuel storage apparatus (10) further comprises a lid (24), the lid (24) and the outer housing (12) together forming an enclosure for

housing the fuel storage tank (14). The lid (24) is detachably or pivotally coupled to the outer housing (12) so as to permit access to and/or removal of the fuel storage tank (14). The fuel storage apparatus (10) further comprises a grab bar (16) configured to facilitate handling of the fuel storage apparatus (10) by a forestry machine or other handling equipment.

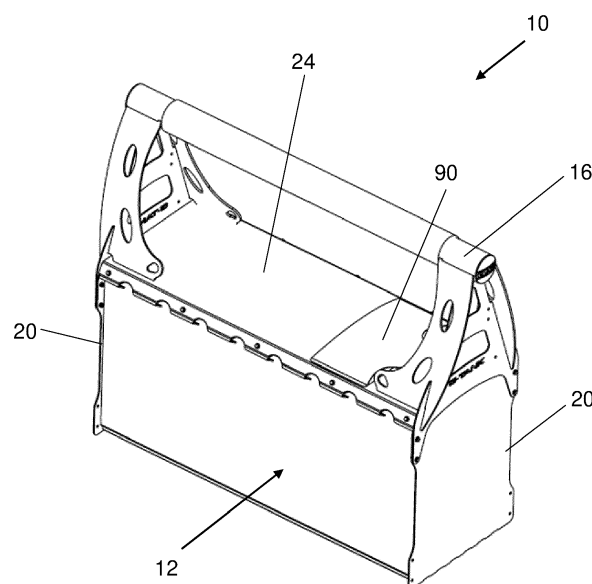


Figure 1

Description

FIELD

[0001] This relates to a fuel storage apparatus for forestry machines.

BACKGROUND

[0002] Fuel storage apparatus, in the form of storage tanks, are used in a variety of industries for the transport and storage of fuel, such as diesel.

[0003] In the forestry industry, for example, fuel storage equipment is essential in order to transport and store the fuel used to power forestry machines and other equipment used in the forest, with many forestry machines requiring significant volumes of fuel to operate.

[0004] However, the transport and handling of fuel for use by forestry machines poses a number of significant technical challenges.

[0005] For example, forestry machines typically operate in remote and often inaccessible locations, such that the handling of the fuel storage equipment is extremely difficult. The fuel storage equipment is also subject to the harsh environmental and operational conditions experienced in the forestry environment.

[0006] Moreover, equipment used within the forestry environment must also meet strict national and International standards, such that conventional fuel storage equipment designed is unsuitable for use within the forestry industry.

SUMMARY

[0007] Aspects of the present disclosure relate to a fuel storage apparatus for forestry machines.

[0008] According to a first aspect, there is provided a fuel storage apparatus for forestry machines, the fuel storage apparatus comprising:

- a fuel storage tank for storing fuel, wherein the fuel storage tank is at least partially constructed from a plastic material;
- an outer housing configured to house therein the fuel storage tank for storing fuel, wherein the outer housing is at least partially constructed from a metallic material;
- a lid, wherein the outer housing and the lid form an enclosure for enclosing the fuel storage tank, and wherein the lid is detachably or pivotably coupled to the outer housing so as to permit access to and/or removal of the fuel storage tank;
- a manifold arrangement comprising a plurality of fitting components for controlling access to and/or from the interior of the fuel storage tank; and
- a grab bar configured to facilitate handling of the apparatus by a forestry machine or other handling equipment.

[0009] Beneficially, the apparatus is configured to meet the requirements of national and International standards which govern the transportation and/or storage of fuel for use on the highway and/or in the forestry environment, e.g. UN ADR standards, while at the same time providing a fuel storage apparatus which can be readily handled by forestry machines, and which is sufficiently robust for use in the forestry environment.

[0010] In particular embodiments, the apparatus comprises or takes the form of a refuelling apparatus for forestry machines. More particularly, but not exclusively, the apparatus comprises or takes the form of a diesel refuelling apparatus for forestry machines.

[0011] In particular embodiments, the apparatus is modular in construction.

[0012] The lid may form the upper structure of the apparatus. In use, the outer housing and the lid form an enclosure for enclosing the fuel storage tank. The lid may be removable, that is the lid may be detachably coupled to the outer housing.

[0013] Beneficially, the provision of a removable lid permits access to and/or removal of the fuel storage tank, for example for inspection purposes. In some jurisdictions, it is a legal requirement to inspect tanks on a regular basis, e.g. annually or biennially, and so the apparatus facilitates ready access to the fuel storage tank for inspection; in contrast to conventional fuel storage equipment which either does not permit inspection and may simply be disposed of, or which must be removed in order for inspection to be carried out, thereby requiring additional handling and transportation with corresponding increased risk to personnel.

[0014] The lid may be fully detachably coupled to the outer housing.

[0015] Alternatively, the lid may be pivotably coupled to the outer housing. The lid may, for example, be pivotably coupled to the outer housing by one or more hinge.

[0016] The apparatus may comprise a fastener arrangement for detachably coupling the lid to the outer housing. The fastener arrangement may comprise one or a plurality of fasteners in the form of bolts. Alternatively or additionally, the fastener arrangement may comprise one or a plurality of fasteners in the form of screws, pins, clamps or other suitable fasteners.

[0017] Where the lid is fully detachably coupled to the outer housing, the fastener arrangement may include one or more fastener on at least two sides of the apparatus.

[0018] Where the lid is pivotably coupled to the outer housing, the fastener arrangement may include one or more fastener on at least one side of the apparatus.

[0019] Beneficially, the provision of a removable lid not only facilitates repeated access to the fuel storage tank for access and/or inspection but permits the fuel storage tank to be partially or wholly removed.

[0020] The lid may be coupled to, or may be integrally formed with, the grab bar. For example, the lid and grab bar may form, or form part of, an assembly.

[0021] As described above, the apparatus comprises

a grab bar to facilitate the handling of the apparatus, for example by a forestry machine or other handling equipment.

[0022] The grab bar may comprise or take the form of an elongate member. The elongate member may be tubular in construction. The grab bar may be cylindrical or substantially cylindrical in shape.

[0023] Beneficially, the cylindrical shape facilitates handling of the apparatus by a forestry machine or other handling equipment. The configuration of the grab bar is particularly beneficial as it facilitates the handling of the apparatus by a timber lifting grapple, commonly known in the forestry industry as a grab.

[0024] The grab bar may be constructed from any suitable material. For example, the grab bar may be at least partially constructed from a metallic material, such as steel or like material.

[0025] The apparatus may comprise a sleeve. The sleeve may be configured for location on and/or at least partially around the grab bar. The sleeve may, for example, be locatable in a recess formed in the grab bar. The grab bar may comprise a recess for receiving the sleeve.

[0026] Beneficially, the sleeve may protect the grab bar from damage and assists in the handling of the apparatus by a forestry machine or other handling equipment. For example, the sleeve is particularly beneficial when the apparatus is being handled by a timber harvesting machine having sharp de-limbing knives for taking the branches off the trees, since the sleeve prevents or reducing blunting of the knives.

[0027] The sleeve may be tubular in shape.

[0028] The sleeve may be at least partially constructed from a plastic material.

[0029] Alternatively or additionally, the sleeve may be constructed from a ceramic material, or metallic material.

[0030] The apparatus may comprise a support arrangement for supporting the grab bar.

[0031] The support arrangement may comprise or take the form of a support frame or superstructure.

[0032] The support arrangement may be configured to couple the grab bar to the lid. The support arrangement may be coupled to, or may be integrally formed with, the lid and/or the grab bar. For example, the support arrangement, the lid and the grab bar may form, or form part of, an assembly.

[0033] The support arrangement may be at least partially constructed from a metallic material, such as steel or like material.

[0034] As described above, the apparatus comprises an outer housing configured to house a fuel storage tank for storing fuel.

[0035] The outer housing may comprise or take the form of a bund.

[0036] The outer housing may comprise a base. The outer housing may comprise at least one side wall. The outer housing defines an open chamber into which the fuel storage tank may be located.

[0037] The outer housing may generally define a

cuboid shape, in particular a rectangular cuboid shape. However, it will be recognised that the outer housing may define other shapes, such as a cube, cylinder of the like.

[0038] The outer housing may comprise or define angled plates for receiving corresponding angled plates on the lid. The angled plates may be coupled to or integrally formed with side walls of the outer housing. The angled plates may comprise bores for receiving fasteners of the fastener arrangement.

[0039] Beneficially, the arrangement of angled plates facilitates a secure engagement between the lid and the outer housing.

[0040] Alternatively or additionally, end faces of the outer housing may comprise one or more bores for receiving fasteners of the fastener arrangement.

[0041] The outer housing is at least partially constructed from a metallic material, such as steel or like material.

[0042] As described above, the fuel storage tank is configured to hold the fuel, and in particular but not exclusively the fuel storage tank may be configured to hold diesel. The fuel may be stored in an enclosed chamber in the fuel storage tank and the fuel storage tank may define a single chamber of a plurality of chambers for storing the fuel therein.

[0043] For example, the fuel storage tank may generally define a cuboid shape, in particular a rectangular cuboid shape. However, it will be recognised that the fuel storage tank may define other shapes, such as a cube, cylinder of the like. The outer housing may be constructed according to the shape and size of the fuel storage tank, which may be defined in accordance with national and/or International standards.

[0044] The fuel storage tank may be of a substantially rigid construction. For example, the fuel storage tank may be constructed so that the size and/or shape of the fuel storage tank does not substantially change in response to the volume of fuel stored therein.

[0045] At least one surface of the fuel storage tank may comprise or define ribs. Beneficially, the ribs may enhance the rigidity of the structure of the fuel storage tank.

[0046] The fuel storage tank may comprise or define a recess portion. The recess portion may be configured, e.g. shaped and/or sized, to define a cavity between the fuel storage tank and the outer housing when the fuel storage tank is housed in the outer housing.

[0047] The recess portion and/or cavity may be configured to receive a monitoring device, e.g. a dip tube or the like, for monitoring for the presence of fuel between the fuel storage tank and the outer housing. Beneficially, this permits leak monitoring to be carried out without the need to remove the fuel storage tank.

[0048] The fuel storage tank may be at least partially constructed from a plastic material. The fuel storage tank may be at least partially constructed from a Polyethylene material, or like material.

[0049] Beneficially, the fuel storage tank is constructed from a rigid plastic material, in particular but not exclusively a rigid Polyethylene material, which is capable of

storing the fuel and which is sufficiently robust for use by forestry equipment.

[0050] The fuel storage tank may comprise or define a flange portion. The flange portion may be coupled to or integrally formed with the fuel storage tank. The flange portion may be constructed from a plastic material.

[0051] The fuel storage tank may comprise at least one port for facilitating access into and/or from the fuel storage tank.

[0052] In use, the manifold arrangement controls access to and/or from the interior of the fuel storage tank, in particular to the at least one port of the fuel storage tank.

[0053] The manifold arrangement may comprise a manifold plate for coupling the manifold arrangement to the fuel storage tank, in particular but not exclusively the flange portion. The manifold plate may be constructed from a metallic material, such as steel or like material.

[0054] Beneficially, the manifold arrangement is configured to meet the requirements of national and International standards which govern the transportation and/or storage of fuel for use on the highway and/or in the forestry environment, e.g. UN ADR standards, while at the same time providing a fuel storage apparatus which can be readily handled by forestry machines, and which is sufficiently robust for use in the forestry environment.

[0055] Moreover, the manifold plate may be removably couplable to the fuel storage tank, in particular the flange portion. Beneficially, this facilitates re-use of the manifold arrangement while permitting the fuel storage tank to be replaced, for example for periodic inspection or replacement or due to damage. In addition, the construction of the fuel storage tank is simplified, since fittings do not need to be formed in the fuel storage tank. In the event of damage to any of the fitting components of the manifold arrangement, the manifold arrangement may be replaced without the requirement to also replace or remove the fuel storage tank.

[0056] The manifold plate may be couplable to the fuel storage tank by a coupling arrangement. The coupling arrangement may comprise or take the form of a mechanical coupling arrangement. The coupling arrangement may comprise one or more bolts.

[0057] The apparatus may comprise a manifold cover.

[0058] The manifold cover may be locatable over the manifold arrangement. The manifold cover may be pivotably coupled to the lid. For example, the manifold cover may be pivotably coupled to the lid by a hinge or other suitable coupling.

[0059] The manifold cover may define a curved outer surface.

[0060] Beneficially, the curved outer surface of the manifold cover is configured so that, when the apparatus is lifted by a forestry machine such as a grab, contact between the forestry machine and the manifold arrangement which may otherwise result in damage to the manifold arrangement, the lid and/or the forestry machine, instead results in the forestry machine being deflected

or sliding off the manifold cover.

[0061] The apparatus may further comprise one or more hold-down members. The hold-down members may comprise or take the form of angled plates.

[0062] In use, the hold-down members may be interposed between the fuel storage tank and the lid and further secure the fuel storage tank in place in the outer housing.

[0063] The hold-down members may be secured by the fastener arrangement.

[0064] The apparatus may comprise a tool cupboard.

[0065] The tool cupboard may be integrally formed with the outer housing.

[0066] The tool cupboard may be removably coupled to the outer housing. For example, the tool cupboard may be configured for coupling to an end of the outer housing.

[0067] The apparatus may be of any suitable size. For example but not exclusively, the apparatus may have an overall length of between 2 metres and 3 metres. The apparatus may have an overall length of about 2.3 metres. The apparatus may have an overall height of between 1.5 metres and 2 metres. The apparatus may have an overall height of about 1.8 metres. However, it will be recognised that the above dimensions are exemplary

[0068] It will be understood that the features defined above or described below may be utilised either alone or in combination. For example, features described above in relation to one of the above aspects or below in relation to the detailed description below may be utilised in any other aspect, or together form a new aspect.

[0069] According to another aspect, there is provided a fuel storage apparatus for forestry machines. The fuel storage apparatus may comprise a fuel storage tank for storing fuel. The fuel storage tank may be at least partially constructed from a plastic material. The fuel storage apparatus may comprise an outer housing configured to house therein the fuel storage tank for storing fuel. The outer housing may be at least partially constructed from a metallic material. The fuel storage apparatus may comprise a lid. The outer housing and the lid may form an enclosure for enclosing the fuel storage tank. The lid may be detachably or pivotably coupled to the outer housing so as to permit access to and/or removal of the fuel storage tank. The fuel storage apparatus may comprise a manifold arrangement for controlling access to and/or from the interior of the fuel storage tank. The manifold arrangement may comprise a plurality of fitting components. The fuel storage apparatus may comprise a grab bar configured to facilitate handling of the apparatus by a forestry machine or other handling equipment.

BRIEF DESCRIPTION OF THE DRAWINGS

[0070] These and other aspects will now be described, by way of example only, with reference to the accompanying drawings, in which:

Figure 1 shows a perspective view of a fuel storage

apparatus for forestry machines;

Figure 2 shows an exploded view of the apparatus shown in Figure 1;

Figures 3, 4, 5, 6, 7 and 8 show elevation views of the apparatus shown in Figure 1;

Figures 9 and 10 show a manifold arrangement of the apparatus shown in Figure 1 in more detail;

Figure 11 shows a perspective view of the apparatus shown in Figure 1, with removable tool cupboard; and

Figure 12 shows an exploded view of the apparatus as shown in Figure 11.

DETAILED DESCRIPTION OF THE DRAWINGS

[0071] Figures 1 to 12 of the accompanying drawings show a fuel storage apparatus, generally denoted 10, for use in the transportation and/or storage of fuel for use by forestry machines.

[0072] Referring first to Figures 1 and 2, for example, the illustrated apparatus 10 takes the form of a diesel refuelling tank and comprises an outer housing 12 configured to house a fuel storage tank 14 (shown in Figure 2) for storing diesel fuel and a grab bar 16 configured to facilitate handling of the apparatus 10 by a forestry machine.

[0073] As will be described further below, the apparatus 10 provides a number of significant benefits compared to conventional fuel storage equipment. For example, the apparatus 10 is configured to meet the requirements of national and International standards which govern the transportation and/or storage of fuel for use on the highway and/or in the forestry environment, e.g. UN ADR standards, while at the same time providing a fuel storage apparatus which can be readily handled by forestry machines, and which is sufficiently robust for use in the forestry environment.

[0074] In the illustrated apparatus 10, the outer housing 12 generally takes the form of a rectangular cuboid box shape having a base 18 (shown in Figure 8) and upstanding walls 20, the base 18 and walls 20 of the outer housing 12 defining an open chamber 22 (shown in Figure 2) into which the fuel storage tank 14 may be located. In the illustrated apparatus 10, the outer housing 12 is constructed from steel.

[0075] The apparatus 10 further comprises a lid 24, the outer housing 12 and the lid 24 when assembled together forming the chamber 22 for enclosing the fuel storage tank 14. In the illustrated apparatus 10, the lid 24 is also constructed from steel.

[0076] With particular reference to Figure 2 of the accompanying drawings, it can be seen that the lid 24 is removable, the lid 24 being detachably coupled to the outer housing 12.

[0077] Beneficially, the provision of a removable lid 24 permits access to and/or removal of the fuel storage tank 14, for example for inspection purposes. In some jurisdictions, it is a legal requirement to inspect tanks on a

regular basis, e.g. annually or biennially, and so the apparatus 10 facilitates ready access to the fuel storage tank 14 for inspection; in contrast to conventional fuel storage equipment which either does not permit inspection and may simply be disposed of, or which must be removed in order for inspection to be carried out, thereby requiring additional handling and transportation with corresponding increased risk to personnel.

[0078] Moreover, the design of the lid 24 beneficially keeps rainwater out while also being able to withstand the forces involved in being lifted by the grab bar 16 plus being thrown around by the forestry machine.

[0079] The apparatus 10 further comprises a fastener arrangement, generally denoted 26, for detachably coupling the lid 24 to the outer housing 12. The fastener arrangement 26 comprises a plurality of fasteners which in the illustrated apparatus 10 are in the form of bolts 28.

[0080] As shown, the outer housing 12 comprises angled plates 30 for receiving corresponding angled plates 32 on the lid 24, the angled plates comprising bores 34 for receiving the bolts 28.

[0081] Beneficially, the arrangement of angled plates 30, 32 facilitates a secure engagement between the lid 24 and the outer housing 12.

[0082] The provision of the removable lid 24 not only facilitates repeated access to the fuel storage tank 14 for access and/or inspection but permits the fuel storage tank 14 to be partially or wholly removed as required for the inspection and/or for removal.

[0083] As can be seen for example from Figure 2, the lid 24 is coupled to the grab bar 16, such that the lid 24 and the grab bar 16 form an assembly.

[0084] As described above, the grab bar 16 facilitates the handling of the apparatus 10 by the forestry machine or other handling equipment. The grab bar 16 takes the form of an elongate member and in the illustrated apparatus 10 the elongate member is tubular in construction. In the illustrated apparatus 10, the grab bar is also constructed from steel.

[0085] Beneficially, the cylindrical shape of the grab bar 16 facilitates handling of the apparatus 10 by a forestry machine or other handling equipment. The configuration of the grab bar 16 is particularly beneficial as it facilitates the handling of the apparatus 10 by a timber lifting grapple, commonly known in the forestry industry as a grab.

[0086] The apparatus 10 further comprises a sleeve 36 configured for location on and around the grab bar 16. The sleeve 36 is tubular in shape and in the illustrated apparatus 10 the sleeve 36 is constructed from a plastic material.

[0087] Beneficially, the sleeve 36 protects the grab bar 16 from damage and assists in the handling of the apparatus 10 by the forestry machine or other handling equipment. The sleeve 36 is particularly beneficial when the apparatus 10 is being handled by a timber harvesting machine having sharp de-limbing knives for taking the branches off the trees, since the sleeve 36 prevents or

reducing blunting of the knives.

[0088] The apparatus 10 further comprises a support arrangement, generally denoted 38, for supporting the grab bar 16 and which couples the grab bar 16 to the lid 24. In the illustrated apparatus 10, the support arrangement 38 takes the form of a support frame and is constructed from steel. The support frame has side corner gusset plates having pear shaped holes which facilitate lifting of the apparatus 10 using a chain sling with hooks, or the like.

[0089] As shown in Figure 2, the apparatus 10 further comprises a plurality of hold-down members 40 which in the illustrated apparatus 10 takes the form of angled plates. In use, the hold-down members 40 are interposed between the fuel storage tank 14 and the lid 24 and further secure the fuel storage tank 14 in place in the outer housing 12.

[0090] The fuel storage tank 14 generally defines a rectangular cuboid shape and has one or more enclosed chamber for holding the diesel fuel. In the illustrated apparatus 10, the fuel storage tank 14 is constructed from a rigid Polyethylene material.

[0091] As shown in Figure 2, at least one surface of the fuel storage tank 14 comprises a number of ribs 42. Beneficially, the ribs 42 enhance the rigidity of the structure of the fuel storage tank 14.

[0092] The fuel storage tank 14 further comprises a recess portion 44, the recess portion 44 shaped and sized to define a cavity between the fuel storage tank 14 and the outer housing 12 when the fuel storage tank 14 is housed in the outer housing 12. The recess portion 44 is configured to receive a monitoring device 46 which in the illustrated apparatus 10 takes the form of a warning float or the like, for monitoring for the presence of fuel between the fuel storage tank 14 and the outer housing 12. Beneficially, this permits leak monitoring to be carried out without the need to remove the fuel storage tank 14.

[0093] As shown in Figure 2 and referring now also to Figures 8 and 9 of the accompanying drawings, the fuel storage tank 14 further comprises a flange portion 48.

[0094] The fuel storage tank 14 further comprises a port 50 (shown in Figure 9) for facilitating access into and/or from the fuel storage tank 14.

[0095] As shown in Figures 9 and 10, the apparatus 10 comprises a manifold arrangement, generally denoted 52. In use, the manifold arrangement 52 controls access to and/or from the interior of the fuel storage tank 14. The manifold arrangement 52 comprises a manifold plate 54 for coupling the manifold arrangement 52 to the flange portion 48 of the fuel storage tank 14 via bolts 56 or other suitable fasteners. In the illustrated apparatus 10, the manifold plate 54 is constructed from metal, in particular steel.

[0096] Beneficially, the manifold arrangement 52 is configured to meet the requirements of national and International standards which govern the transportation and/or storage of fuel for use on the highway and/or in the forestry environment, e.g. UN ADR standards, while

at the same time providing a fuel storage apparatus 10 which can be readily handled by forestry machines, and which is sufficiently robust for use in the forestry environment. Moreover, the manifold plate 54 may be removably couplable to the fuel storage tank, in particular the flange portion 48. Beneficially, this facilitates re-use of the manifold arrangement 52 while permitting the fuel storage tank 14 to be replaced, for example for periodic inspection or replacement or due to damage. In addition, the construction of the fuel storage tank 14 is simplified, since fittings do not need to be formed in the fuel storage tank 14. In the event of damage to any of the fitting components of the manifold arrangement 52, the manifold arrangement 52 may be replaced without the requirement to also replace or remove the fuel storage tank 14.

[0097] With particular reference to Figure 10 of the accompanying drawings, which shows an exploded view of the manifold arrangement 52, it can be seen that in the illustrated apparatus 10 the manifold arrangement 52 comprises a plurality of fitting components, generally denoted 53. In the illustrated apparatus 10, the manifold arrangement 52 comprises a first fitting component 58, a second fitting component 60, a third fitting component 62, a fourth fitting component 64, a fifth fitting component in the form of a hose 66, a sixth fitting component 68, a seventh fitting component 70, an eighth fitting component 72, adaptor ninth fitting component 74, a tenth fitting component 76, an eleventh fitting component 78, a twelfth fitting component 80 and a thirteenth fitting component 82. As shown in Figure 10, the manifold arrangement 52 further comprises manifold washer profiles 84, and hose fittings 86.

[0098] Referring again in particular to Figures 1 and 2 of the accompanying drawings, it can be seen that the apparatus 10 further comprises a manifold cover 88 which is pivotably coupled to the lid 24. The manifold cover 88 is locatable over the manifold arrangement 52 and defines a curved outer surface.

[0099] Beneficially, the curved outer surface of the manifold cover 88 is configured so that, when the apparatus 10 is lifted by a forestry machine such as a grab, contact between the forestry machine and the manifold arrangement 52 which may otherwise result in damage to the manifold arrangement 52, the lid 24 and/or the forestry machine, instead results in the forestry machine sliding off the manifold cover 88.

[0100] Referring now also to Figures 11 and 12 of the accompanying drawings, it can be seen that the apparatus 10 may further comprise a removable tool cupboard 90, the tool cupboard 90 being secured to the outer housing 12 by a fastener arrangement, generally denoted 92 and comprising a plurality of fasteners 94 in the form of bolts. In the illustrated apparatus 10, the cupboard 90 is constructed from steel and comprises a main body 96 and a door 98.

[0101] It will be understood that the above described embodiments are merely exemplary and that various modifications may be made without departing from the

scope of the invention. For example, the fuel storage apparatus may alternatively be used to store fuel, e.g. diesel, for use in railway, construction and/or agriculture applications.

Claims

1. A fuel storage apparatus (10) for forestry machines, the fuel storage apparatus (10) comprising:

a fuel storage tank (14) for storing fuel, wherein the fuel storage tank (14) is at least partially constructed from a plastic material;
 an outer housing (12) configured to house therein the fuel storage tank (14) for storing said fuel, wherein the outer housing (12) is at least partially constructed from a metallic material;
 a lid (24), wherein the outer housing (12) and the lid (24) form an enclosure for enclosing the fuel storage tank (14), and wherein the lid (24) is detachably or pivotably coupled to the outer housing (12) so as to permit access to and/or removal of the fuel storage tank (14);
 a manifold arrangement (52) comprising a plurality of fitting components (53) for controlling access to and/or from the interior of the fuel storage tank (14); and
 a grab bar (16) configured to facilitate handling of the fuel storage apparatus (10) by a forestry machine or other handling equipment.

2. The fuel storage apparatus (10) of claim 1, wherein the apparatus (10) is modular in construction.

3. The fuel storage apparatus (10) of claim 1 or 2, wherein the manifold arrangement (52) comprises a manifold plate (54) for coupling the manifold arrangement (52) to a flange portion (48) of the fuel storage tank (14).

4. The fuel storage apparatus (10) of claim 3, wherein the manifold plate (54) is constructed from metal and the flange portion (48) is constructed from a plastic material.

5. The fuel storage apparatus (10) of any preceding claim, comprising a manifold cover (88) locatable over the manifold arrangement (52).

6. The fuel storage apparatus (10) of claim 5, wherein the manifold cover (88) defines a curved outer surface.

7. The fuel storage apparatus (10) of claim 5 or 6, wherein the manifold cover (88) is pivotably coupled to the lid (24).

8. The fuel storage apparatus (10) of any preceding claim, comprising a support arrangement (38) for supporting the grab bar (16).

9. The fuel storage apparatus (10) of any preceding claim, wherein the outer housing (12) comprises or defines angled plates (30) for receiving corresponding angled plates (32) on the lid (24).

10. The fuel storage apparatus (10) of any preceding claim, wherein the fuel storage tank (14) comprises or defines a recess portion (44), the recess portion (44) configured to define a cavity between the fuel storage tank (14) and the outer housing (12) when the fuel storage tank (14) is housed in the outer housing (12).

11. The fuel storage apparatus (10) of claim 10, wherein the recess portion (44) and/or cavity are configured to receive a monitoring device (46) for monitoring for the presence of fuel between the fuel storage tank (14) and the outer housing (12).

12. The fuel storage apparatus (10) of any preceding claim, comprising one or more hold-down members (40) interposed between the fuel storage tank (14) and the lid (24), the one or more hold-down members (40) securing the fuel storage tank (14) in place in the outer housing (12).

13. The fuel storage apparatus (10) of any preceding claim, comprising a tool cupboard (90).

14. The fuel storage apparatus (10) of claim 13, wherein the tool cupboard (90) is removably coupled to the outer housing (12).

15. The fuel storage apparatus (10) of claim 13, wherein the tool cupboard (90) is integrally formed with the outer housing (12).

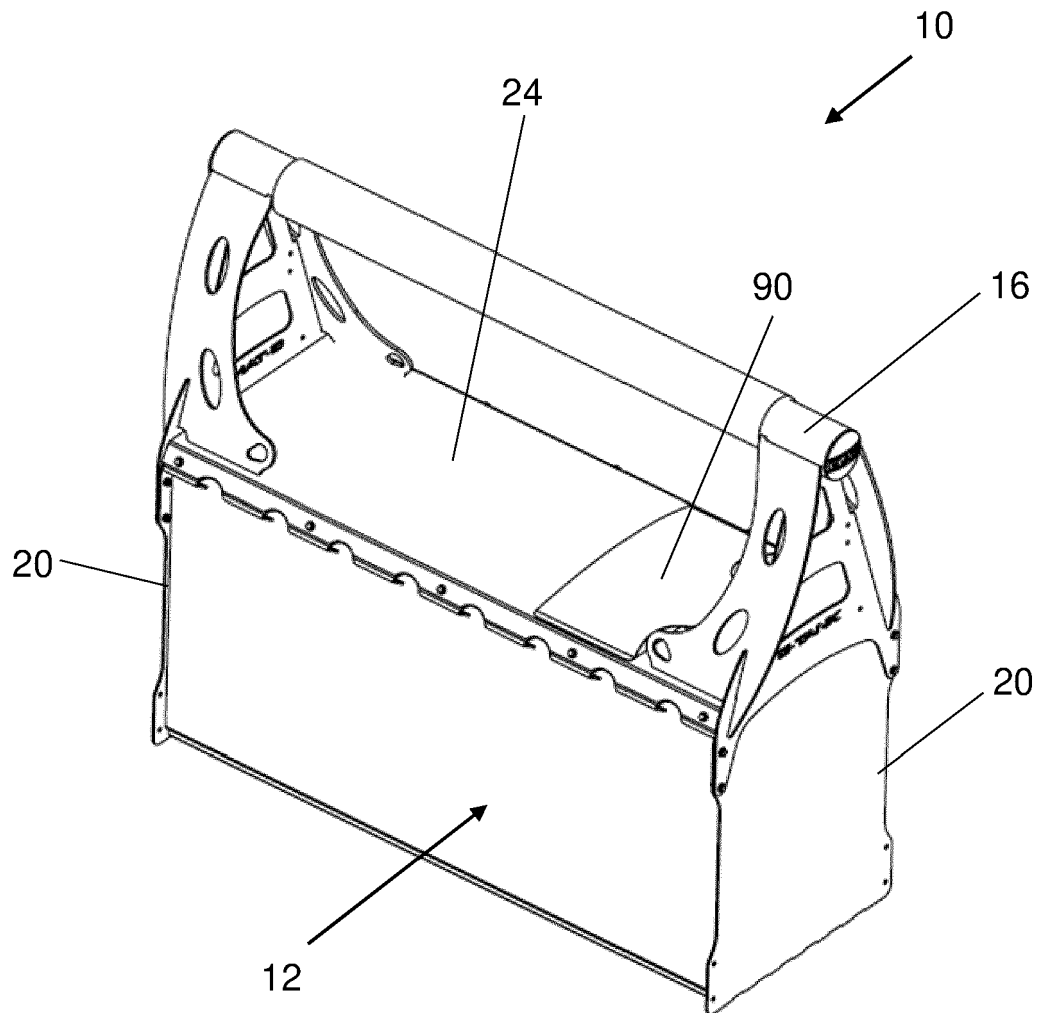


Figure 1

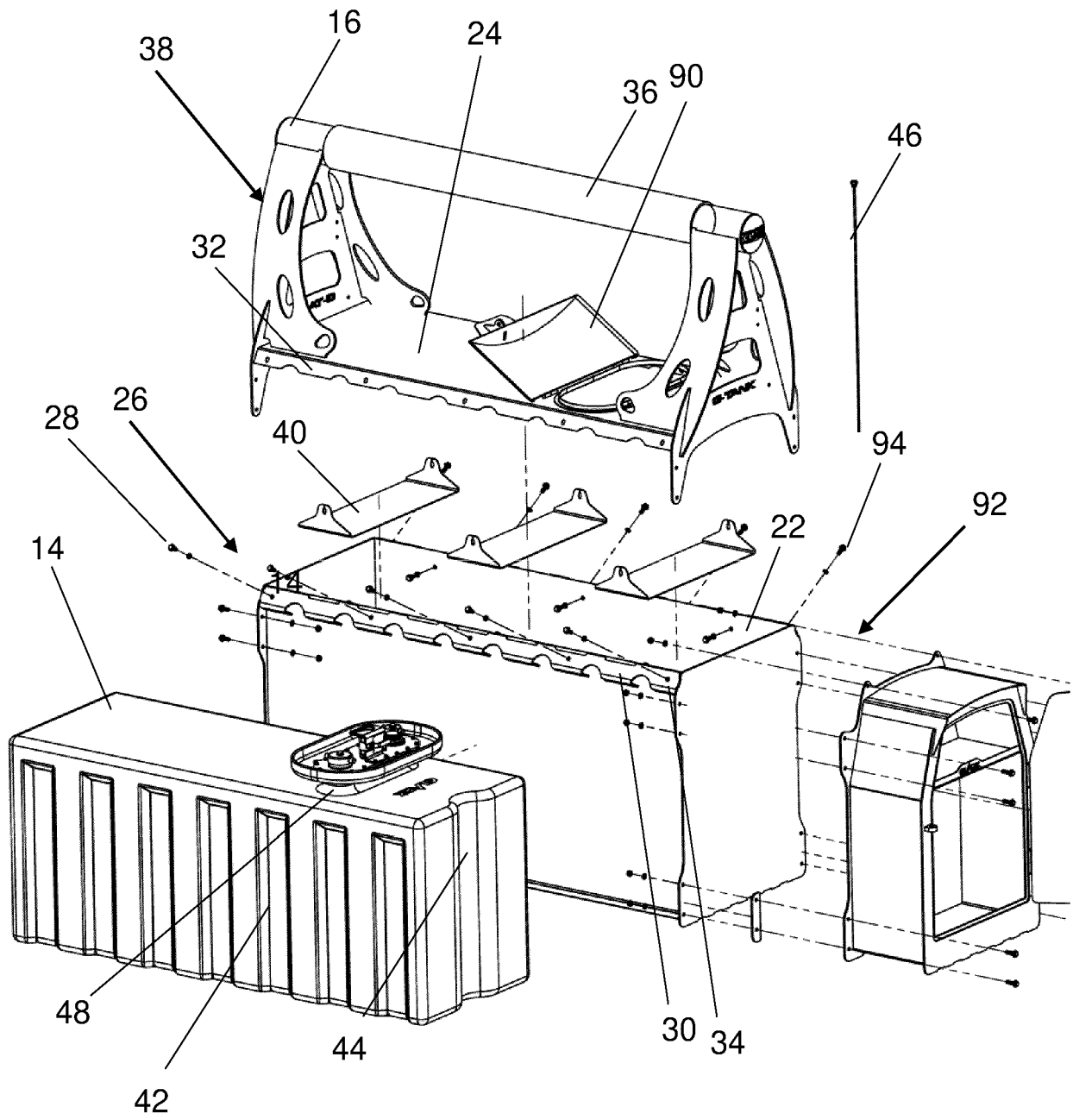


Figure 2

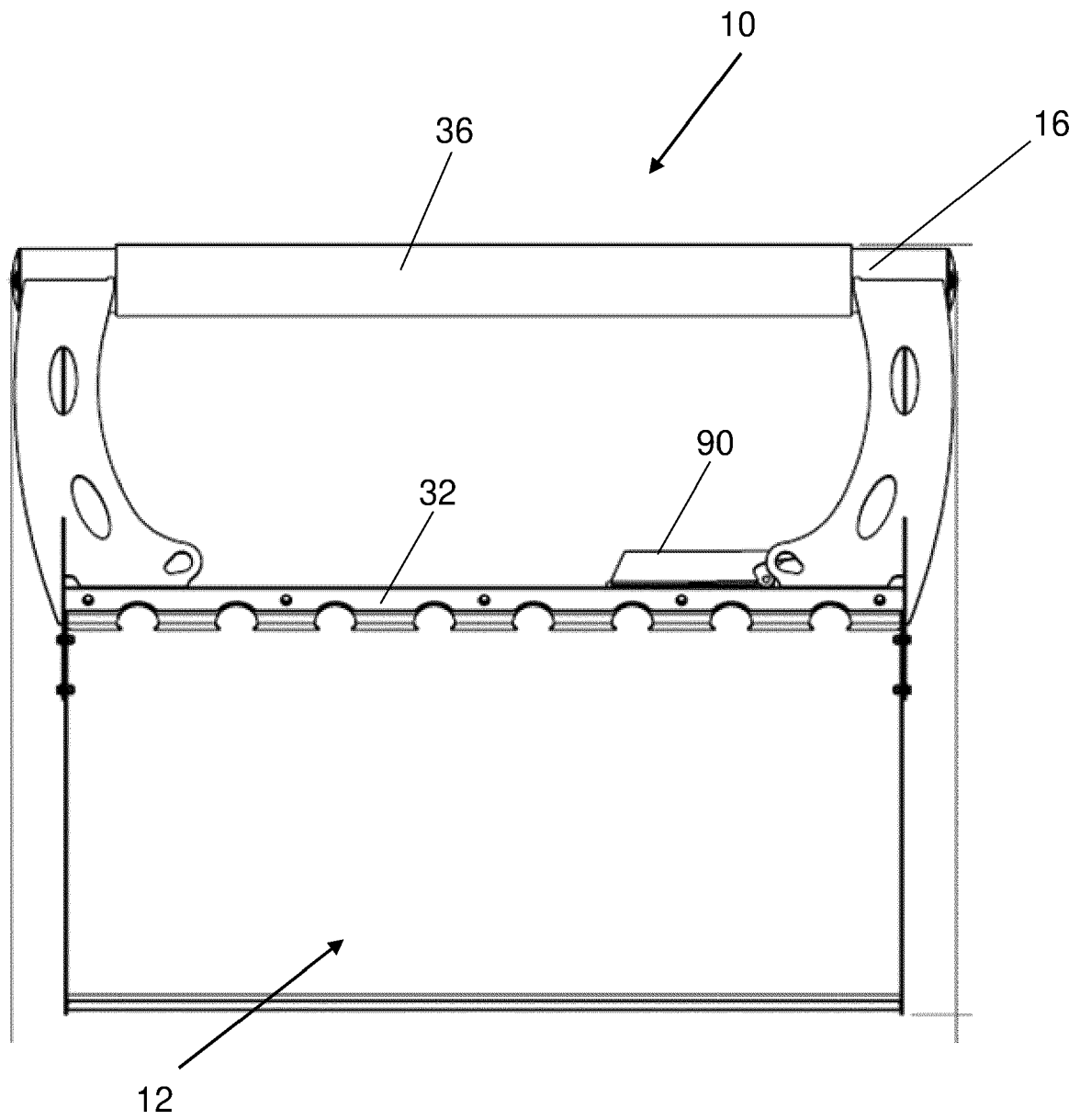


Figure 3

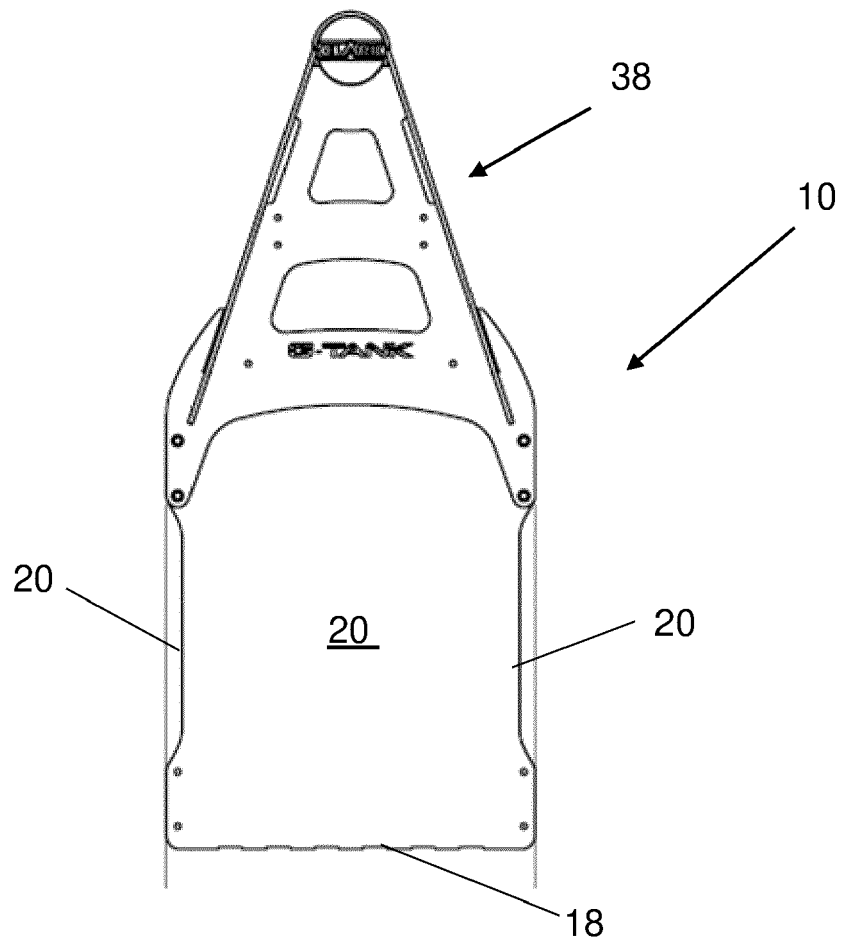


Figure 4

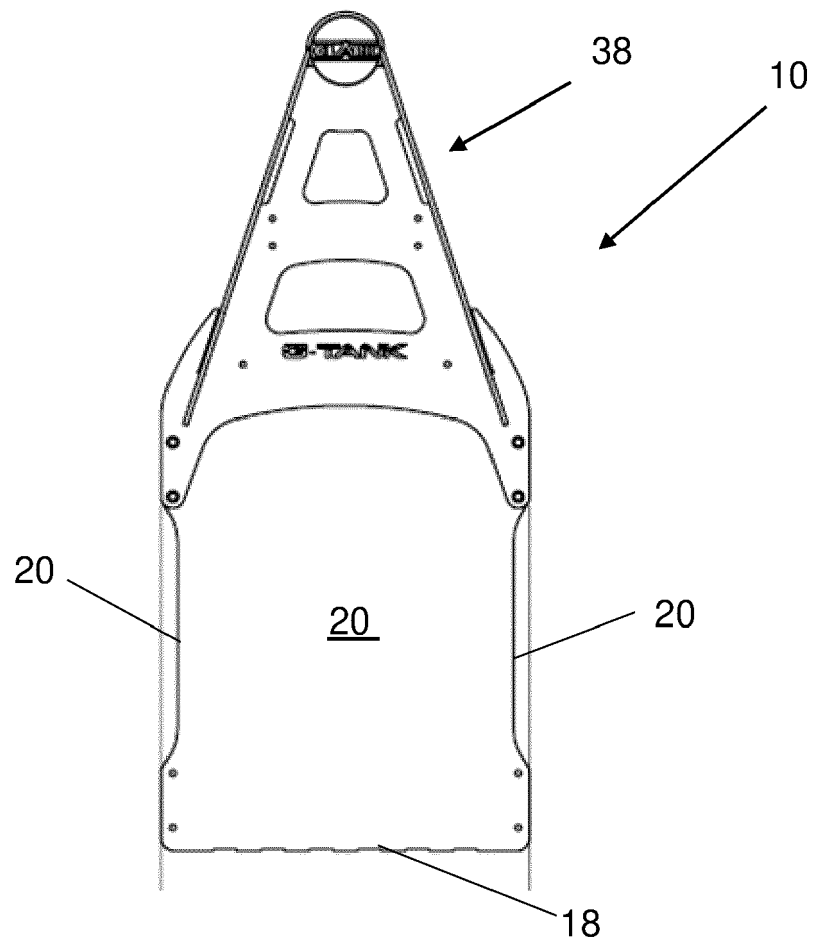


Figure 5

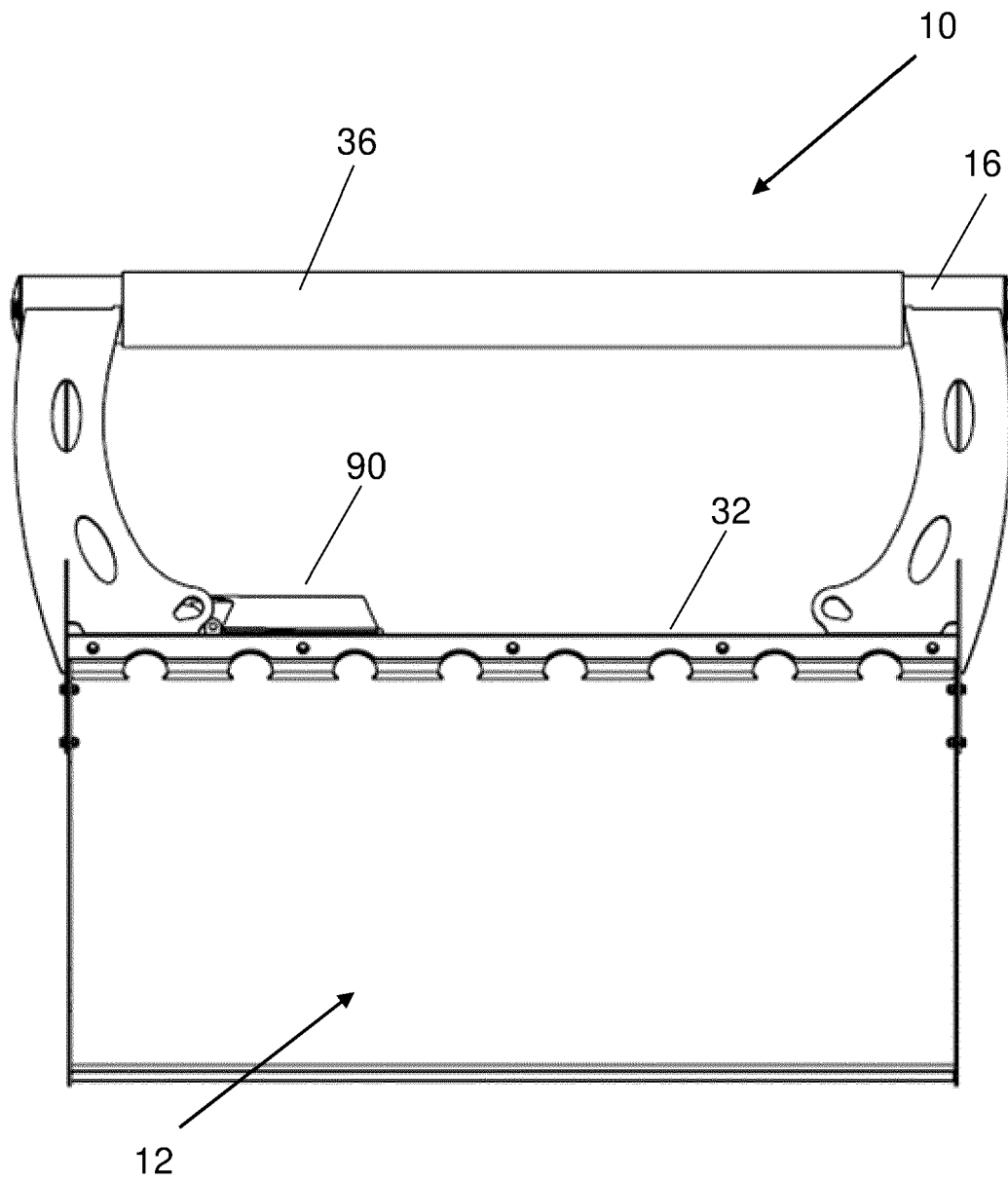


Figure 6

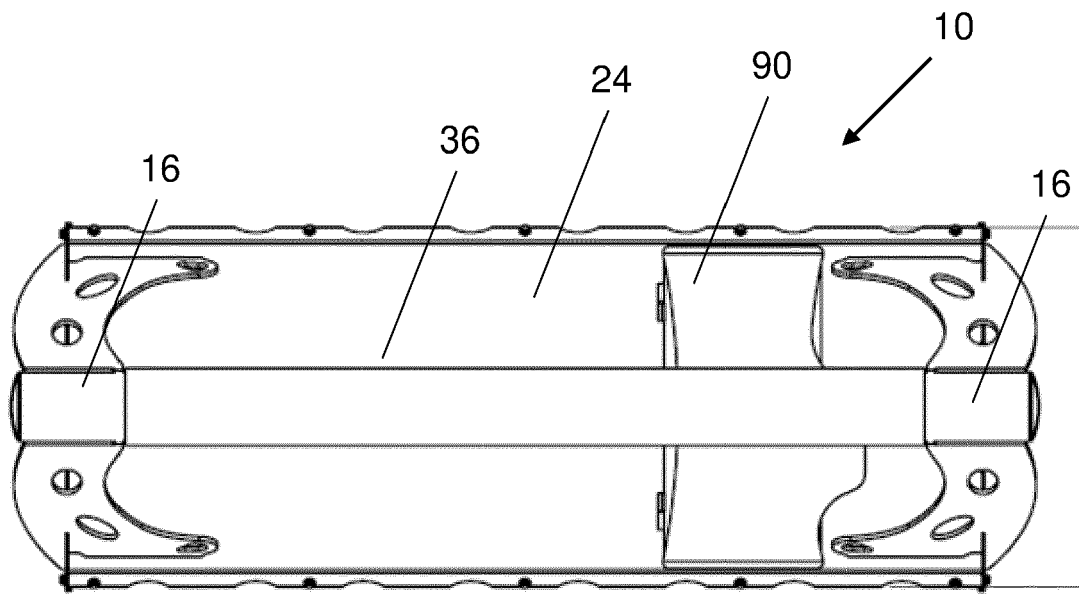


Figure 7

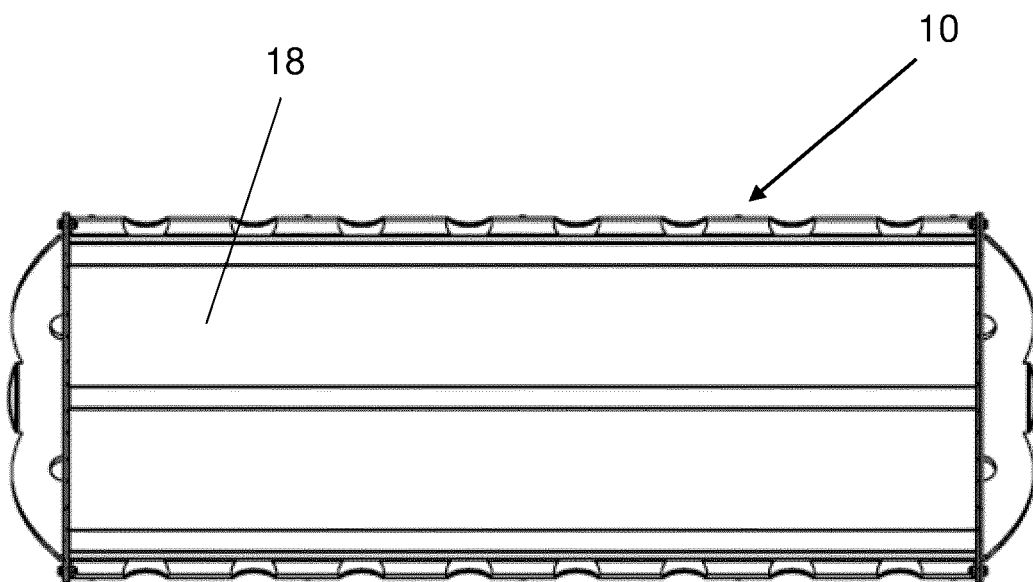


Figure 8

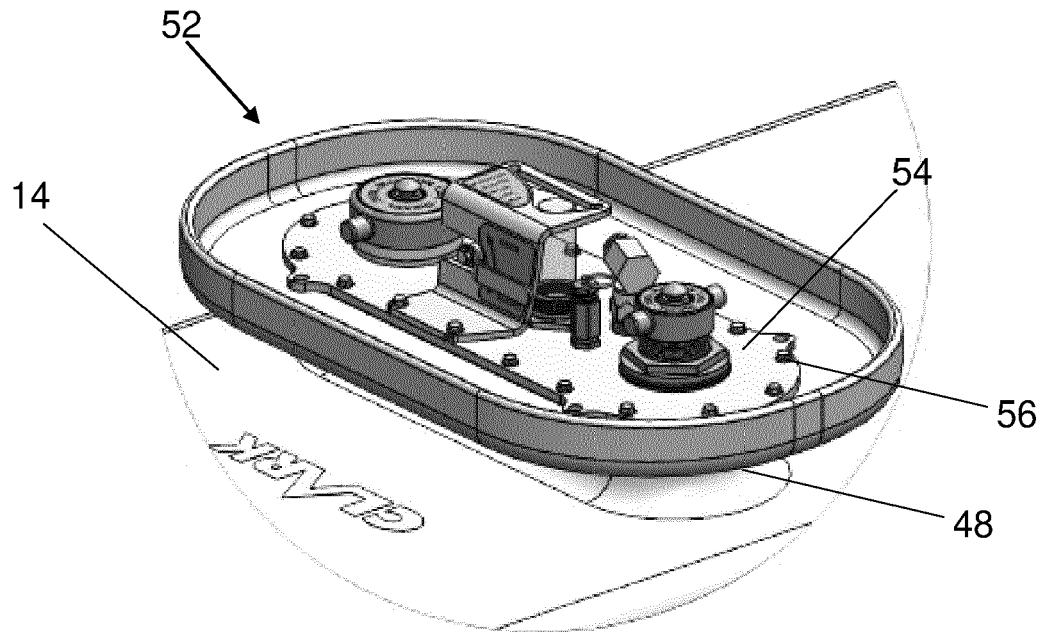


Figure 9

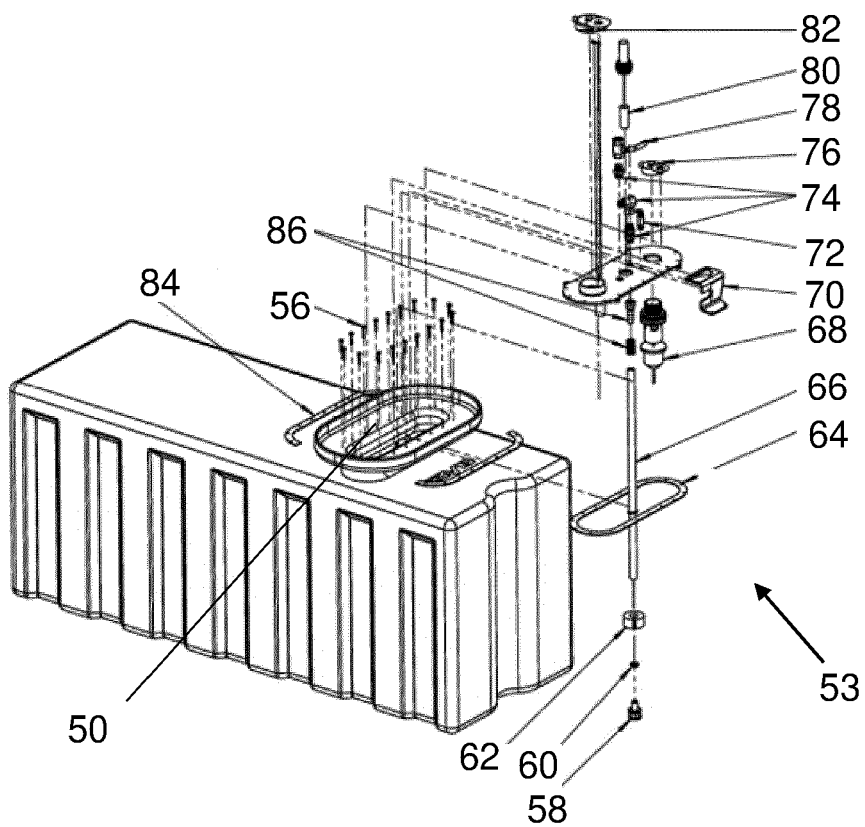


Figure 10

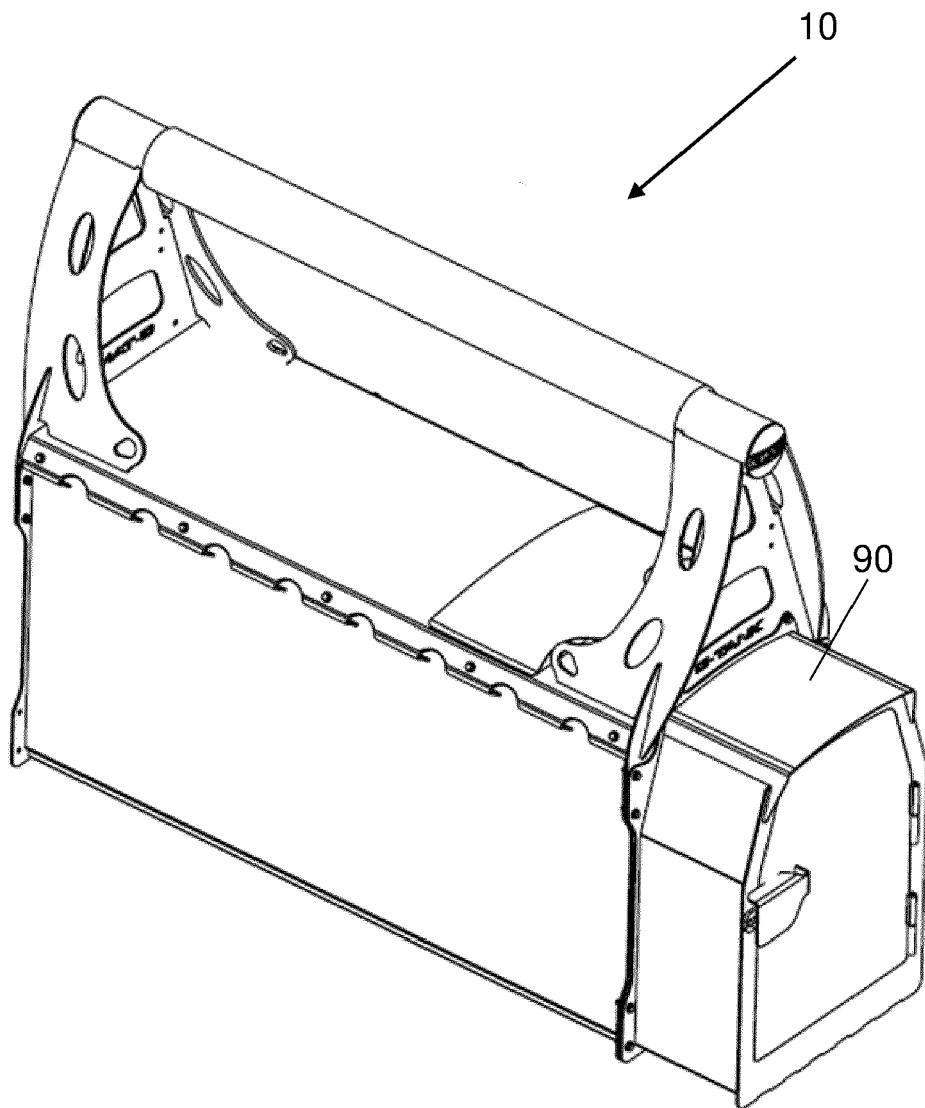


Figure 11

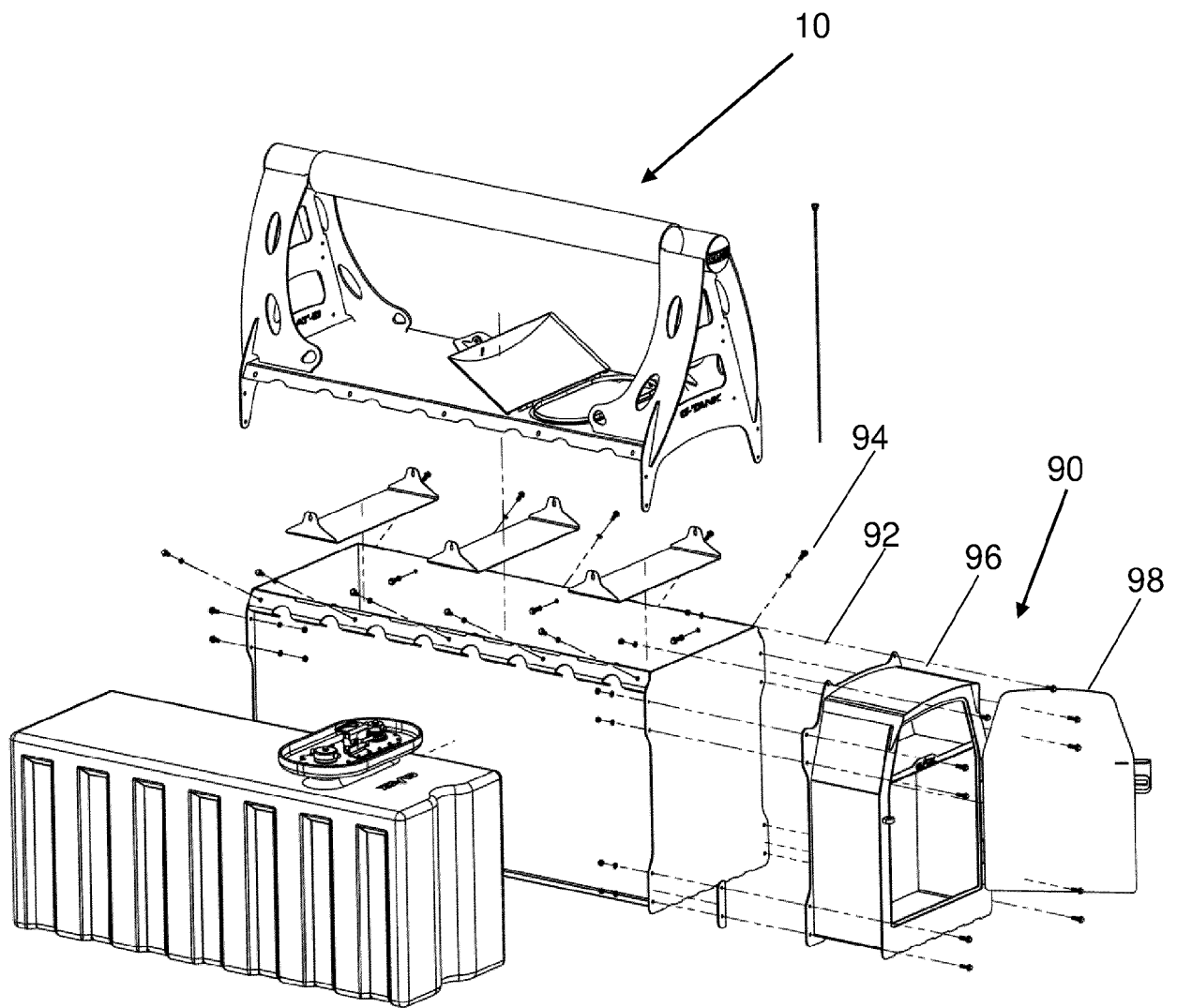


Figure 12



EUROPEAN SEARCH REPORT

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A	* column 2, line 35 - column 4, line 2; figures 1-7 *	3-7,9, 11,12	B27B17/00 B65D47/06 B65D77/04 F02B63/00 F02B77/00
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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 23 April 2021	Examiner Lämmel, Gunnar
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			

**ANNEX TO THE EUROPEAN SEARCH REPORT
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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
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