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Schubach

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[54] **UNITARY FUEL TANK-BOLSTER FOR BUS WITH REMOVABLE POWER UNIT**

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[52] **U.S. Cl.** ..... **180/11,** 280/5 F, 280/106 R

[51] **Int. Cl.** **B62d 21/16**

[58] **Field of Search** ..... 280/106 R, 5 F, 5 H, 5 R; 180/11

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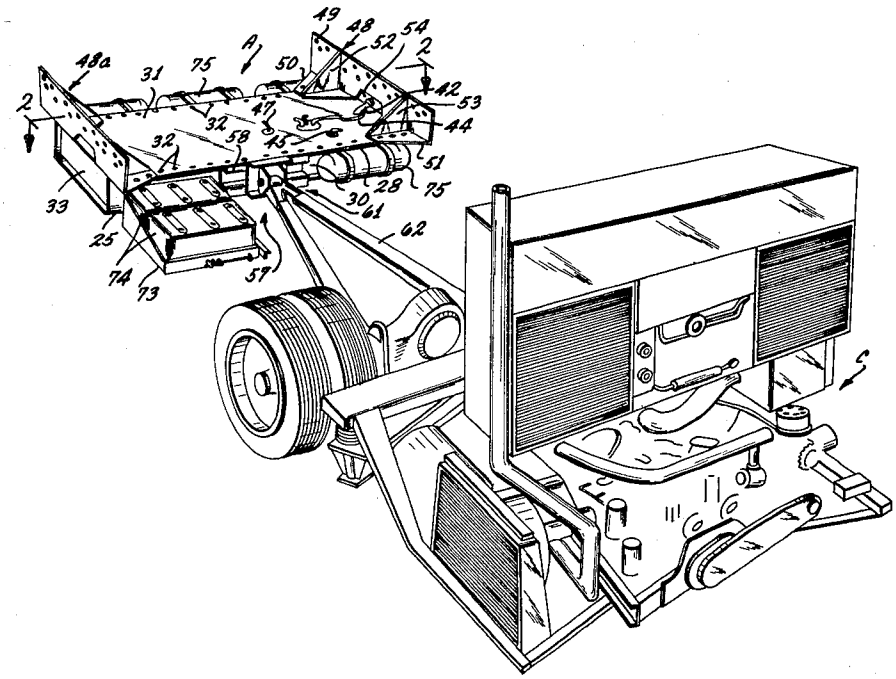
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Assistant Examiner—Terrance L. Siemens
Attorney, Agent, or Firm—Patrick J. Schlesinger

[57] **ABSTRACT**

In a bus or similar vehicle having a power unit docked for easy removal and replacement therein, the bolster-tank of the present invention provides not only a structural bolster for connecting the power unit to the vehicle body, but also a fuel tank for the vehicle. The bolster-tank also provides support for the vehicle's electrical batteries and compressed air accumulator tanks.

11 Claims, 8 Drawing Figures



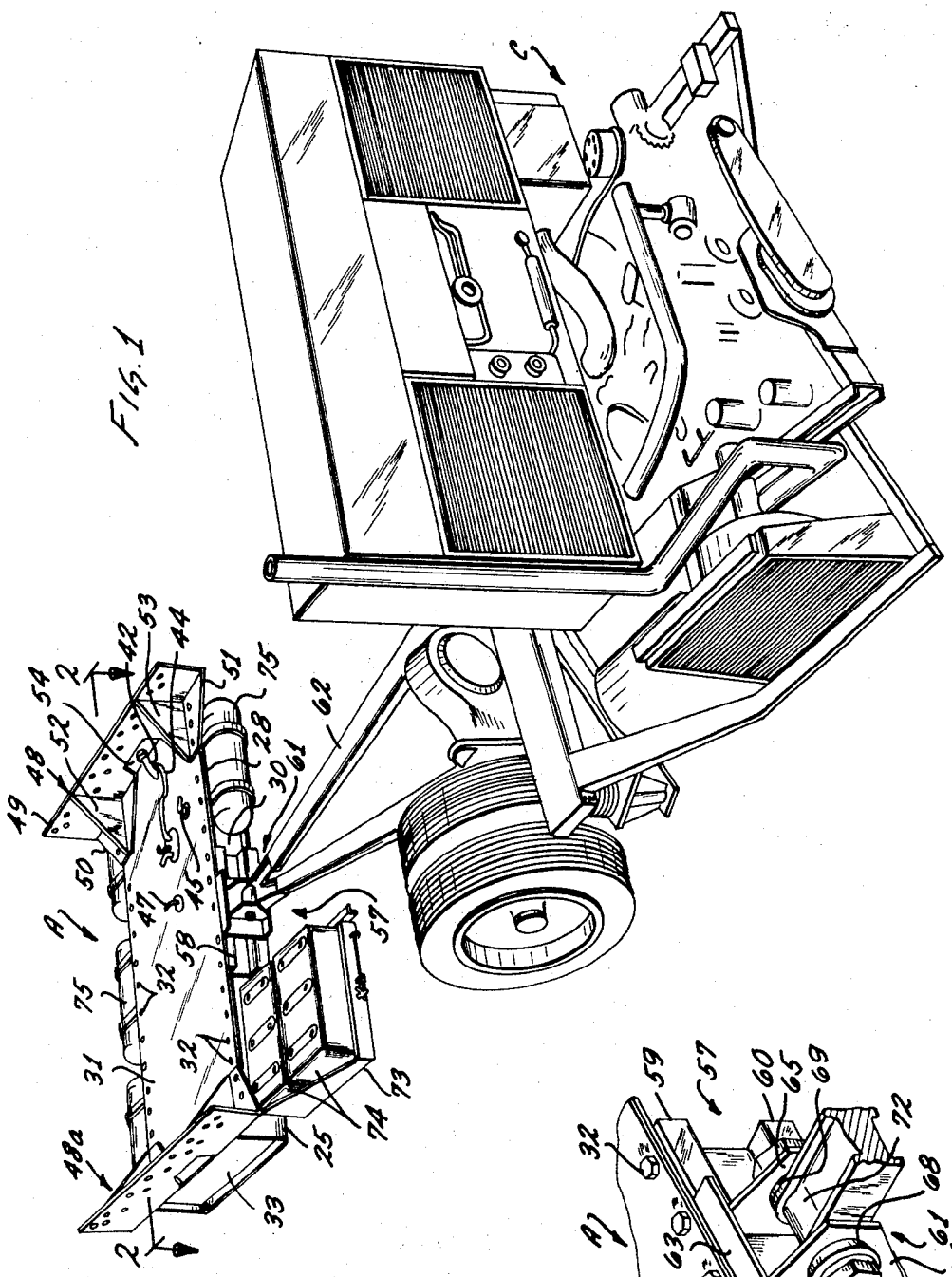


Fig. 1

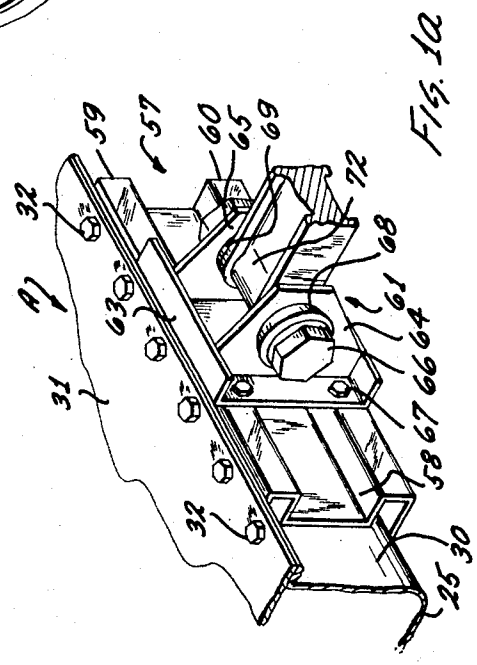


Fig. 1a

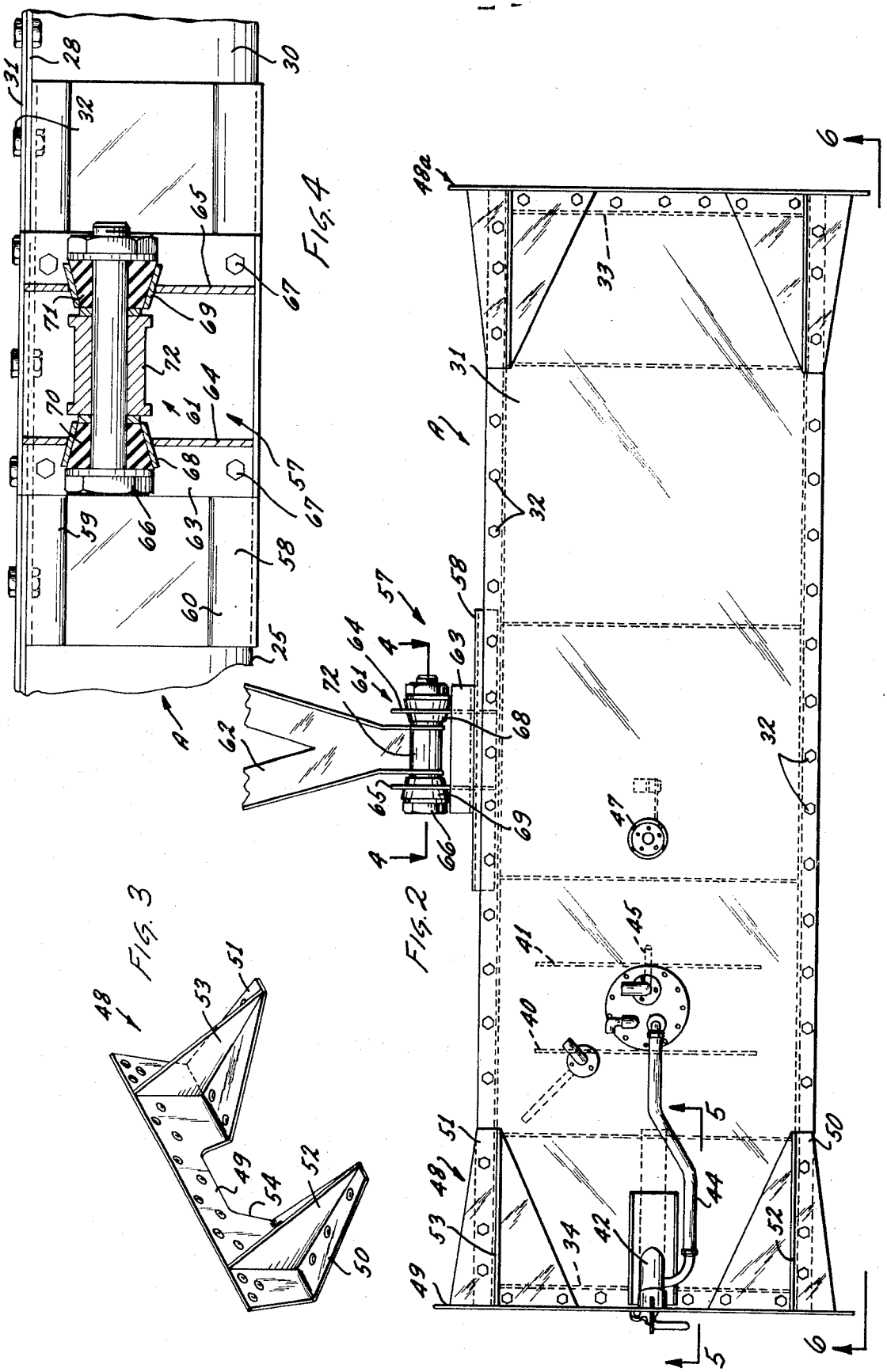

FIG. 4
FIG. 2
FIG. 3

FIG. 5

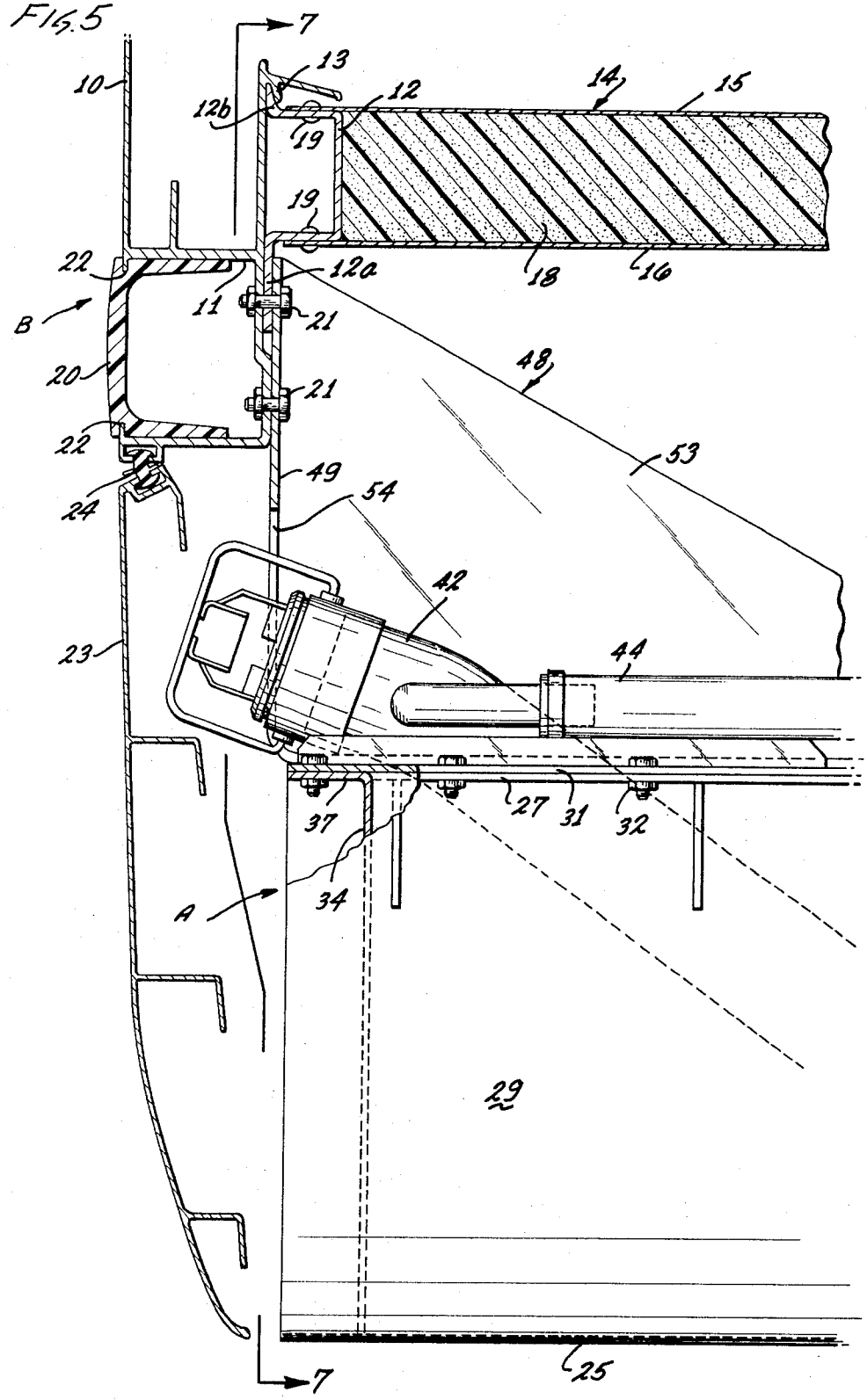

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12b
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12a
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FIG. 6

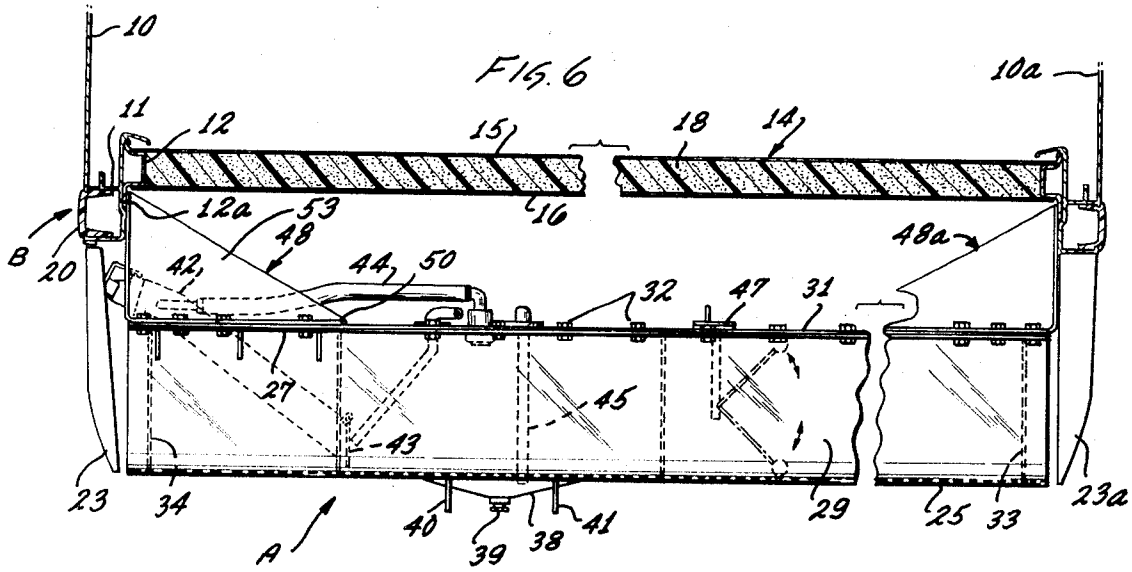
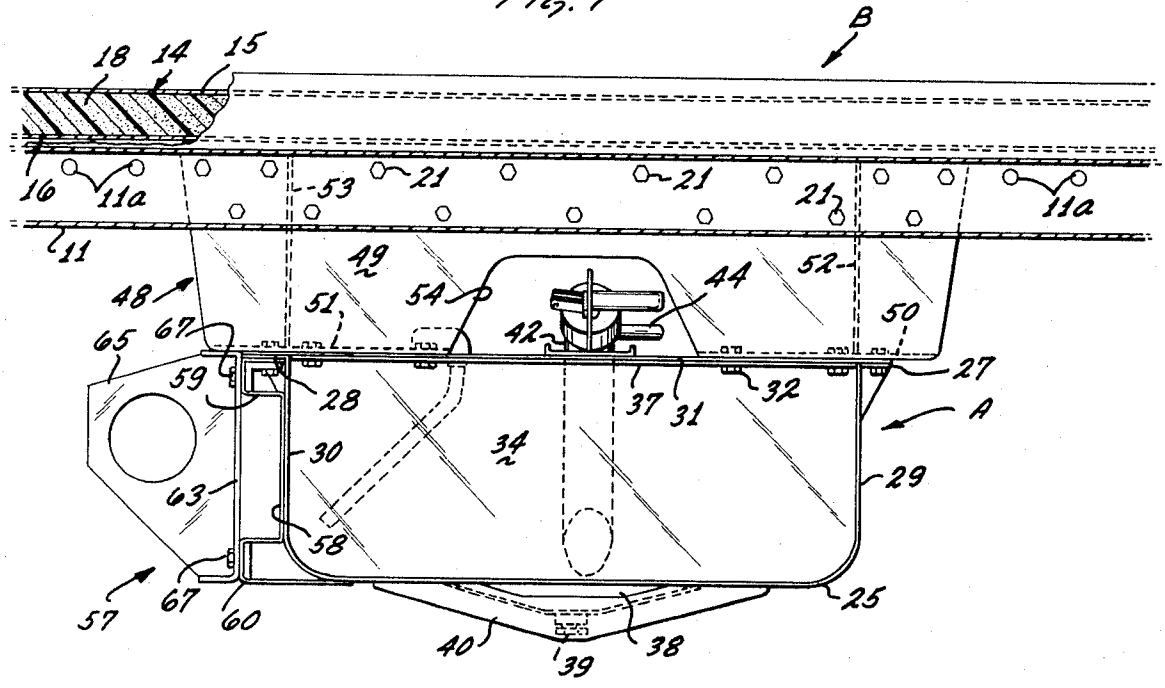

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10a
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12a
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48a
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FIG. 7


B
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11a
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11a
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UNITARY FUEL TANK-BOLSTER FOR BUS WITH REMOVABLE POWER UNIT

BACKGROUND OF THE INVENTION

Patent application Ser. No. 325,630 filed Jan. 22, 1973 and assigned to the assignee of the present invention discloses a bus or similar vehicle having a power unit docked in the rear end of the vehicle body, said power unit comprising a propulsion engine, accessory equipment, drive axle, support and drive wheels, and heating and air conditioning equipment for the vehicle.

A new generation of buses now in the process of development, and to which the foregoing vehicle belongs, requires that the floor of the vehicle be as low as practicable. Due to this requirement, space beneath the vehicle floor is limited, and if a conventional fuel tank were mounted beneath the floor it might be subject to damage by road hazards. An alternative, of course, would be to mount the fuel tank in the space provided in the bus body for the docking of the removable power unit, but in such location the tank would be exposed to heat generated by the power unit, and, in the event of accidental leakage, the fluid fuel would escape directly into the space occupied by the power unit with the possibility of accidental fire or explosion.

Lancia U.S. Pat. No. 1,789,238 issued Jan. 13, 1931, shows a fuel tank mounted unitarily between the rear ends of the two side frame members of an otherwise conventional automobile chassis frame for the purpose of adding rigidity to the frame while providing the fuel tank. This Lancia tank, however, is neither designed for, nor capable of providing thrust support medially of its length for any structure such as the removable power unit of the subject invention. Neither would it be capable of withstanding any substantial driving and braking stresses applied to it medially of its length, a basic concept and requirement of the bolster-tank of the present invention.

SUMMARY OF THE DISCLOSURE

The present disclosure shows a bolster element of box section shape mounted structurally across the interior of a bus body in the under-floor area of a bus and ahead of a space provided in the rear of the bus body for docking a removable power unit. A hitch for connection to a forward element of the power unit is provided on the rear side of the bolster, and a selected portion of the interior of the bolster is closed off by end plates and sealed to provide a fuel tank for the bus. Necessary piping, fittings, etc. are provided for operatively connecting the fuel tank thus formed to the power unit. Mounting supports for the vehicle's batteries and compressed air accumulator tanks are also provided on the bolster-tank thus formed.

BRIEF DESCRIPTION OF THE DRAWINGS

The objectives and advantages of the invention will be apparent from the following description and the accompanying drawings wherein:

FIG. 1 is a perspective view of an illustrative embodiment of the present invention with the power unit and bolster-tank removed from the vehicle while still interconnected to each other.

FIG. 1*a* is a fragmentary, enlarged, perspective view of the hitch zone of FIG. 1.

FIG. 2 is a plan view of the bolster-tank of FIG. 1 but without the battery and air tank mountings.

FIG. 3 is a perspective view of one of the bolster-tank mounting brackets.

FIG. 4 is an enlarged sectional view taken along line 4—4 of FIG. 2.

FIG. 5 is an enlarged, fragmentary, sectional view taken along line 5—5 of FIG. 2 and showing relevant portions of the bus body.

FIG. 6 is a sectional view taken along line 6—6 of FIG. 2, intermediate portions being broken away.

FIG. 7 is a fragmentary, sectional view to the same scale as FIGS. 6 and 7 taken along line 7—7 of FIG. 5, a portion being broken away, and the rubber bushings and cups of the hitch bracket omitted.

DETAILED DESCRIPTION OF THE FORM OF THE INVENTION SHOWN IN THE DRAWINGS

Referring to the drawings in detail, a bolster-tank A made in accordance with the present invention is mounted in a bus body B, relevant portions of which are best shown in FIGS. 5, 6 and 7. The illustrated bus body comprises generally similar side wall panels 10 and 10*a*, of extruded aluminum, each having an exteriorly open channel 11, see FIG. 5, formed along its lower edge for access to a row of rivets 11*a*, see FIG. 7. The rivets 11*a* attach the wall panel 10 to a flange 12*a*, see FIG. 5, which extends integrally from the lower flange of a floor support channel 12 having also a narrow flange 12*b* along its upper flange. The flange 12*b* is seated beneath a retaining flange 13 formed integrally on the wall panel 10.

The bus floor 14 comprises a rigid, rectangular panel having aluminum top and bottom plates 15 and 16 and a sandwich filling 18 of structural plastic foam. Lateral extensions of the top and bottom floor plates receive the channel 12 therebetween, and are secured thereto as by suitable fasteners, such as rivets 19. The floor 14 provides usual support for the passengers, and in addition strongly resists any stresses which might tend to deform the vehicle body from its original rectangular shape.

A channel closure strip 20, -preferrably of suitable extruded plastic material, is fitted into each access channel 11 after the rivets 11a have been set, and bolster-tank bracket mounting bolts 21, to be referred to later herein, drawn down snug. The closure strip 20 is retained in its access channel 11 by flanges 22, which enter grooves provided therefor along the sides of the closure strip 20.

Usual under-floor access doors 23 and 23*a* are hingedly mounted on resilient hinges 24 in a known manner, and are retained in downswung, closed position by usual latches, not shown.

The bolster-tank A comprises a relatively wide and shallow structural channel member 25 with outwardly extending side flanges 27 and 28, see FIG. 7, along the upper edges of its respective sidewalls 29 and 30, see FIG. 7. A top closure plate 31 is fitted to the flanges 27 and 28, and is secured thereto by bolts 32, suitable sealing means, not shown, being provided between the flanges 27 and 28 and the closure plate 31 to insure against leakage. End plates 33 and 34 are fitted one into each end of a selected tank portion of the structural channel member 25, and are secured in sealed relation to the channel member 25. An outwardly turned flange 37, see FIGS. 5 and 7, is provided along the

upper edge of each end plate, and these end plate flanges also are secured in sealed relation to the top closure plate **31** to comprise a fully sealed fuel tank portion within the structural channel member **25.**

A usual drainage depression **38** with a fuel drain plug fitting **39** mounted therein is provided in the bottom of the fuel tank portion of channel member **25.** Runner-like flanges **40** and **41** are welded to project from the tank bottom, one along each side of the drain plug, and extend lengthwise of the vehicle to protect the drain plug from damage by any road hazards which may be encountered during operation of the vehicle.

The bolster-tank A is provided with suitable and usual fuel tank accessories, such as a filler pipe **42** with flapper-type anti-surge valve **43** at its lower end, a whistle vent line **44** to indicate when the tank is filled when using liquid fuel such as gasoline or diesel fuel, fuel feed line **45,** fuel level gage **47,** etc.

A pair of bolster-tank mounting brackets **48** and **48a** for structurally attaching the bolster-tank A to the bus body B are of suitable plate or sheet metal, such as aluminum alloy or steel. Each of these brackets comprises an upright plate portion **49** secured by suitable mounting means, such as bolts **21,** see FIGS. **5** and **7,** to the inner side of the channel portion **11** of the vehicle side wall panel **10,** and also overlies the flange **12***a* of the floor mounting channel **12,** which flange is flush-fitted into a recess provided therefor along the inner side of the wall panel **10.**

Triangular, integral extensions **50** and **51,** see FIG. **3,** from the lower edge of the plate portion **49** are bent inwardly at right angles thereto, and triangular reinforcing gussets **52** and **53** are fitted and welded into the angle between the respective triangular extensions and the upright plate portion. An arched opening **54** is provided in the upright plate portion **49** to provide access to the fuel filler pipe **42** when the under-floor access door **23** is swung upwardly about its supporting hinge. Bolts **55** connect the brackets **48** and **48A** to marginal portions of the closure plate **31** and the side and end wall top flanges therebeneath.

A hitch support and bolster-tank reinforcing member **57** of suitable sheet or plate metal is mounted on the rear side of the bolster-tank channel portion **25** as best shown in FIGS. **2** and **4,** and comprises a medial plate portion **58,** see FIGS. **2, 4** and **7,** with rectangular channel portions **59** and **60** formed along its upper and lower edges, respectively. The upper side flange of the upper channel portion **59** is secured, as by welding, to the under side of the rear top flange **27** of the bolster channel member **25,** and the lower flange of the lower channel portion **60** is extended and secured to the bottom of the channel member **25.**

A clevis type hitch **61** is provided for attaching the A-frame tongue **62** of the power unit C to the bolster-tank A. The hitch **61** comprises a base channel portion **63** of suitable sheet or plate metal, with a pair of similar bushing support plates **64** and **65** fitted and welded perpendicularly therein. The hitch **61** is mounted by bolts **67** transversely across the bottoms of the channel portions **59** and **60** of the member **57.**

A pair of conically tapered metal bushing supports **68** and **69** are mounted co-axially in the plates **64** and **65,** respectively, and a pair of tapered rubber bushings **70** and **71** are fitted respectively therein and are spaced axially apart to receive therebetween a clevis bearing **72,** see FIGS. **1a** and **4,** provided on the forward end of the power unit tongue **62.** A clevis bolt **66** is provided to releasably hitch the tongue bearing **72** to the hitch **61.** The specific type of hitch employed is not material to the invention and any of a number of known type hitches may be used.

A battery support bracket **73,** see FIG. **1,** preferably is mounted on the rear side of the bolster-tank channel member **25,** with usual electric storage batteries **74** for the vehicle mounted therein. A required plurality of compressed air accumulator tanks **75** also are mounted as required on the channel member **25.** These tanks supply compressed air for the vehicle's air brakes, air suspension system, etc.

OPERATION OF THE ILLUSTRATED FORM OF THE INVENTION

With the bolster-tank A mounted in the bus body B as shown in the drawings, and assuming that the power unit C is docked and properly secured in the space provided therefor in the rear end of the vehicle body B, in order to remove the power unit alone it is necessary first to withdraw the clevis bolt **62** and release any other power unit anchoring means, not shown, which may be present.

The usual electrical cables and fluid hoses, not shown, which operatively interconnect the power unit C to the bus body B preferably are provided with plugs and fittings, not shown, of suitable or conventional quick-disconnect types to facilitate freeing the power unit for withdrawal from the body by being rolled backwardly. Suitable supplementary support as may be required is provided for such withdrawal as mentioned in Patent application Ser. No. 325,630 mentioned previously herein. If desired, the bolster tank A may be removed from the bus body B simultaneously with the power unit C as shown in FIG. **1,** in which case many if not all of the hoses and electrical connections between the power unit and the bolster-tank A, batteries **74** and air tanks may be designed to remain connected. This latter arrangement would be a matter of routine design and would facilitate operation and testing of the various elements of the power unit while the latter is removed from the bus body for maintenance.

The invention adds greatly to the advantages of the removable power unit itself as set forth in the aforementioned patent application.

Having thus described my invention, what is claimed as new and useful, and desired to secure by U.S. letters Patent is:

1. A unitary bolster-tank for a bus or similar vehicle having a power unit removably docked in a space provided therefor in the aft end of the vehicle body, said bolster-tank comprising:

a bolster element of box cross-sectional shape extending transversely across the vehicle body forwardly of the space provided within the body for the power unit,

means connecting the ends of the bolster element to structural members on opposite sides of the vehicle body with sufficient strength to withstand and transfer to the vehicle body operating stresses imposed on the bolster element by the power unit,

end means closing off and sealing each end of a selected portion of the interior of the bolster element to define between said end means a sealed space of sufficient volume to comprise a fuel tank for the vehicle in which the bolster element is mounted,

fuel tank accessory means operatively incorporated in the sealed space between the two end means to complete a unitary bolster-tank, and

hitch means mounted on a medial portion of the bolster-tank for releasably connecting to the bolster-tank a forward element of a power unit docked in the space provided therefor in the vehicle body.

2. A bolster-tank as claimed in claim **1** wherein each end of the bolster element is connected to its respective side of the vehicle body by a bracket strongly attached to said each end of the bolster element and to its respective side of the vehicle body.

3. A bolster-tank as claimed in claim **1** wherein the bolster-tank comprises a channel member of heavy structural metal,

and

a plate covers a selected portion of the open side of the channel and is sealed thereto to define, with the portion of the channel which it covers, a structure of box cross-sectional shape.

4. A bolster-tank as claimed in claim **1** wherein the bolster-tank comprises:

a channel member having a bottom and two integral side flanges mounted with its open side directed upwardly,

an outwardly turned flange along the free edge of each channel member side flange,

a pair of end plates fitted and secured in the channel member in marginally sealed, and selected, spaced apart relation,

an outturned flange along the upper edge of each end plate,

a cover plate covering and conforming to the outturned top flanges on the channel member, side flanges and end plates,

and

means securing the cover plate in sealed relation to the outturned top flanges of the side flanges and end plates to enclose and seal the space between the end plates.

5. A bolster-tank as claimed in claim **4** wherein the plate covering a portion of the open side of the channel member is removable.

6. A bolster-tank as claimed in claim **3** wherein the channel member is relatively wide, lengthwise of the vehicle and shallow.

7. A bolster-tank as claimed in claim **1,** wherein the hitch means comprises a reinforcing member mounted on the rear side of the bolster-tank channel portion and a hitch member mounted on the rear side of the reinforcing member, the hitch member being constructed and arranged for pivotal, releasable connection to a forward element of a power unit docked in the space provided therefor in the after end of the vehicle body for transmitting operating stresses from the power unit to the bolster-tank and thence to the vehicle body.

8. A bolster-tank as claimed in claim **7** wherein the hitch member comprises a base portion secured to the reinforcing member, a pair of similar bushing support plates secured in parallel, laterally spaced apart relation to the base portion, a pair of tapered bushing supports mounted one in each support plate, and a pair of rubber bushings mounted in co-axial, axially spaced apart relation, one in each of the bushing supports to receive a clevis bolt for pivotally connecting the forwardly extending element of the power unit to the hitch member.

9. A bolster-tank as claimed in claim **7** wherein the reinforcing member comprises a central plate portion in supported engagement with the rear side of the bolster element, and a pair of channels formed one along the upper edge of the central plate portion and one formed along the lower edge of the plate portion, the channels being of substantially equal height, the upper flange of the upper channel portion being secured to the underside of the outwardly extending top flange on the rear wall of the bolster channel member and the lower flange of the lower of said two channels being elongated and extending beneath the bottom of the bolster-tank channel member and fixedly secured thereto, the hitch member being mounted on the rear sides of the two channel portions of the support member.

10. A bolster-tank as claimed in claim **7** wherein the bolster-tank is removable from its position in the bus body for removal while connected by the hitch means to a power unit docked in the space provided therefor in the bus body, a battery support member is mounted on the rear side of the bolster-tank or supporting electrical batteries for a power unit connected to the hitch means and a compressed air tank is also mounted on the rear side of the bolster-tank.

11. A bolster-tank as claimed in claim **10** wherein the bushing supports are conically tapered and the rubber bushings are tapered and are fitted one into each of the bushing supports.

* * * * *