July 5, 1966 A. J. SCHULTZ 3,258,793

OFFSHORE TERMINAL

Filed Aug. 31, 1964 3 Sheets-Sheet 1

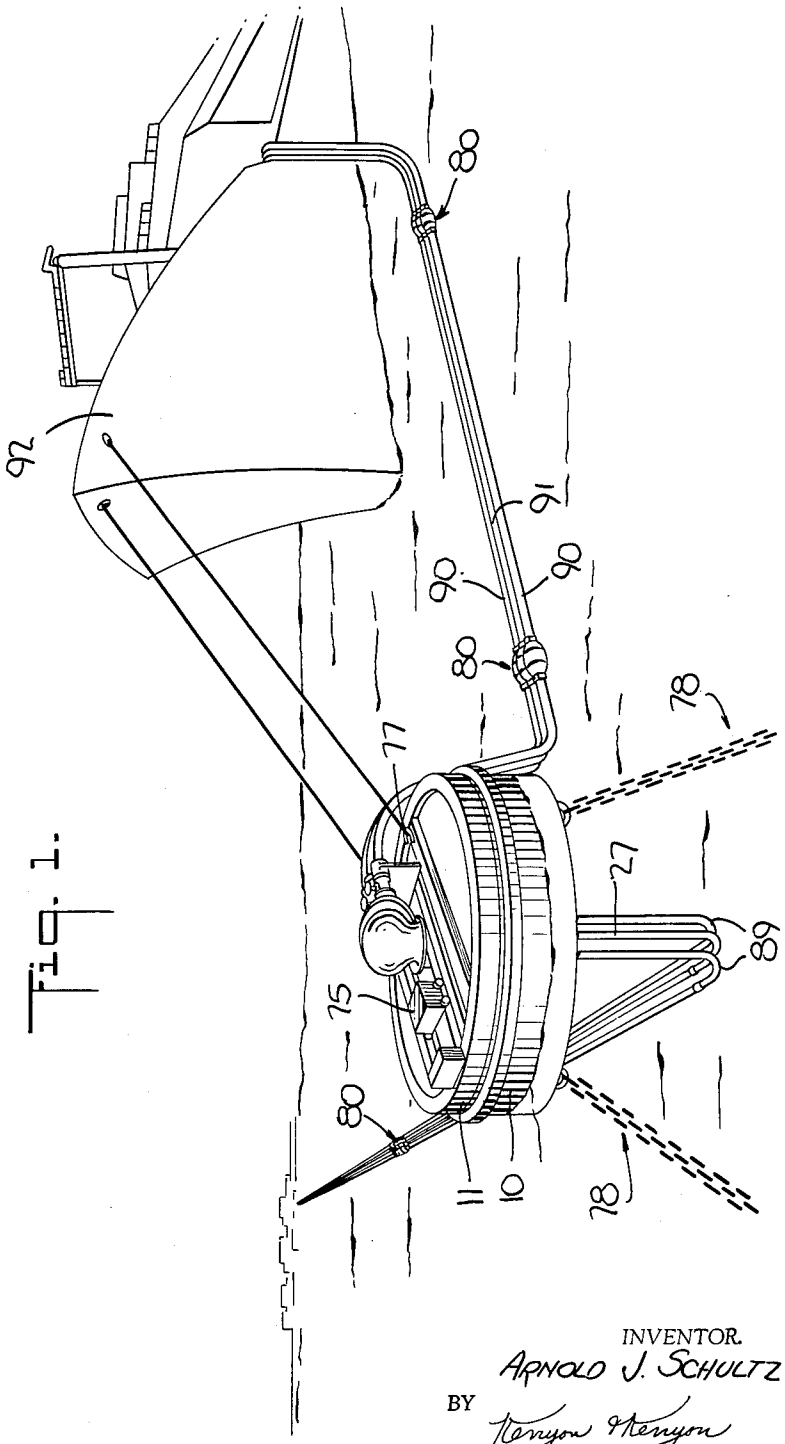


Fig. 1.

INVENTOR.
ARNOLD J. SCHULTZ
BY Kenyon & Kenyon
ATTORNEYS

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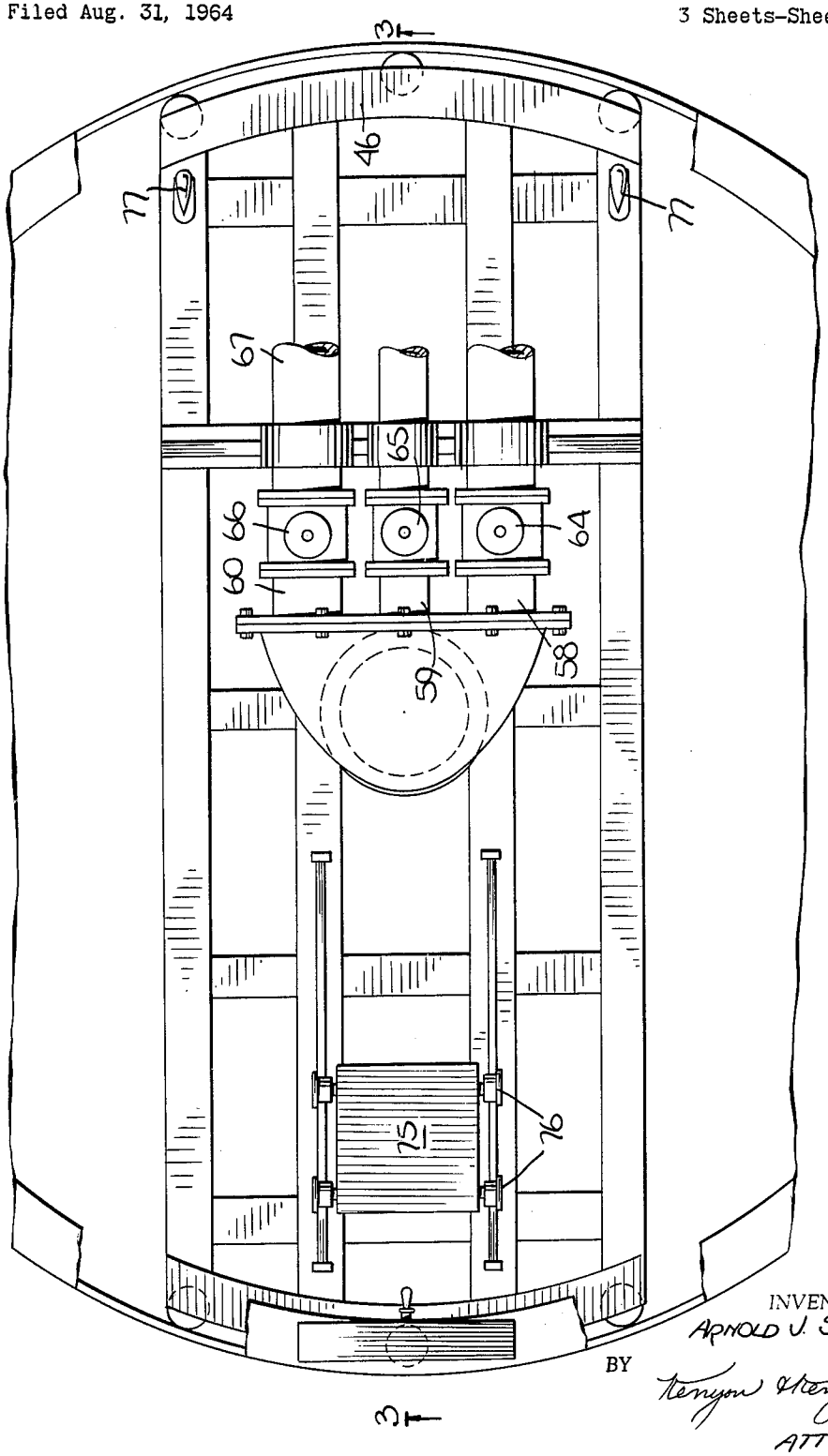


Fig. 2.

INVENTOR.
ARNOLD J. SCHULTZ

BY Kenyon & Kenyon

ATTORNEYS

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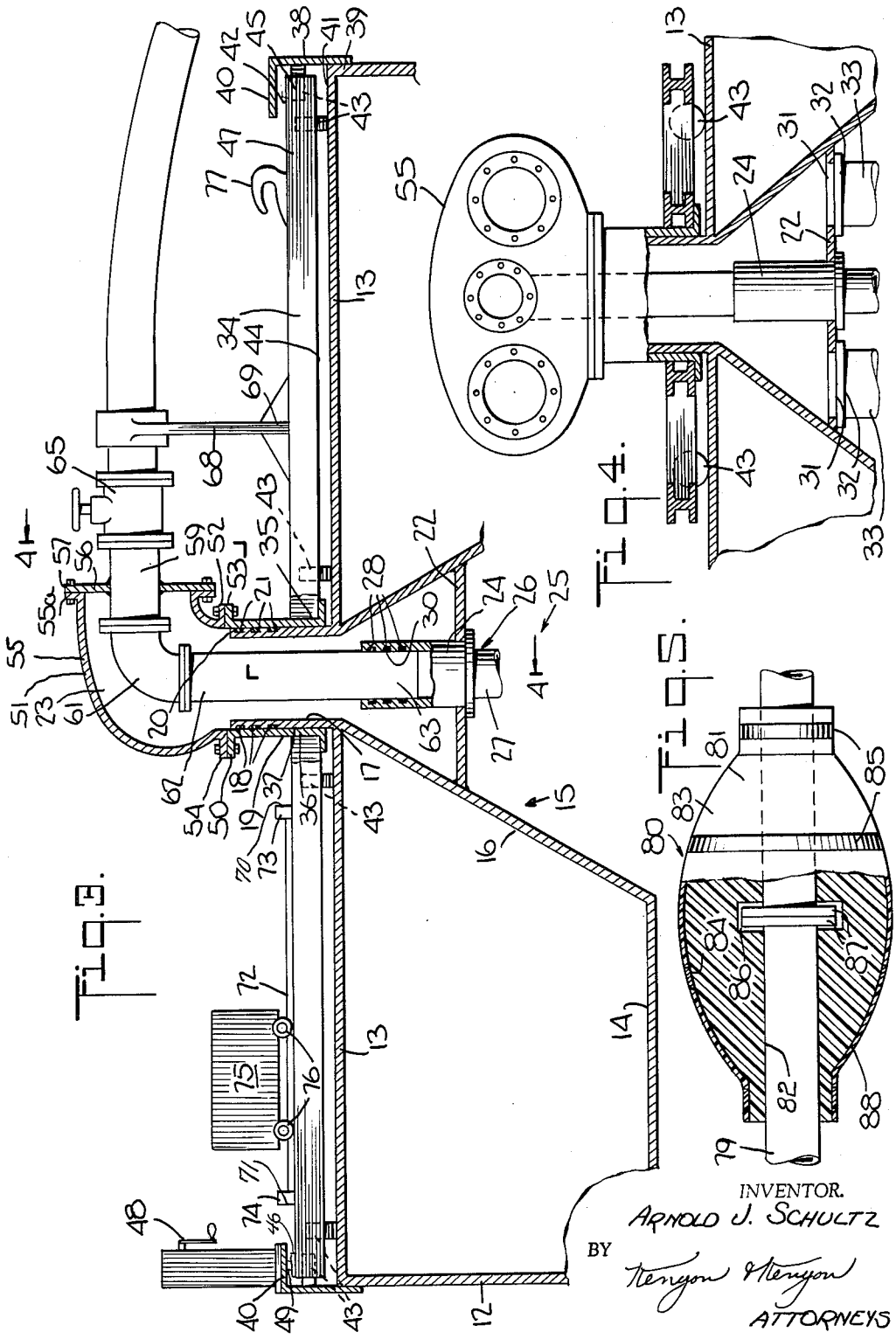


Fig. 1.

Fig. 4.

Fig. 5.

INVENTOR.
ARNOLD J. SCHULTZ
BY Kenyon & Kenyon
ATTORNEYS

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OFFSHORE TERMINAL

Arnold J. Schultz, 520 5th Ave., New York 36, N.Y.

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7 Claims. (Cl. 9—8)

This invention relates to improvements in an offshore terminal facility for loading and unloading tankers and the like at locations remote from permanent shore installations.

There have been attempts in the prior art to provide offshore terminal facilities but like the present invention such prior structures have had one or more objectionable features making their commercial use unfit. One of the major objections to prior art structures has been the tendency to leak, primarily as a result of aging and wearing of the gasketing material required by the particular design. Other objections to prior art devices include the requirement of large volume compartments in the float structure itself communicating with the fuel and water lines, thereby increasing cleaning problems, corrosion problems, and associated problems connected with abnormally high dead space, et cetera.

Another problem with prior art structures has been that of maintaining proper orientation of the terminal at all times, i.e. prevent listing due to weight of hose lines and the like.

It is an object of the present invention to provide an offshore terminal having none of the above mentioned defects and objectionable features and further providing a structure which is virtually free of maintenance problems for the life of the structure.

Briefly the present invention comprises a cylindrical buoyant compartment and hull member having a generally flat top deck thereon disposed above the normal water line of the hull. The hull has a centrally disposed conically shaped fuel compartment therein having a flat base portion disposed inwardly from the bottom of the hull and a cylindrical extension communicating with the fuel compartment disposed upwardly from the said top deck. A circular platform overlies the top deck and is supported thereon by roller members on its underside permitting rotatable movement of the platform relative to the deck. The platform has an upwardly extending central conduit section dimensioned for rotatable disposition over the extension on the fuel compartment. The latter extension has a plurality of vertically spaced peripheral recesses on its outer surface and has a corresponding plurality of metal seal rings mounted in said recesses and bearing against the opposed inner surface of the conduit section in sliding sealing relationship therewith.

A vertical sleeve member is concentrically disposed within the fuel compartment and is affixed to said base and communicates externally of the underside of the hull.

A header horn is affixed to the upper end of said conduit section to provide a top closure for the fuel compartment. A central pipe member is carried within said horn and extends into said sleeve at its lower end and has an upper end extending externally of said horn. A plurality of metal seal rings is mounted in inner recessed portions of said sleeve and as said ring bears against the outer surface of said central pipe member is in sliding sealing relationship therewith.

Said horn is provided with external valve means for said central pipe member and for the fuel compartment, said valve means being adapted for interconnection with ship-based hose lines, means are provided on the underside of the fuel compartment for interconnecting said central pipe member and said fuel compartment with shore-based hose lines.

A peripheral thrust plate is affixed to the outer edge of said hull and has an upper flange overlying said deck and the outer edge portion of said platform. A plurality of roller members are mounted at the periphery of said platform and extend radially outwardly therefrom to bear against the thrust plate to provide radial stability for the platform. Gear track means is disposed on the upper face of the platform at its periphery and manual crank means is mounted on the upper flange on said thrust plate having associated gear means meshing with the gear track to provide manual rotational power for said platform relative to the hull member.

Track means are provided on said platform extending generally radially thereon and a ballast car is movably disposed on said track means being adjustable therealong to counterbalance listing tendencies of said hull caused by interconnection of said facility with ship-based hose lines.

Float members are included for the hose lines each comprising a pair of matching longitudinal buoyant elements of foam-like material having grooved surfaces therein for assembly together against said hose line to provide a spheroidal assembly completely surrounding a longitudinal section of the hose. The outer surfaces of said elements having matching peripheral grooved portions therein at a plurality of axially spaced positions and radially disposed relative to the longitudinal axes of said grooved suraces. Radially enlarged recessed portions are provided in said grooved surfaces intermediate the ends of the said elements and are adapted to receive connecting flanges of said hose lines. A water impervious fiber glass outer covering is provided for each of said elements.

Other objects and features of the invention will become apparent in the following description and claims and in the drawings in which:

FIG. 1 is an isometric representation of the facility in use;

FIG. 2 is a fragmentary plan view of the facility;

FIG. 3 is a fragmentary section taken along lines 3—3 of FIG. 2;

FIG. 4 is a fragmentary section taken along lines 4—4 of FIG. 3;

FIG. 5 is an enlarged partial section of a float member.

Referring to the drawings, particularly FIGS. 1–3, the device of the present invention is comprised of hull member **10** and rotary platform **11**. The hull **10** is constructed of any conventional marine hull fabricating material such as steel or the like and is preferably welded. It has a generally cylindrical construction with straight vertical sides **12**, a flat top deck **13**, flat outer bottom **14** and a conical central portion designated generally by reference numeral **15** having a slanted inner bulkhead **16** of conical configuration, the water-tight non-liquid containing portion of the hull, constituting the major volume of the hull, being analogous to a toroidal configuration. The conical structure **15** is actually frusto-conical and includes a cylindrical extensions **17** at the upper end thereof extending upwardly from deck **13** and having a plurality of vertically spaced rectangular recessed portions **18** at the outer surface **19** thereof near its upper end **20** within each of which is disposed a metal sealing ring **21**.

Intermediate upper deck **13** and outer bottom **14** is disposed horizontal base member **22** which closes off the upper part **23** of the central portion of hull **10**. Said base carries central sleeve member **24** which is disposed within compartment **23** and communicates externally of said compartment into outer chamber **25** of the conical section **15** and is adapted at its external end **26** for interconnection with a marine hose line **27**. Said sleeve member

24 has a plurality of vertically spaced recesses 28 on its inner surface 29 each carrying a metal sealing ring 30 therein.

Base member 22 also includes a pair of openings 31 therein each including suitable connecting means 32 adapted for interconnection with respective hose lines 33.

Circular platform member 34 is disposed over deck 13 and has a central opening 35 carrying an upwardly extending cylindrical conduit section 36 dimensioned for insertion over hull extension 17 as shown, metal seal rings 21 providing sliding sealing fluid-tight contact between hull extension 17 and the inner surface 37 of conduit section 36. The platform 34 has an overall diameter somewhat less than the overall diameter of the cylindrical hull 10. Peripheral thrust plate 38 is mounted at the upper outer edge portion 39 of hull 10 and has a radially inwardly extending horizontal flange 40 thereon overlying outer edge portion 41 of deck 13 and also outer edge portion 42 of platform 34. Rotatably mounted on platform 34 are a plurality of roller members 43 which rotatably support the platform on the deck and with respect to thrust plate 38. Some of the rollers 43 as shown in FIG. 3 are disposed on the underside 44 of platform 34 and others are mounted at the outer edge 45 thereof to bear against thrust plate 38.

Circular gear track 46 is mounted on the upper face 47 of plate 34 at its periphery 42. Hand crank means 48 is mounted on flange 40 of thrust plate 38 carrying gear means 49 associated therewith and engaging gear track 46 to provide manual rotative power for platform 34 relative to deck 13.

Disposed on the upper end 50 of conduit 36 is cowl or horn member 51 having a bottom flange 52 bolted to a corresponding flange 53 on the conduit section 36 by bolt members 54. Said horn 51 has a laterally facing flared portion 55 terminating in flange 55*a* to which is bolted header plate 56 by means of conventional bolts 57. Said header plate 56 carries three pipe sections 58, 59, 60 which extend therethrough and are joined thereto by welding or the like providing a fluid-tight connection therebetween. Pipe sections 58 and 60 communicate directly with inner compartment 23 in said hull 10 and pipe section 58 is affixed through L section 61 to central pipe member 62 which is received at its lower end 63 in sleeve member 24 to which it is slidably and rotatably sealed by metal seal rings 28. Each of said pipe sections 58, 59 and 60 are interconnected with external valve means 64, 65, 66 respectively located externally of header plate 56. Each of said valve means 64, 65 and 66 has conventional hose connecting means 67 thereon adapted for interconnection with a marine hose line, said hose connection means each being supported by mounted plate 68 which is secured at its lower end 69 to deck 34.

Secured to upper surface 47 of deck 34 and extending radially from an inboard point 70 to an outboard point 71 are a pair of spaced rails 72. Stop members 73 and 74 are located at said inboard and outboard ends 70, 71 respectively. Movably disposed on said rails is ballast car 75 being supported on wheels 76 riding on said rails 72. Said car is adapted to contain a ballast material such as water or the like (not shown).

Conventional supplementary fixtures such as mounting hooks 77, etc. may be employed. Conventional anchoring means 78 are included to locate the facility at any desired location.

As means for floating the marine hose lines 79, float members 80 may be employed which comprise a pair of matching longitudinal buoyant elements 81 of foam-like material such as polyurethane foam each having an inner longitudinal grooved surface 82 adapted to fit around hose 79 and said elements 81 fitting together to form a complete enclosure for the hose section. The overall configuration of the float member is spheroidal in contour. The outer surfaces 83 of the elements 81 have a plurality of matching peripheral grooves 84 at axially spaced positions therealong and radially disposed relative the longitudinal axis of the hose 79. Securing bands 85 of metal or other suitable material are disposed around the assembled elements 81 in the recesses 84 and fastened by conventional means to thereby secure the elements 81 in place against hose 79. The grooved surfaces 82 of the elements 80 may be provided with radially enlarged recesses 86 to form inner circular recesses in the float member assembly to receive joining flanges 87 at hose end sections. The float members are provided with an outer water repellent covering 88 of fiber glass which may be of the order of about one-fourth inch in thickness or any other preferred thickness as desired.

In use the bottom fittings 32 of the inner conical compartment 23 are interconnected with shore-based hose lines 89 for fuel oil and fitting 26 is interconnected with shorebased hose line 27 for the transport of water. Likewise the outboard connectors 67 adjacent the header horn 51 are interconnected with ship-based fuel hoses 90 and the inboard or central fitting 67 is interconnected with ship-based water hose 91. Float members 80 are carried by the respective lines, both ship-based and shore-based, at any desired intervals such as twenty feet or more. After interconnection of the ship-based hose lines 90 and 91 ballast car 75 is adjusted radially along track means 72 to compensate for the list otherwise provided by said lines. Crank means 48 is adjusted for the appropriate rotative orientation of platform 34 with respect to deck 13 so that header horn 51 and associated valves face in the desired direction with respect to ship 92 for interconnection with said ship-based lines. Lines will have been run from the ship 92 to the securing or mooring hook 77 on the offshore terminal to moor the ship during the loading or unloading operation which can now be appropriately carried on by adjustment of the valve means 65.

From the above it can be seen that a novel offshore terminal facility is provided satisfying all of the aforesaid objects. With the provision of metal seal rings of the general composition and construction of automotive piston rings as is contemplated by the present invention it can be understood that maintenance free operation is provided for an offshore terminal facility perspectively throughout the life of the facility.

It is to be understood that changes and additions may be made by those skilled in the art without departing from the scope or spirit of the invention.

I claim:

1. An offshore terminal facility for loading and unloading tankers comprising a hull member having a top deck thereon, a fuel compartment in said hull base portion, an extension communicating with said fuel compartment disposed upwardly from said top deck, a platform overlying said top deck and rotatably mounted on said hull, a conduit section on said platform mounted on said extension and dimensioned for rotatable movement relative to said extension, said extension having a plurality of vertically spaced peripheral recesses on its outer surface, seal rings mounted in said recesses and bearing against the opposed inner surface of said conduit section in sliding sealing relationship therewith, a vertical sleeve member disposed within said fuel compartment and communicating externally of said hull, a header horn affixed to said conduit section providing a closure for said fuel compartment, a central pipe member carried within said horn having a lower end portion extending into said sleeve and an upper end communicating externally of said horn, a plurality of seal rings mounted in inner recessed portions of said sleeve and bearing against the outer surface of the lower end portion of said pipe in sliding sealing relationship therewith, said horn provided with valve means for said central pipe member and for said fuel compartment adapted for interconnection with ship-based hose lines, and means on the underside of said fuel compartment for

interconnecting said central pipe member and said fuel compartment with shore-based hose lines.

2. An offshore terminal facility for loading and unloading tankers comprising a compartmented hull member having a top deck thereon, a fuel compartment in said hull having a base portion, an extension communicating with said fuel compartment disposed upwardly from said top deck, a platform overlying said top deck and rotatably mounted on said hull, a conduit section on said platform mounted on said extension and dimensioned for rotatable movement relative to said extension, said extension having a plurality of vertically spaced peripheral recesses on its outer surface, seal rings mounted in said recesses and bearing against the opposed inner surface of said conduit section in sliding sealing relationship therewith, a vertical sleeve member disposed within said fuel compartment and communicating externally of said hull, a header horn affixed to said conduit section providing a closure for said fuel compartment, a central pipe member carried within said horn having a lower end portion extending into said sleeve and an upper end communicating externally of said horn, a plurality of seal rings mounted in inner recessed portions of said sleeve and bearing against the outer surface of the lower end portion of said pipe in sliding sealing relationship therewith, said horn provided with valve means for said central pipe member and for said fuel compartment adapted for interconnection with ship-based hose lines, and means on the underside of said fuel compartment for interconnecting said central pipe member and said fuel compartment with shore-based hose lines.

3. An offshore terminal facility for loading and unloading tankers comprising a compartmented hull member having a top deck thereon, a fuel compartment in said hull having a base portion, an extension communicating with said fuel compartment disposed upwardly from said top deck, a circular platform overlying said top deck and rotatably mounted on said hull, a conduit section on said platform mounted on said extension and dimensioned for rotatable movement relative to said extension, said extension having a plurality of vertically spaced peripheral recesses on its outer surface, metal seal rings mounted in said recesses and bearing against the opposed inner surface of said conduit section in sliding sealing relationship therewith, a vertical sleeve member disposed within said fuel compartment affixed to said base and communicating externally of said hull, a header horn affixed to said conduit section providing a closure for said fuel compartment, a central pipe member carried within said horn having a lower end portion extending into said sleeve and an upper end communicating externally of said horn, a plurality of metal seal rings mounted in inner recessed portions of said sleeve and bearing against the outer surface of the lower end portion of said pipe in sliding sealing relationship therewith, said horn provided with valve means for said central pipe member and for said fuel compartment adapted for interconnection with ship-based hose lines, and means on the underside of said fuel compartment for interconnecting said central pipe member and said fuel compartment with shore-based hose lines.

4. An offshore terminal facility for loading and unloading tankers comprising a buoyant compartmented hull member having a top deck thereon, a centrally disposed fuel compartment in said hull having a flat base portion, an extension communicating with said fuel compartment disposed upwardly from said top deck, a circular platform overlying said top deck and having roller members thereon for rotatable movement on said deck, a conduit section on said platform mounted on said extension and dimensioned for rotatable movement relative to said extension, said extension having a plurality of vertically spaced peripheral recesses on its outer surface, metal seal rings mounted in said recesses and bearing against the opposed inner surface of said conduit section in sliding sealing relationship therewith, a vertical sleeve member disposed concentrically within said fuel compartment affixed to said base and communicating externally of said hull, a header horn affixed to said conduit section providing a closure for said fuel compartment, a central pipe member carried within said horn having a lower end portion extending into said sleeve and an upper end communicating externally of said horn, a plurality of metal seal rings mounted in inner recessed portions of said sleeve and bearing against the outer surface of the lower end portion of said pipe in sliding sealing relationship therewith, said horn provided with external valve means for said central pipe member and for said fuel compartment adapted for interconnection with ship-based hose lines, and means on the underside of said fuel compartment for interconnecting said central pipe member and said fuel compartment with shore-based hose lines.

5. An offshore terminal facility for loading and unloading tankers comprising a cylindrical buoyant compartmented hull member having a top deck thereon, a centrally disposed conically shaped fuel compartment in said hull having a flat base portion, a cylindrical extension communicating with said fuel compartment disposed upwardly from said top deck, a circular platform overlying said top deck and having roller members for rotatable movement on said deck, a cylindrical conduit section on said platform mounted on said extension and dimensioned for rotatable movement relative to said extension, said extension having a plurality of vertically spaced peripheral recesses on its outer surface, metal seal rings mounted in said recesses and bearing against the opposed inner surface of said conduit section in sliding sealing relationship therewith, a vertical sleeve member disposed concentrically within said fuel compartment affixed to said base and communicating externally of the underside of said hull, a header horn affixed to said conduit section providing a top closure for said fuel compartment, a central pipe member carried within said horn having a lower end portion extending into said sleeve and an upper end communicating externally of said horn, a plurality of metal seal rings mounted in inner recessed portions of said sleeve and bearing against the outer surface of the lower end portion of said pipe in sliding sealing relationship therewith, said horn provided with external valve means for said central pipe member and for said fuel compartment adapted for interconnection with ship-based hose lines, and means on the underside of said fuel compartment for interconnecting said central pipe member and said fuel compartment with shore-based hose lines.

6. An offshore terminal facility for loading and unloading tankers comprising a cylindrical buoyant compartmented hull member having a generally flat top deck thereon, a centrally disposed conically shaped fuel compartment in said hull having a flat base portion disposed inwardly from the bottom of said hull, a cylindrical extension communicating with said fuel compartment disposed upwardly from said top deck, a circular platform overlying said top deck and having roller members thereon for rotatable movement on said deck, a cylindrical central conduit section on said platform mounted on said extension and dimensioned for rotatable movement relative to said extension, said extension having a plurality of vertically spaced peripheral recesses on its outer surface, metal seal rings mounted in said recesses and bearing against the opposed inner surface of said conduit section in sliding sealing relationship therewith, a vertical sleeve member disposed concentrically within said fuel compartment affixed to said base and communicating externally of the underside of said hull, a header horn affixed to said conduit section providing a top closure for said fuel compartment, a central pipe member carried within said horn having a lower end portion extending into said sleeve and an upper end communicating externally of said horn, a plurality of metal seal rings mounted in inner recessed portions of said sleeve and bearing against the outer surface of the lower end portion of

said pipe in sliding sealing relationship therewith, said horn provided with external valve means for said central pipe member and for said fuel compartment adapted for interconnection with ship-based hose lines and means on the underside of said fuel compartment for interconnecting said central pipe member and said fuel compartment with shore-based hose lines; radially adjustable weight means on said platform to counterbalance listing tendencies of said hull caused by interconnection of said facility with ship-based hose lines.

7. An offshore terminal facility for loading and unloading tankers comprising a cylindrical buoyant compartmented hull member having a generally flat top deck thereon disposed above the normal water line of said hull, a centrally disposed conically shaped fuel compartment in said hull having a flat base portion disposed inwardly from the bottom of said hull, a cylindrical extension communicating with said fuel compartment disposed upwardly from said top deck, a circular platform overlying said top deck and having roller members thereon for rotatable movement on said deck, means for manually rotating said platform relative to said deck, a cylindrical central conduit section on said platform mounted on said extension and dimensioned for rotatabl movement relative to said extension, said extension having a plurality of vertically spaced peripheral recesses on its outer surface, metal seal rings mounted in said recesses and bearing against the opposed inner surface of said conduit section in sliding sealing relationship therewith, a vertical sleeve member disposed concentrically within said fuel compartment affixed to said base and communicating externally of the underside of said hull, a header horn affixed to the upper end of said conduit section providing a top closure for said fuel compartment, a central pipe member carried within said horn having a lower end portion extending into said sleeve and an upper end communicating externally of said horn, a plurality of metal seal rings mounted in inner recessed portions of said sleeve and bearing against the outer surface of the lower end portion of said pipe in sliding sealing relationship therewith, said horn provided with external valve means for said central pipe member and for said fuel compartment adapted for interconnection with ship-based hose lines, and means on the underside of said fuel compartment for interconnecting said central pipe member and said fuel compartment with shore-based hose lines; track means on said platform extending generally radially thereon, a ballast car movably disposed on said track means, being adjustable therealong to counterbalance listing tendencies of said hull caused by interconnection of said facility with ship-based hose lines.

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MILTON BUCHLER, *Primary Examiner.*

T. MAJOR, *Assistant Examiner.*