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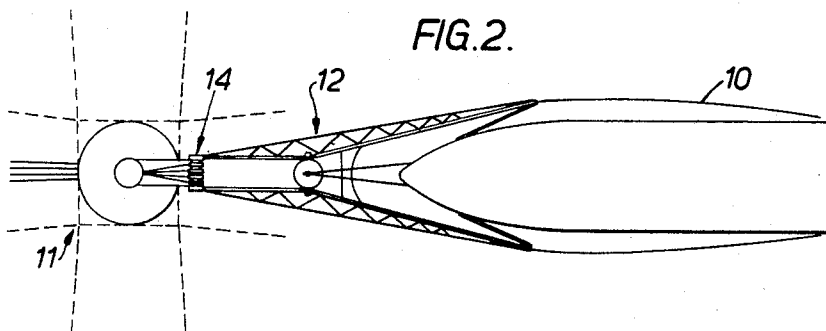
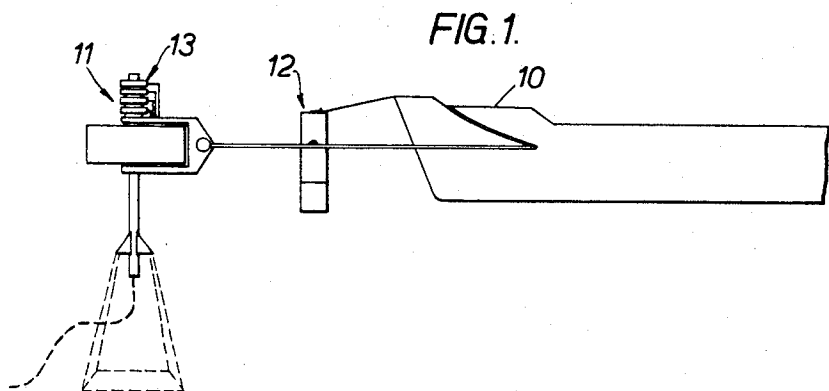
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3,430,670

FLUID-HANDLING APPARATUS

Original Filed Aug. 5, 1964

Sheet 1 of 2



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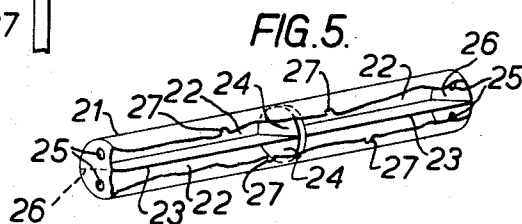
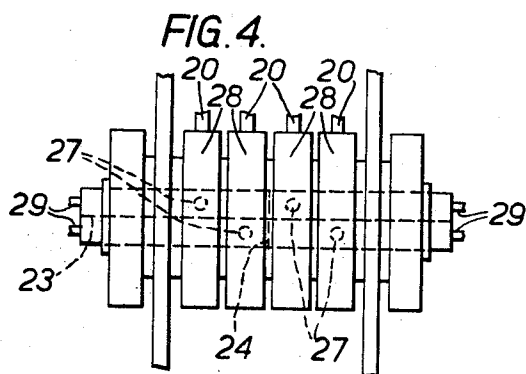
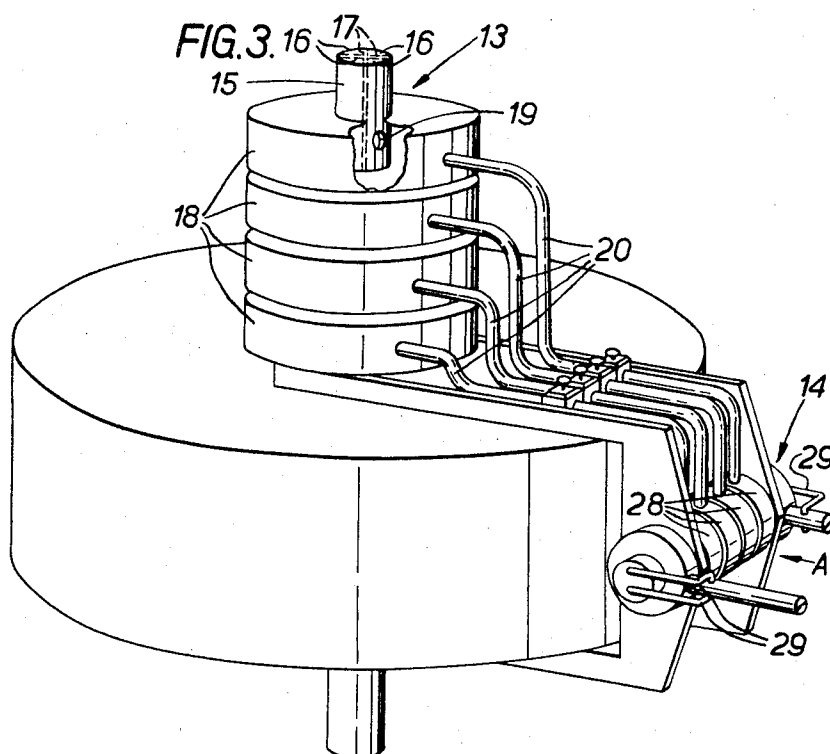
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## FLUID-HANDLING APPARATUS

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Continuation of application Ser. No. 387,748, Aug. 5, 1964. This application Jan. 26, 1967, Ser. No. 612,051

U.S. Cl. 141—387

7 Claims

Int. Cl. B65b 3/00; F16l 39/04; F17d 1/08

### ABSTRACT OF THE DISCLOSURE

A mooring buoy suitable for the cargo transference of the fluid cargo of tank ships from ship to shore is provided with a manifold arrangement wherein a number of drums are mounted for rotation on a tube forming part of a single point mooring buoy. The tube, which is normally in an up-right position, has its bore partitioned longitudinally and its tubular wall apertured to provide a number of apertured compartments each of which is segregated from the others and represents the end of a pipeline extending to the shore. The drums have no inner wall and form separate compartments with the tube spaced apart from one another axially of the tube. Each drum has an aperture in its outer wall. Accordingly, fluid cargo may be passed in separate streams from pipelines of a ship moored to the buoy into the respective compartments formed by the drums, thence by the apertures in the tube into the respective tube compartments and so in separate streams to the shore. Because the drums, and hence the drum compartments, are spaced apart from one another, there is no common sealing ring between adjacent drums and the tube. Thus, if different products are being supplied to adjacent drums, danger of leakage across a common sealing ring and resultant cross-contamination which would not be detectable until the entire cargo had been unloaded, is avoided.

This invention relates to fluid handling apparatus and particularly to manifold arrangements for handling oil products.

With the advent of large tank ships, super tankers, single point mooring arrangements may be used for loading and unloading. With such arrangements liquid cargo of a tank ship is loaded or unloaded via a buoy. A difficulty which has been encountered with the loading and unloading of liquid cargo via a buoy is the lack of satisfactory apparatus to allow a plurality of different oil products to be loaded or unloaded simultaneously.

It is an object of the present invention to provide such apparatus.

This application is a continuation of my co-pending application, Ser. No. 387,748, filed Aug. 5, 1964, and now abandoned.

According to the present invention, we provide a fluid handling apparatus comprising a first member having a plurality of compartments, means whereby a fluid may flow into each of said compartments, a plurality of hollow members pivotably mounted, preferably being rotatably mounted, upon the first member and being spaced thereon one from another, each hollow member being mounted with respect to the first member in such manner that a fluid contained in a compartment of the first member can flow through an aperture in said compartment into one of said hollow members in all positions of the hollow member and means whereby a fluid may flow out of each of said hollow members.

Conveniently the first member may be in the form of a right circular cylinder divided into a plurality of longi-

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tudinally extending compartments by longitudinally extending partitions.

Each hollow member suitably comprises a separate right circular cylindrical annulus, closed at its ends, each annulus being positioned co-axially with the first member and being arranged so as to co-operate with an aperture in a compartment of the first member. Since the hollow members are spaced one from another the risk of leakage of fluid, from one hollow member to another, is obviated.

Suitably one or more of the hollow members is associated with means for mooring a ship to a buoy. Alternatively the first member is associated with means for mooring a ship to a buoy.

This invention is particularly useful for use in conjunction with the single point mooring arrangement described in our copending United Kingdom application No. 31642/62 (Serial No. 977,439) and in its corresponding U.S. Patent No. 3,155,069.

In order that the invention can be more easily understood some specific embodiments will hereinafter be described, by way of example only, with reference to the drawings accompanying the provisional specification, in which:

FIG. 1 shows a side elevation of a ship moored to a buoy;

FIG. 2 shows a plan view of FIG. 1;

FIG. 3 shows a perspective view, part cut away, of part of the buoy of FIGS. 1 and 2 on an enlarged scale;

FIG. 4 shows an end elevation of part of FIG. 3 looking in the direction of arrow A;

FIG. 5 shows a perspective view, part cut away, of part of FIG. 4.

Referring to FIGS. 1 and 2 there is shown a tank ship 10 moored to a buoy 11 via mooring means 12. The mooring means 12 forms the subject of our co-pending United Kingdom application No. 31642/62 (Serial No. 977,439) and in its corresponding U.S. Patent No. 3,155,069 and is fully described therein.

The buoy 11 has a first manifold arrangement 13 (FIG. 1) and a second manifold arrangement 14 (FIG. 2), which arrangements facilitate the handling of the liquid cargo of tank ship 10.

Referring now to FIG. 3, there is shown in more detail the first manifold arrangement 13 which comprises a cylindrical member 15 which is divided into four fluid tight compartments 16 by longitudinally extending partitions 17. Four cylindrical fluid tight members 18 are rotatably mounted on member 15. The top member 18 is shown cut-away to show an aperture 19 in member 15 which allows fluid to flow from compartment 16 to member 18. Member 15 has a plurality of apertures such that each compartment 16 has an aperture 19 associated with each of the members 18 respectively.

In loading, fluid is caused to flow along compartment 16, through apertures 19 into the corresponding members 18 and then out via pipes 20. The arrangement shown allows four different products to be transferred simultaneously to or from the single stationary member 15 from or to a point which may move 360° around the member 15.

Referring now to FIGS. 3, 4 and 5 together, there is shown in more detail the manifold arrangement 14 which comprises a cylindrical member 21 divided into four fluid tight compartments 22 by longitudinally extending partitions 23 and transversely extending partitions 24. Apertures 25, FIG. 5, are provided in the closed ends 26 of member 21, to allow fluid to flow into and out of the compartments 22. Apertures 27 are provided in member 21 to allow flow of fluid between compartments 22 and corresponding cylindrical fluid tight members 28 mounted on member 21.

Spacing members 29 are also mounted on member 21 to maintain members 28 located in position with respect to the apertures 27.

In loading, fluid is caused to flow into compartments 28 via pipes 20, through apertures 27 into compartments 22 then out through apertures 25 into pipes 29.

In both manifold arrangements 13 and 14, fluid flow for unloading is in the opposite direction to that described above.

Although the specific embodiments have been described as particularly suitable for use in buoys the invention should not be considered to be restricted to such use. For example, a further use for the fluid handling apparatus described is on quays for facilitating the loading and unloading of tank ships.

I claim:

1. A fluid handling apparatus comprising a first manifold arrangement and a second manifold arrangement, said first manifold arrangement comprising: a first member having a plurality of fluid-tight compartments and also having a pair of apertures for each compartment for the flow of fluid through the respective compartments, and a plurality of hollow members, one for each of said compartments, mounted to said first member for rotation thereon and spaced apart from one another axially of said first member, each said hollow member having communication with its associated compartment through one of the pair of apertures of its associated compartment, said second manifold arrangement comprising: a second member mounted to said first member for rotation with said hollow members, said second member having a plurality of fluid-tight compartments and also having a pair of apertures for each of said last-mentioned compartments, for the flow of fluid through the respective compartments, a first set of conduit means associated with said second member and coupling said second member with said hollow members, for conducting fluid between said hollow members and the respective fluid-tight compartments of said second member through one aperture of said last-mentioned pair, and a second set of conduit means associated with said second member, for conducting fluid to and from the respective fluid-tight compartments of said second member through the other aperture of said last-mentioned pair.

2. A fluid handling apparatus as claimed in claim 1 wherein the first member is in the form of a right circular cylinder divided into a plurality of longitudinally extending compartments by longitudinally extending partitions.

3. A fluid handling apparatus as claimed in claim 1 wherein each hollow member comprises a separate right circular cylindrical annulus, closed at its ends, each an-

nulus being positioned co-axially with the first member and being arranged so as to co-operate with an aperture in a compartment of the first member.

4. A fluid handling apparatus as claimed in claim 1 in which the first member has associated therewith means for mooring a ship thereto.

5. A fluid handling apparatus as claimed in claim 1 in which at least one of the hollow members has associated therewith means for mooring a ship thereto.

6. In a single point mooring buoy suitable for the cargo transference of the fluid cargo of tank ships, a manifold arrangement which comprises a first member formed of a tubular wall whose bore is divided into a plurality of compartments by means of a plurality of longitudinally extending partitions, one boundary of each compartment being a longitudinally extending segment of the tubular wall, said wall having an aperture in in each segment, said segment communicating with the associated compartment, and a plurality of individual hollow members concentrically mounted to said first member for rotation thereon, said hollow members each having an opening in its periphery for the flow of fluid therethrough, said hollow members also being spaced apart from each other axially of said first member and forming a plurality of individual fluid-tight compartments with said tubular wall of said first member, each of said last-mentioned compartments communicating, in all positions of the hollow members, with one of the compartments of the first member by means of one of the apertures in the tubular wall of the first member, whereby a plurality of different fluids may be pumped through the manifold arrangement without inter-mixing.

7. A single point mooring buoy according to claim 6 wherein each compartment of the hollow members is in the form of a right circular cylinder, closed at its ends, each cylinder being positioned co-axially with the first member and being arranged so as to co-operate with one of the apertures in the first member.

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U.S. Cl. X.R.

137—236, 615; 10—86; 285—136, 137