R. ZOLLING.

TANK SHIP.

APPLICATION FILED JUNE 1, 1912.

1,103,239.

Patented July 14, 1914.

2 SHEETS—SHEET 1.

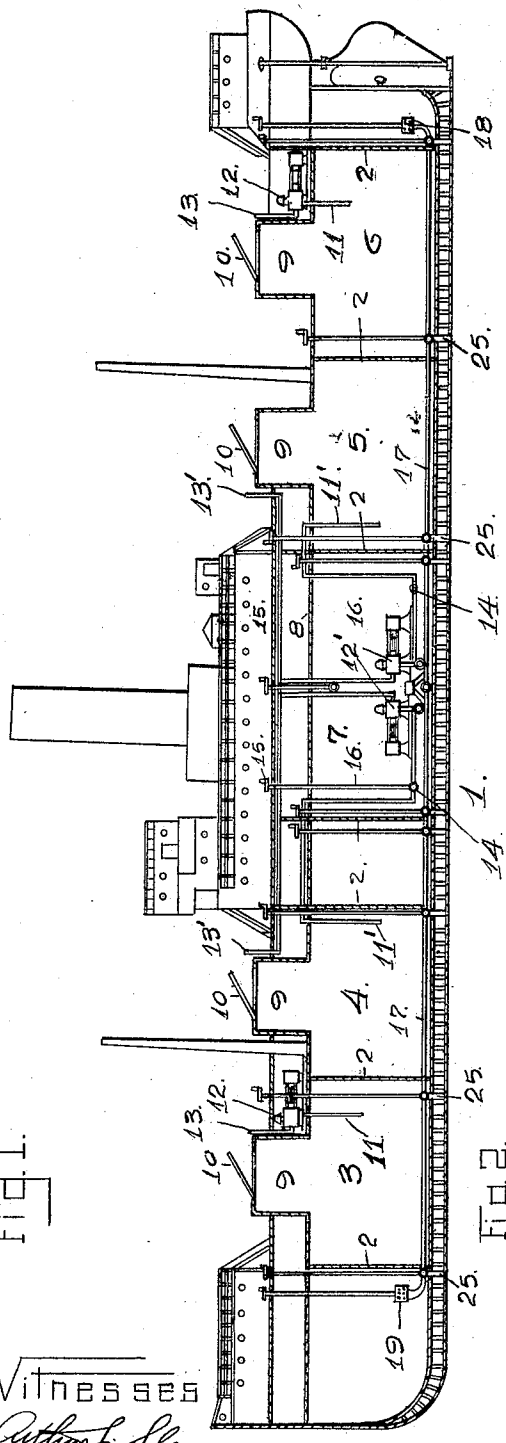


Fig. 1.

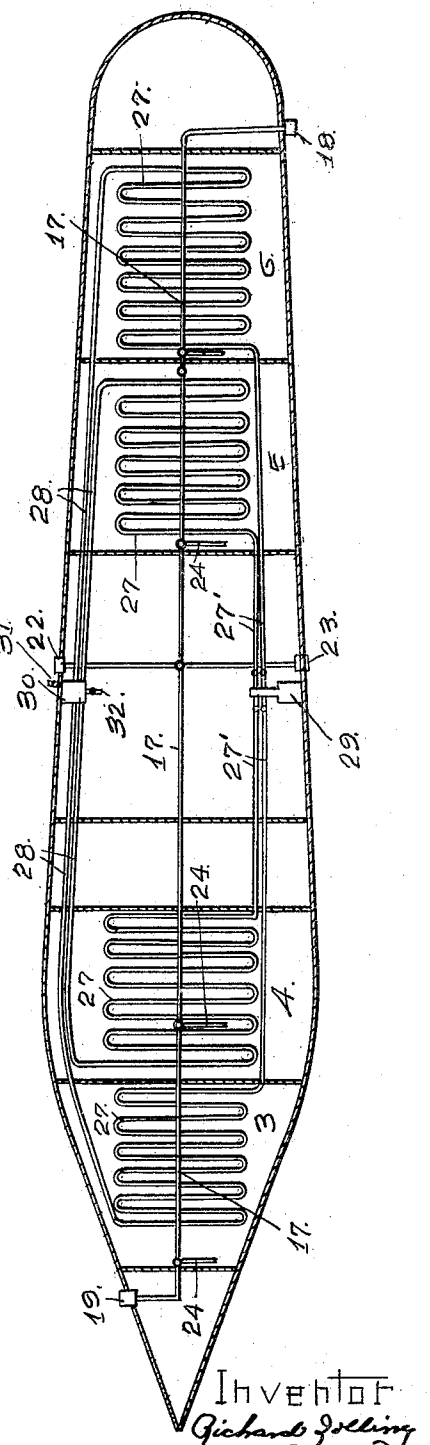


Fig. 2.

Witnesses

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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

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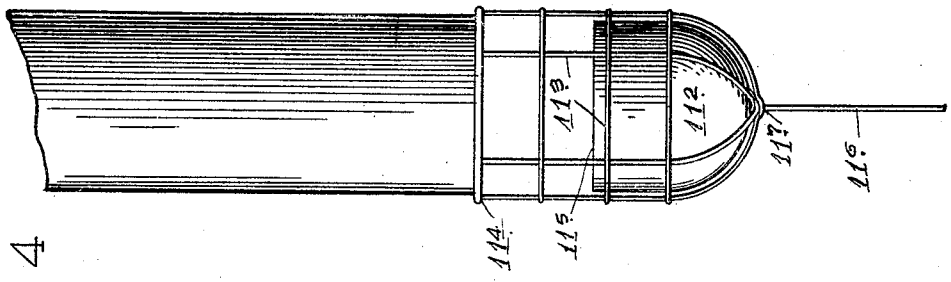


Fig. 4

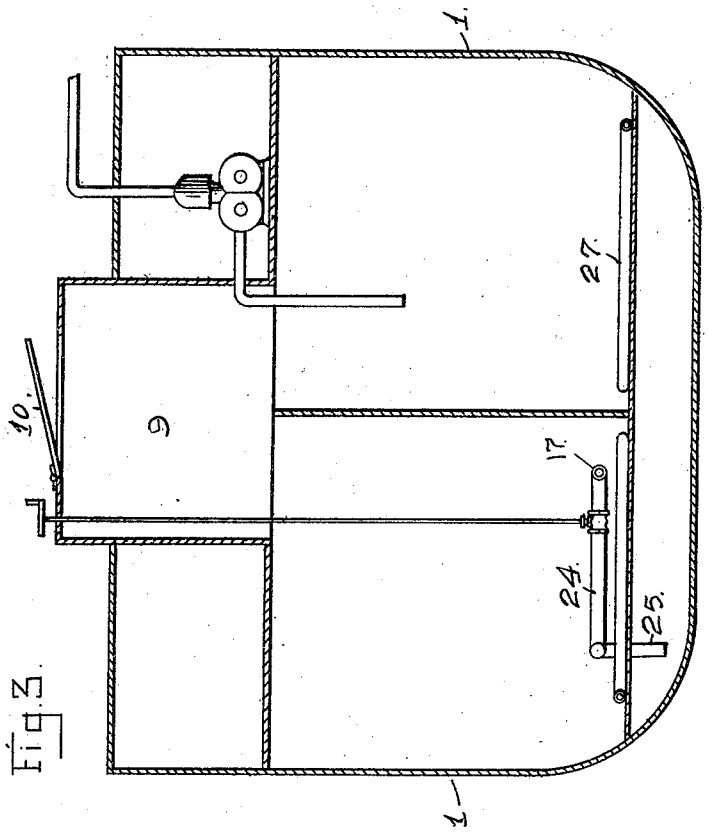


Fig. 3

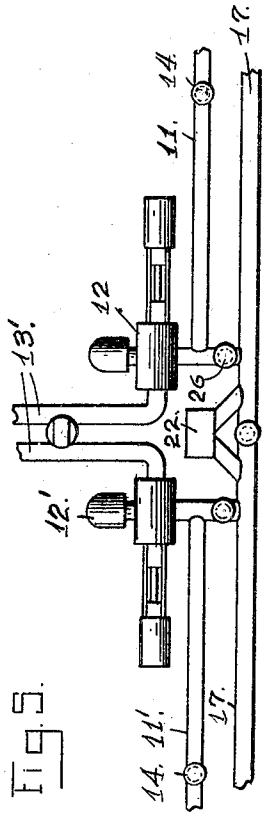


Fig. 5

Witnesses

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his atty.

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UNITED STATES PATENT OFFICE.

RICHARD ZOLLING, OF OAKLAND, CALIFORNIA.

TANK-SHIP.

1,103,239. Specification of Letters Patent. Patented July 14, 1914.

Application filed June 1, 1912. Serial No. 700,956.

To all whom it may concern:

Be it known that I, RICHARD ZOLLING, a citizen of the United States, residing at Oakland, in the county of Alameda and State of California, have invented certain new and useful Improvements in Tank-Ships, of which the following is a specification.

The hereinafter described invention relates to an improved tank ship and particularly to that type of ship employed for transporting in bulk from one port to another large quantities of oil or other fluids of lighter specific gravity than water, and has for its principal objects to provide means for rapidly discharging the fluid from within the vessel, through a series of suction pipes which project partly within the body of the fluid to be discharged, from the top thereof, and to provide a means for admitting water into the bottom of the compartments containing the fluid to be discharged, to float the body thereof and maintain the same in contact with the suction pipes until the fluid is entirely withdrawn from the compartments.

Another object is to provide an automatically operated valve in each suction pipe, which valve will remain open to permit of a discharge of fluid from the vessel, and when the fluid is exhausted will be automatically closed by the elevating water, thus preventing the water from being sucked into the pipe and intermixed with the discharged fluid.

A further object is to provide a means whereby the water admitted into each compartment to float the fluid may be pumped from the various compartments, leaving the same in an empty condition, ready to receive a fresh cargo.

Another and important object is to provide a tank ship with a heat distributing system in the hold thereof, and so positioned as to lie at the bottom of each liquid compartment, and be submerged in the liquid, and supplied with a heating medium from the condenser overflow, so that the fluid in the compartments is at all times maintained at a high degree of temperature and in a thin fluidal condition, which permits the same to be easily pumped from the compartments.

The invention consists in providing a ship adapted to receive fluid of lighter specific gravity than water and transport the same, with suction discharge pipes extending downwardly a short distance into the body of the fluid, for discharging the fluid from the ship, an inlet pipe connected at suitable points to sea cocks in the hold of the vessel below the water line thereof, to admit water into the hold of the vessel to float the fluid into contact with the suction and discharge pipes, devices for automatically closing said suction and discharge pipes against the entering of water thereinto after the fluid has been withdrawn from the hold of the ship, means for heating said fluid while contained in the hold of the ship, means for converting said water inlet pipe into a discharging means for discharging the water from the hold after the fluid has been pumped therefrom, and means for admitting the heating water into the hold of the ship to assist in elevating the fluid therein as it is being drawn therefrom.

With the above mentioned and other objects in view, the invention consists in the construction and novel combination of parts hereinafter fully described, illustrated in the accompanying drawings, and pointed out in the claims hereto appended; it being understood that various changes in the form, proportion, size and minor details of construction, within the scope of the claims hereto appended may be resorted to without departing from the spirit or sacrificing any of the advantages of the invention.

To comprehend the invention, reference should be had to the accompanying sheets of drawings, wherein—

Figure 1 is a longitudinal central sectional view of my improved tank ship, disclosing the several compartments in the hold thereof, the suction and discharge pipes projecting downwardly into certain of the compartments, the sea cocks in the sides of the vessel below the water line thereof the communication between the same and the interior of the vessel, the valves for admitting water into the hold of the vessel to elevate the fluid therein, the valves and mechanism for pumping said water from the vessel, and the heating system for heating the fluid by the water from the condenser. Fig. 2 is a longitudinal sectional plan view of Fig. 1, disclosing the arrangement of the water inlet and heating systems, the flow of water from the condenser being indicated by arrows. Fig. 3 is a transverse sectional view of my improved tank ship,

disclosing the suction and discharge pipe projecting a short distance into the hold of the vessel, the pump connected thereto, one of the pipes for admitting water into the hold to elevate the fluid, and the heating system for the fluid. Fig. 4 is an enlarged detail of the automatic valve at the lower end of each of the suction and discharge pipes for closing the end of the pipe against the admission of water thereto upon the withdrawing of all the fluid from the ship. Fig. 5 is an enlarged detail of the pumps connected with certain of the suction and discharge pipes, and also connected to the pipes for admitting the water to the hold, and the various valves associated with the various pipes.

Referring more particularly to the drawings, the reference numeral 1 designates the hull of a ship, preferably a tank ship which is divided by transversely extending partitions 2, into suitable compartments 3, 4, 5 and 6, which are adapted to contain oil, and a central compartment 7 for the machinery of the ship, the ship deck 8 providing a cover for each of the compartments, and a filling opening 9 adapted to be closed by a hatch 10 is provided in the deck 8 above each compartment.

Extending downwardly through the deck 8 of the ship and projecting a short distance into their respective compartments, are suitable suction pipes 11 and 11′, each connected at their inner or upper ends to suitable suction pumps 12 and 12′ operated by any suitable power and from which extend the respective discharge pipes 13 and 13′, the oil being drawn upwardly through the suction pipes 11 and 11′ by the pumps 12 and 12′ and discharged into suitable receivers (not shown) through the discharge pipes 13 and 13′; the pumps 12′ being located preferably in the engine compartment 7 and the pumps 12 being positioned on the deck 8 above their respective compartments.

The suction pipes 11′ are provided within their length with suitable valves 14 each adapted to be opened and closed by a hand wheel 15 on the upper end of an operating rod 16 extending upwardly through the deck 8 of the ship.

The lower open ends of the suction pipes 11 and 11′, projecting within the compartments, are each provided with a float valve 11^2, constructed of any suitable material and confined within a cage 11^3, bolted as at 11^4 to the lower end of the pipe, the float being of such weight that it will not float in oil, but as the oil is pumped from the compartments and the water is admitted thereinto in a hereinafter described manner, to float the oil and rises nearly to the top of the float, the same will be carried upwardly by the water as it rises, the top flat face 11^5 thereof closing the lower open end of the pipe and preventing the suction of water through the same. The float is directed in its movement by a guide rod 11^6, projecting from the lower end thereof and extending through a suitable opening 11^7 in the lower part of the cage 11^3.

Extending longitudinally of the ship within the hull thereof and positioned at one side of the longitudinal center of the ship and lying adjacent the keel thereof, is a water inlet pipe 17, connected at its respective ends with valve controlled sea cocks 18 and 19, located at the bow and stern of the ship below the water-line thereof, and connected midway of its length by inlet pipes 20 and 21 with other valve controlled sea cocks 22 and 23, positioned one on each side of the ship about midway of its length and located below the water-line thereof. Extending laterally from the pipe 17 at suitable intervals are valve controlled branch pipes 24, the open ends of which extend downwardly as at 25 within close proximity to the keel plates of the ship. The inlet pipe 17 is also connected through valve controlled branch pipes 26, with the suction pipes 11′ adjacent their connection with the suction pumps 12′, for a hereinafter described purpose.

Positioned in the bottom of each compartment below the water inlet pipe 17 is a section of heating pipes or radiators 27, for heating the oil contained within the compartment as it is being transported from one port to another, to maintain the oil in a thin fluidal condition, that it may be easily pumped from the compartment. Each of the coils is provided with a valve controlled inlet pipe 27′ and an outlet pipe 28 so that the heating fluid may be circulated through the coil. The inlet pipes 27′ of the coils 27 are connected with the ship's boiler steam condenser 29, which receives its feed water from any suitable source, the condenser water after having condensed the boiler steam and thereby becomes very highly heated is forced through the coils 27, by a pump, not shown, into a suitable outlet chamber 30, which is provided with a valve controlled overflow opening 31 and also a valve controlled opening 32, communicating with the interior of the vessel and operated for a purpose hereinafter described.

From the above description it will be observed that the condenser water after being heated to a high degree of temperature in condensing the boiler steam is forced through the heating radiators before being pumped overboard, thus maintaining the oil always at a high degree of temperature and preventing the same from becoming cold and thick, due to the hull being surrounded by the cold water in which the ship floats.

Assuming that the ship is in a condition

to receive a cargo, the hatches 10 are opened and the oil to be transported is fed to the compartments 3, 4, 5 and 6, through the openings 9 in the deck of the ship until the compartments have received the required amount, the hatches 10 are now closed and the vessel proceeds to the port of destination. During the journey the valves in the inlet pipe 27′ are opened permitting the water from the condenser 29 to circulate through the radiators 27, flow through the pipes 28 into the chamber 30 and thence overboard through the overflow opening 31 which is normally open, the heat from the radiators rising upward, the entire volume of oil will be heated on arrival at port of discharge to approximately 90° Fahr. at which temperature the oil will be easily pumped from the compartments, as it will be in a thin condition. When it is desired to discharge the cargo at the port of arrival, the valves 14 in the suction pipes 11′ are opened, the pumps 12 and 12′ operated, the pumps 12 drawing the oil upwardly through the suction pipes 11 and forcing it into a suitable receiver through the pipe 13 and the pumps 12′ drawing the oil through the pipes 11′ and discharging it through the pipes 13′. As the level of the oil recedes to a point adjacent the lower end of the suction pipes 11 and 11′, the sea cocks 18, 19, 22 and 23 are opened permitting sea water to flow into the feed pipe 17, the valves in the branch pipes 24 are now opened permitting enough water to flow into the compartments to maintain the oil level to the required height to be drawn out, as the level of the water rises and the oil is drawn from the compartments, the advancing water will contact with the floats 11^3, but as the floats are weighted so as not to be floated by the water and close the end of the pipes until the water has nearly reached the top flat face 11^5 thereof, approximately all of the oil will be withdrawn from each compartment before the flat face 11^5 of the float closes the open end of the suction pipe to prevent the drawing in of any water. After the oil has been withdrawn from the compartments, the sea cocks are closed, the valves 14 are also closed, the pipes 13′ are removed from the oil receivers and directed overboard, the valves 26 opened and the pumps 12′ operated. It will now be observed that the water admitted into the compartments to displace and elevate the oil is now drawn from the compartments through the branch pipes 24, the inlet pipe 17, the valves 26 and forced overboard through the discharge pipes 13′. After the water is pumped from the compartments the valves are all closed leaving the compartments in condition to receive a fresh cargo. To expedite the elevating of the oil as it is being pumped from the compartments, the valve 32 communicating with outlet chamber 30 and the interior of the vessel is opened and the valve 31 closed, permitting the condenser water to also flow into the compartments. It will be apparent that in elevating the oil to the suction pipes, that the oil is more readily drawn up by the pumps than if the suction pipes extended to the ship's keel and the pumps required to elevate the oil from the bottom of the compartment as is now the universal practice.

From the above construction, it will be apparent that the stability of the ship may be maintained while the oil is being pumped therefrom, by regulating the valves in the branch pipes 24.

Gages and other mechanism, not shown, may be positioned at any suitable point in the ship to indicate the level of the oil and water in each compartment and to indicate when the entire amount of oil is drawn from any compartment.

It is to be understood that the pumps for sucking the oil from the various compartments may be located at any suitable place, and if it be desirable the pumps 12 may be located at the dock at which the ship discharges its cargo.

Having thus described the invention what is claimed as new and desired to be protected by Letters Patent is:—

1. In combination with a tank ship for transporting oil, the same being divided into suitable oil receiving compartments, of a suction pipe projecting downwardly into each compartment, a discharge pipe associated with said suction pipe, a pump interposed between said suction and discharge pipes for drawing the oil from the compartments, valve controlled means communicating with the exterior of the ship for admitting water into each compartment to replace the oil as it is drawn therefrom and maintain the oil level in contact with the suction pipe, and valve controlled means for connection with certain of said pumps for discharging the water from said compartments.

2. In combination with a tank ship for transporting oil, the same being divided into suitable receiving compartments, of a suction pipe projecting downwardly into each compartment, a discharge pipe associated with said suction pipe, a pump interposed between said suction and discharge pipes for removing the oil from the compartments, means within each compartment for heating the oil as it is contained therein and maintaining it in a fluid condition, means for admitting water into each compartment to replace the oil as it is drawn therefrom and maintain the oil level in contact with the suction pipe, and valve controlled means associated with certain of said pumps for withdrawing the water from each compart-

ment after the oil has been drawn therefrom.

3. In combination with a tank ship for transporting oil, the same being divided into suitable receiving compartments, of a suction pipe projecting downwardly into each compartment, a discharge pipe associated with said suction pipe, a pump interposed between said suction and discharge pipes for drawing the oil from the compartments, means for admitting water into each compartment to replace the oil as it is being drawn therefrom and maintain the oil level in contact with the suction pipe, and means associated with each suction pipe for closing the same after the oil has been drawn from the compartment to prevent the entering of the water into said suction pipe.

4. In combination with a tank ship for transporting oil, the same being divided into suitable receiving compartments, of a suction pipe projecting downwardly into each compartment, a discharge pipe associated with said suction pipe, a pump interposed between said suction and discharge pipes for drawing the oil from the compartments, means for admitting water into each compartment to replace the oil as it is being drawn therefrom and maintain the oil level in contact with the suction pipe, and a valve carried at the lower end of each suction pipe and acted upon by the advancing water to close the lower end of the pipe and close the same after the oil has been drawn from the compartment, to prevent the entering of the water into said suction pipe.

5. In combination with a tank ship for transporting oil, the same being divided into suitable receiving compartments, of a suction pipe projecting downwardly into each compartment, a pump interposed between said suction and discharge pipes for drawing the oil from the compartments, valve controlled means for admitting water into the bottom of each compartment to replace the oil as it is being drawn therefrom and maintain the oil level in contact with the suction pipe, and valved connections between said water inlet means and certain of said oil drawing pumps and thrown into communication after the oil has been drawn from the compartments, for connecting said pumps with said water inlet means for pumping the water from the compartments.

6. In combination with a tank ship for transporting oil, the same being divided into suitable oil receiving compartments, of a suction pipe projecting downwardly into each compartment, a discharge pipe associated therewith, a pump interposed between said suction and discharge pipes for drawing the oil from the compartments, radiators positioned in the bottom of each compartment and adapted to receive a heating fluid, and valve controlled means for admitting the heating fluid into each compartment to replace the oil as it is being drawn therefrom and maintain the oil level in contact with the suction pipe.

7. In combination with a tank ship for transporting oil, the same being divided into a plurality of oil receiving compartments, of an oil suction apparatus communicating with the upper portion of each of said compartments for pumping the oil therefrom, independently operated valve controlled communications between each of said compartments and the exterior of the ship below the water-line thereof for admitting water into said compartments to maintain the oil level in contact with the suction apparatus while the same is being withdrawn therefrom, and valve controlled means associated with certain of said oil suction means for discharging the water from each of said compartments after the oil has been removed therefrom.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

RICHD. ZOLLING.

Witnesses:

HARRY H. TOTTEN,

D. B. RICHARDS.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."