April 29, 1952 E. B. HUDSON 2,594,930

CARGO BARGE

Filed Jan. 14, 1947 2 SHEETS—SHEET 1

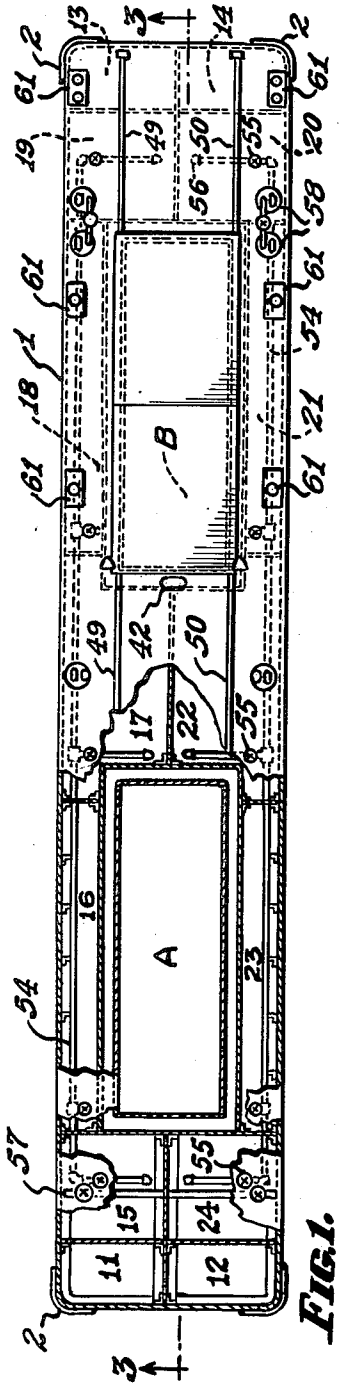


FIG. 1.

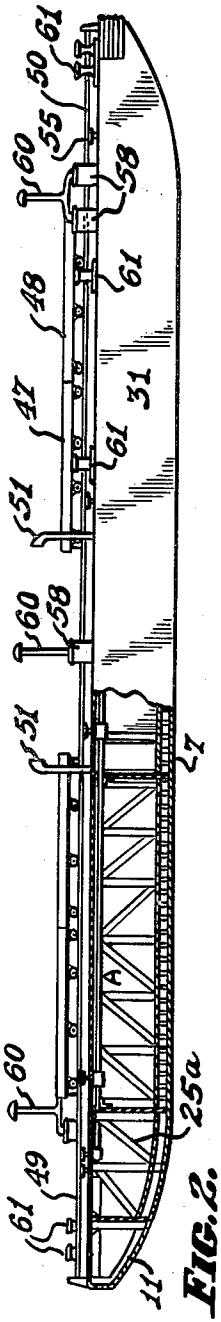


FIG. 2.

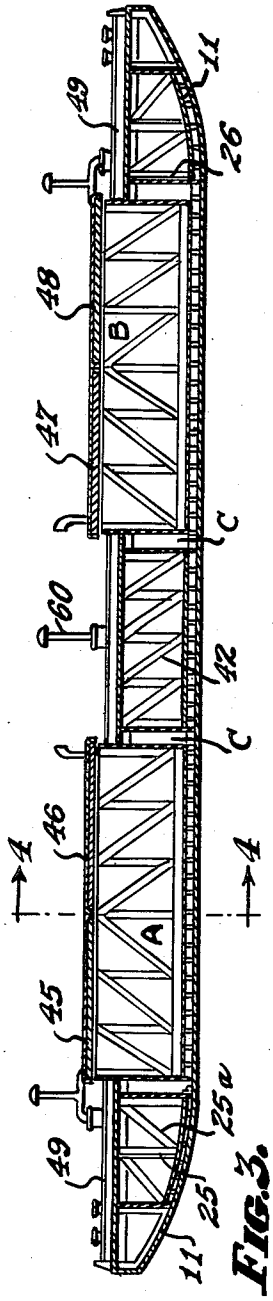


FIG. 3.

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CARGO BARGE

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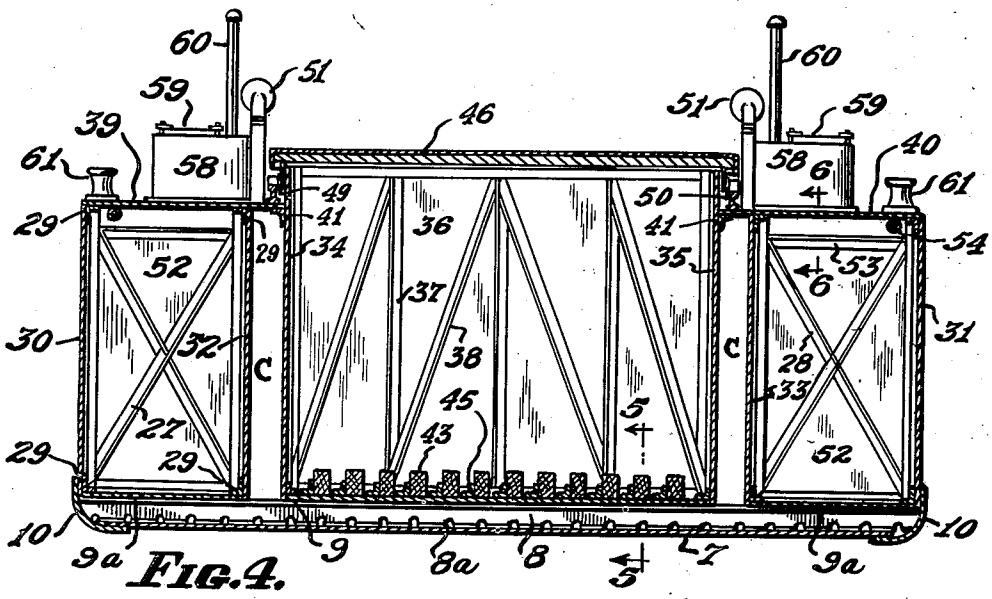


FIG. 4.

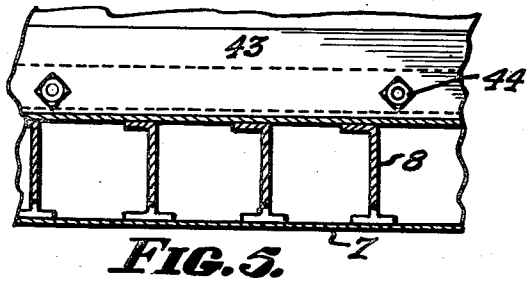


FIG. 5.

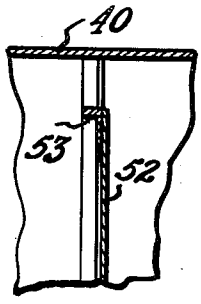


FIG. 6.

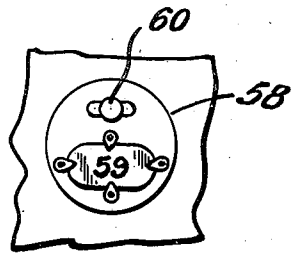


FIG. 7.

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CARGO BARGE

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6 Claims. (Cl. 114—26)

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My invention relates to barges in which commodities may be transported, usually upon inland waterways. Such barges are bound together in elongated groups or tows and pushed to their destination by a powered vessel such as a steamboat or diesel boat. It is the practice in the art to design and construct barges for particular types of commodities, their use for other types of commodities being restricted or impossible.

There is, however, a substantial problem in connection with long haul transportation on inland waterways. The movement of a particular type of commodity will be limited largely, if not entirely, to movement in a single direction. Barges employed for a particular commodity in such traffic are not generally adapted to the transportation of other types of commodities in the opposite direction. Yet there exist other types of commodities the movement of which is predominantly in the opposite direction. For example, the movement of oil and petroleum products from the port of New Orleans by barge is up river and extends to the areas served by the tributaries of the Mississippi. Thus, oil is shipped by barge from New Orleans to refineries in the Cincinnati area. These barges must, however, return empty since they are not suitable for the transportation of other commodities in the opposite direction. Yet there are commodities such as steel which, south and west of the Cincinnati area, move predominantly in the opposite direction.

The movement of empty barges over long hauls on inland waterways is both uneconomical and inconvenient. It is well-known that the towing of groups of unloaded barges involves considerable difficulty especially in the suspectibility of a long tow, which rides high out of the water, to displacement and turning by wind pressure.

The principal object of this invention is a provision of a new type of barge to meet the need for a vessel which will carry different types of cargo in the light of the problem set forth above.

Specifically it is an object of the invention to provide a barge capable of carrying either liquid cargo or solid cargo and fully adapted to the transportation and protection of both types.

It is an object of the invention to provide a barge having the above characteristics which, nevertheless, is adequately strong and secure, and in which separate compartments are provided for the transportation of both types of

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commodities so that the previous use of the barge for transporting one type will not affect its ability to transport the other, or the conditions of protection of the said other commodity during its transportation.

These and other objects of the invention which will be set forth hereinafter or will be apparent to one skilled in the art upon reading these specifications I accomplish by that construction and arrangement of parts of which I shall now describe as exemplary embodiment which is a barge capable of use in the transportation of oil and petroleum products in one direction and the transportation of sheet steel or other metal products in the opposite direction. While the exemplary embodiment aforesaid is indicative of a large field of utility for my invention, it does not exhaust its utility, and barges responding to my invention are useful in other fields. Reference is made to the accompanying drawings wherein:

Figure 1 is a plan view of my exemplary barge with portions cut away to show interior construction.

Figure 2 is an elevational view thereof with parts cut away at one end to show interior construction.

Figure 3 is a longitudinal sectional view taken along the line 3, 3 of Figure 1.

Figure 4 is a sectional view transverse the barge taken along the line 4, 4 of Figure 3.

Figure 5 is a partial sectional view taken along the line 5, 5 of Figure 4.

Figure 6 is a partial sectional view taken along the line 6, 6 of Figure 4.

Figure 7 is a partial plan view showing one of the expansion domes which I may employ.

The barge herein illustrated and described is made of steel plates welded or otherwise joined together and associated with an interior, strength-giving frame work and is exemplary of one type of construction to which the principles of my invention may be applied. The barge is so constructed as to provide certain spaced compartments provided with covering hatches for the shipment of steel, the remainder of the hold of the barge being divided into a plurality of tanks or compartments for the shipment of liquid cargo.

Hitherto it has been the practice to provide in barge construction a series of compartments which, filled with air, contribute the desired buoyancy to the barge, together with other compartments or tanks for carrying the solid or liquid cargo. In the practice of my invention I

divide a barge into two series of compartments, one series of which is designed for the shipment of solid cargo and the other series of which, constituting tanks, is designed for the shipment of liquid cargo. The basic concept making possible the successful use of my barge for wet and dry cargos is the concept of employing the tanks as buoyancy compartments when the barge is in use for the shipment of dry cargo, and the employment of the tanks for wet cargo, the dry cargo compartments furnishing the required buoyancy on the return trip. I have further found that by calculating the loads it is possible to apportion the volume capacities of the compartments and tanks respectively in such a way that the loads in each type of use of the barge will be substantially equal and hence the water line of the loaded barge will fall substantially at the same level irrespective of the type of the cargo carried. Since the compartments for the two types of cargo are different, no cleaning problem arises, and it is not necessary to remove the after effects of one type of cargo before the barge may be employed for carrying the other.

It is known in a barge or other vessel to provide cargo compartments in association with buoyancy tanks into which water may be introduced, if desired, to trim the vessel. So far as is known, however, no structure has hitherto been provided having classes of compartments, in which these compartments could be used as desired for solid or liquid cargo, the unused compartments furnishing the required buoyancy. The great differences in the specific weights of oil and steel, for example, permit the proportioning of the types of cargo spaces to the ends set forth above, and in particular to the proportioning of compartments employed for buoyancy to the specific weight of the particular cargo chosen. In my structure the compartments designed for the transportation of steel will have very much less volume capacity than those designed for the transportation of oil, but nevertheless will provide sufficient buoyancy in view of the fact that oil is only slightly heavier than water.

Referring to the drawings, the hold of the barge is indicated at 1 and comprises sides, ends, and a bottom as will hereinafter be described. The barge is provided with bumper plates indicated at 2. The bottom plates 7 are fastener to a series of angular bottom struts 8 over which I preferably fasten an inner floor of plate metal 9. This inner floor may be continuous and across the barge and welded at its edges to the curved corner plates 10 of the barge to provide a bulk-headed bottom construction. I prefer, however, a modification of the construction as later set forth. At the ends of the barge other struts 11 running longitudinally (see Figures 2 and 3) may be employed and the inner floor laid over them.

The barge is provided with a pair of compartments marked A and B which are spaced from each other and spaced from the sides and ends of the barge. Excepting for a pair of relatively small compartments located at each end of the barge and marked 11, 12, 13 and 14, the remainder of the barge is divided by bulk-heads in a welded construction into 10 tanks marked respectively 15 to 24 inclusive. The barge is reinforced by lateral, cross-braced frames. At the ends and in the central portion of the barge these frames extend across it from side to side as indicated at 25 and 26 in Figures 2 and 3.

Opposite the compartments A and B the frames are short as shown at 27 and 28 in Figure 4. Longitudinal angle irons 29 connect the corners of the individual frames and serve as means to which the outer plates and the inner bulk-heads of the barge may be attached as by welding. In Figure 4 I have indicated the outer plates at 30 and 31. These are also attached as shown to the corner members 10. Inner plates 32 and 33 are also shown as attached to the frames.

The compartments A and B are provided with side walls 34 and 35 and end walls, one of which is shown in Figure 4 at 36. These walls may be stiffened and braced interiorly by metal angles 37 and 38. The side and end walls of the compartments are spaced from the inner plates or bulkheads which surround them, two of which are indicated at 32 and 33 in Figure 4. Top plates 39 and 40, which cover all of the barge excepting the compartments A and B are attached to the angles 29 at the tops of the frames but extend inwardly to meet the side and end walls of the compartments A and B, where they may be welded to angles 41 on these walls. The top plates thus form a deck for the barge covering and forming the tops of all liquid receiving tanks in the barge and covering the top of the spacing between the side and end walls of the compartments A and B and the corresponding bulk-head walls of the tanks.

Each compartment A or B is thus surrounded by a cofferdam construction having an interior space which I have marked C. This space is preferably wide enough (say 18 inches or more) to permit entrance of a workman for welding; and the top plates are provided with a manhole entrance as at 42 in Figure 1, leading to the space C. Instead of running the inner floor 9 continuously across the barge at the positions of the compartments, I prefer to omit it under the space C, continuing it as at 9a under the sidewise disposed tanks. In this event the cofferdam may be used as a space through which any water leaking in and collecting above the bottom of the barge may be withdrawn by pumping. I prefer to cut away the bottom portions of the struts 8 at intervals as at 8a to permit drainage. The inner plates 32 and 33 of the tanks are preferably smooth and unobstructed on their sides facing the cofferdam space so as to facilitate maintenance of the barge and prevent the formation of gas pockets in the cofferdam space.

The various frames may be cross-braced as at 25a in Figures 2 and 3, and the sheet or plate metal tank-dividing partitions 52 are welded at their sides and bottoms to the side plates 30 or 31 of the barge, to the bulkhead plates 32, 33 etc., and to the inner floors 9 or 9a respectively to give a liquid-tight construction. It is not necessary that they be welded to the decking plates 39 and 40, though this may be done, if desired. I prefer to terminate the partitions short of the decking plates, as most clearly shown in Fig. 6, reinforcing their upper edges with metal angles 53 as may be required. This leaves space beneath the decking for a system of piping by means of which the tanks may be emptied and filled. Such a system of piping is indicated at 54 in Figure 1. It is provided with valves 55 operable from above the deck, with vertical pipes as at 56 extending to the bottoms of the several tanks, and with a suitable shore connection as at 57.

For the shipment of the sheet steel I prefer to provide the bottom or floor of the compart-

ments A and B with wood beams 43 bolted as at 44 to angles 45 welded or otherwise fastened to the floor 9. The compartments A and B are covered with hatch covers 45, 46, 47 and 48 which are movable to give access to the compartments. I preferably mount these hatch covers on rollers slidable on tracks 49 and 50 which tracks are fastened to the steel deck of the barge. The cofferdam space C may be vented by ventilators 51.

Each of the several liquid cargo tanks 15 to 24 inclusive is provided with an expansion dome 58. The domes have access openings with tight covers 59, and are also provided with vertical stand-pipes 60 fitted with vacuum release valves. Where expansion domes for adjacent tanks come close together, they may have a common standpipe and valve as will be evident from the drawings.

For fastening the barge in a tow or for mooring it, I provide the conventional bits 61.

As hereinabove indicated, one feature of my invention is an apportioning of the volume capacity of the two classes of cargo compartments, in the light of the specific weights of the classes of cargo, to provide a vessel in which either class of cargo compartments will furnish the required buoyancy when the other class is loaded. In the exemplary embodiment, my barge for the shipment of steel and oil is 195 feet in length, 35 feet in width and 13 feet in depth, with a total volume capacity of 68,810 cubic feet. A volume capacity of 20,790 cubic feet is allotted to dry cargo and a volume capacity of 48,020 cubic feet is allotted to liquid cargo. With a petroleum oil averaging 32.3 cubic feet per ton, filling the tanks 15 to 24 90% full, gives a cargo weight of 1340 tons. The same weight of steel at 124 pounds per cubic foot may be readily placed in compartments A and B (taken together), and considering proper packing for shipment. Thus, it will be seen that each class of compartment, when empty, will provide the desired buoyancy in the vessel for the normal cargo in the other class of compartment.

The great difference between the specific weights of steel and oil permits the apportioning of the cargo spaces in such a way that maximum loads of of each commodity may be transported in the respective directions, and this is a very great advantage. With classes of commodities having less difference in their specific weights the apportioning of the volume capacities of the classes of compartments may be varied and a comprise effected.

Modifications may be made in my invention without departing from the spirit of it. Having thus described my invention in an exemplary embodiment, what I claim as new and desire to secure by Letters Patent is:

1. In a barge a hull comprising a bottom and side and end walls, ribs overlying said bottom, floored and walled compartments for the shipment of dry cargo symmetrically arranged in said hull and resting on said ribs, said compartments being spaced from the sides and ends of said hull, means dividing substantially the remainder of said hull into tanks for the shipment of liquid cargo, said means comprising walls spaced from the walls of said compartments, said tanks terminating upwardly in a decking extending from the sides and ends of said barge to the walls of said compartments whereby a covered space is left surrounding the walls of said compartments, hatch means covering said compartments, piping communicating with said tanks, and access openings through said decking communicating with the spaces between said compartments and said tanks.

2. The structure claimed in claim 1 wherein said hatch means are slidable on tracks affixed to said decking, and wherein expansion domes and vacuum release valves are in communication with said tanks, and in which said ribs are cut away to permit drainage above said bottom, the space between said compartments and tanks opening downwardly into the space above said bottom and providing a means for pumping leakage from said barge.

3. The structure claimed in claim 1 wherein said hatch means are slidable on tracks affixed to said decking, and wherein expansion domes and vacuum release valves are in communication with said tanks, wherein said ribs are cut away to permit drainage above said bottom, the space between said compartments and tanks opening downwardly into the space above said bottom and providing a means for pumping leakage from said barge, and including ventilating means in communication with said space.

4. In a cargo barge capable of a two-way haul wherein a dry cargo is to be carried in one direction and a liquid cargo is to be carried in the opposite direction and the two cargoes are of such nature that separate compartments must be provided for each, a hull having a bottom and side and end walls, spaced ribs overlying said bottom, a floored and walled dry cargo compartment symmetrically arranged about the center of gravity of said barge and supported on said ribs, said dry cargo compartment being spaced from the sides and end of said barge, means dividing substantially the remainder of the hull into liquid cargo compartments, said means comprising walls spaced from the walls of said dry cargo compartment to provide cofferdam space surrounding said dry cargo compartment, the walls of the liquid cargo compartments facing said cofferdam space being substantially free of obstructions thereby facilitating ready maintenance of the walls of said liquid cargo compartments, said liquid cargo compartments terminating upwardly in decking etxending from the sides of the barge to the walls of the dry cargo compartment, hatch means covering the dry cargo compartment, piping communicating with the liquid cargo compartment, and access openings in the decking communicating with said cofferdam space.

5. In a cargo barge capable of a two-way haul wherein a dry cargo is to be carried in one direction and a liquid cargo is to be carried in the opposite direction and the two cargoes are of such nature that separate compartments must be provided for each, a hull having a bottom and side and end walls, ribs overlying said bottom, a floored and walled dry cargo compartment symmetrically arranged about the center of gravity of said barge and supported on said ribs, said dry cargo compartment being spaced from the sides and ends of said barge, substantially the remainder of the hull being divided into tanks surrounding said dry cargo compartment, the volume capacities of said compartment and the aggregate of said tanks being proportioned in substantially inverse ratio to the specific weights of a predetermined dry cargo and a predetermined liquid cargo so that during the shipment of said predetermined dry cargo the tanks will supply the required buoyance for the dry

cargo and during the shipment of said predetermined liquid cargo said compartment will provide the required bouyancy for the liquid cargo, the inner walls of said tanks being spaced from the walls of said dry cargo compartment to provide a cofferdam space separating said dry cargo compartment and said tanks, said ribs being cut away to permit drainage above said bottom, said cofferdam space opening downwardly between said ribs and providing access to the bottom of the barge for pumping leakage therefrom and for inspecting the exteriors of the compartment and tanks.

6. In a cargo barge capable of a two-way haul wherein a dry cargo is to be carried in one direction and a liquid cargo is to be carried in the opposite direction and the two cargoes are of such nature that separate compartments must be provided for each, a hull comprising a bottom and side and end walls, spaced apart ribs overlying said bottom, a floored and walled dry cargo compartment symmetrically arranged about the center of gravity of said barge and supported on said ribs, said compartment being spaced from the sides and ends of said barge, means dividing substantially the remainder of the hull into liquid cargo compartments, said means comprising walls spaced from the walls of said dry cargo compartment, said liquid cargo compartments terminating upwardly and decking extending from the sides of the barge to the walls of said dry cargo compartment whereby a covered space is left separating the walls of

the dry and liquid cargo compartments, hatch means covering said dry cargo compartment, piping communicating with said liquid cargo compartment, access openings communicating with the covered spaces between the dry and liquid cargo compartments, said ribs being cut away to permit drainage above the bottom of said barge, said covered spaces opening downwardly between said ribs to provide access to the bottom of the barge for pumping leakage therefrom and for inspecting the compartments.

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