

No. 784,943.

PATENTED MAR. 14, 1905.

F. K. HOOVER & A. J. MASON.
VESSEL FOR CARRYING ORE OR LIKE MATERIAL.

APPLICATION FILED FEB. 17, 1903.

3 SHEETS—SHEET 1.

Fig. 1.

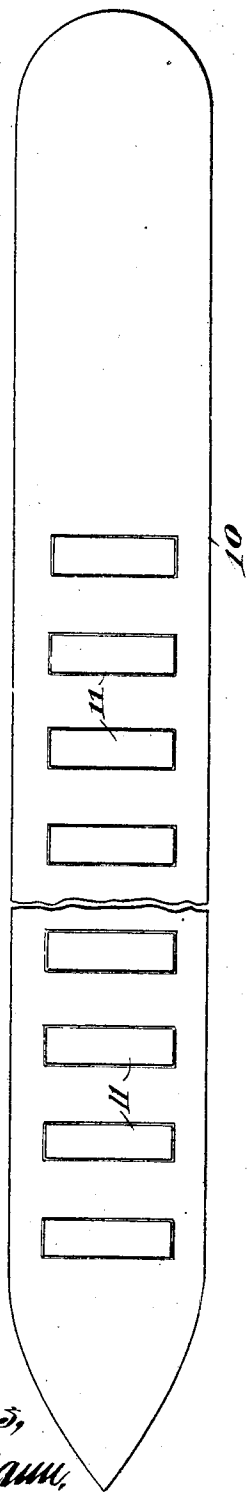
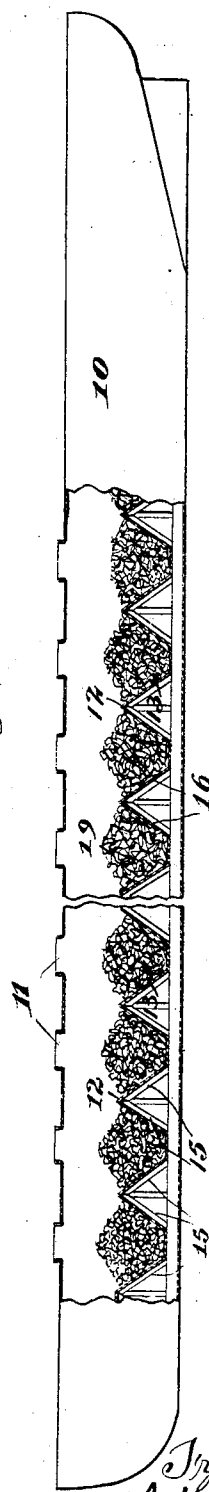


Fig. 2.



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3 SHEETS--SHEET 2.

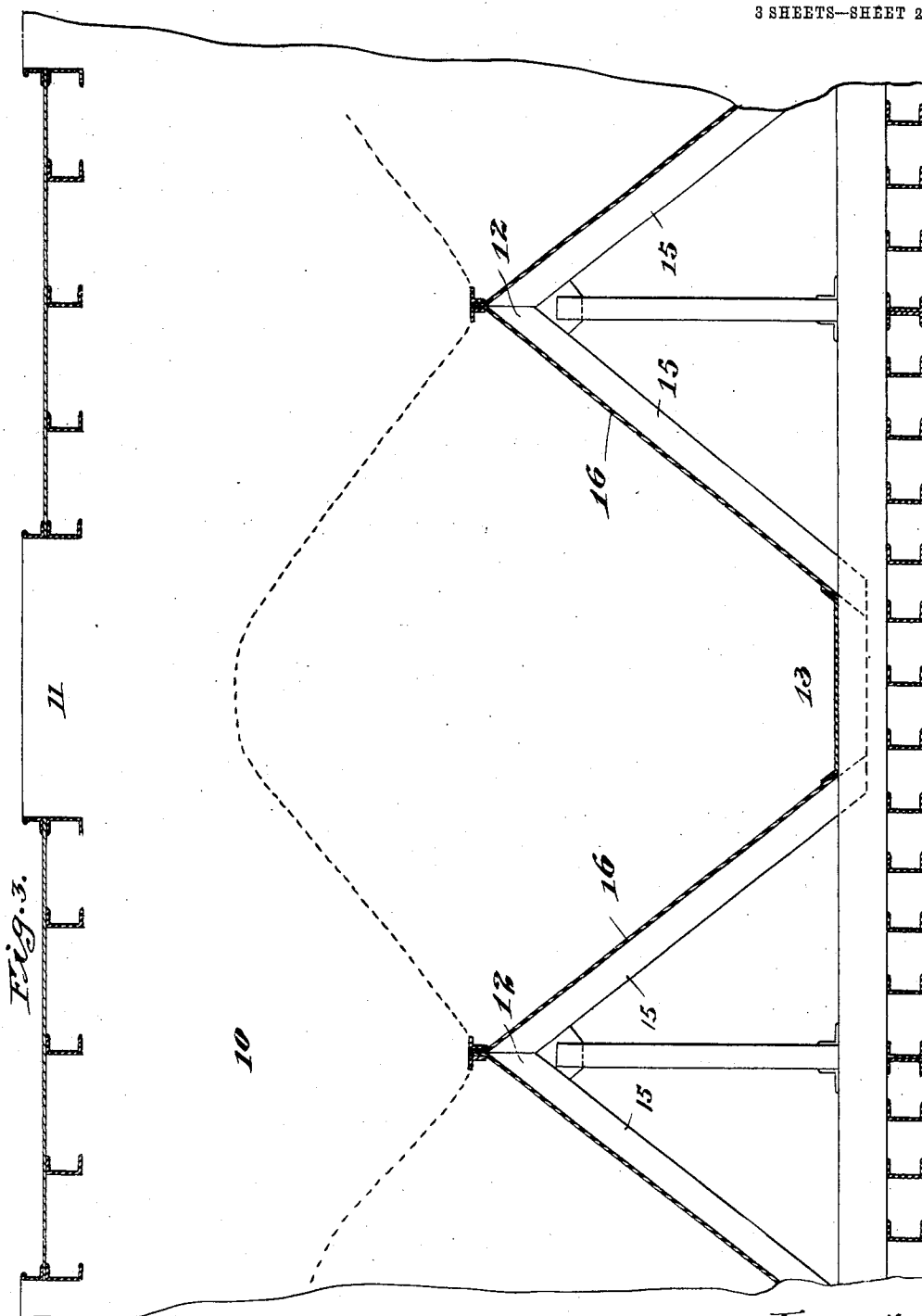


Fig. 3.

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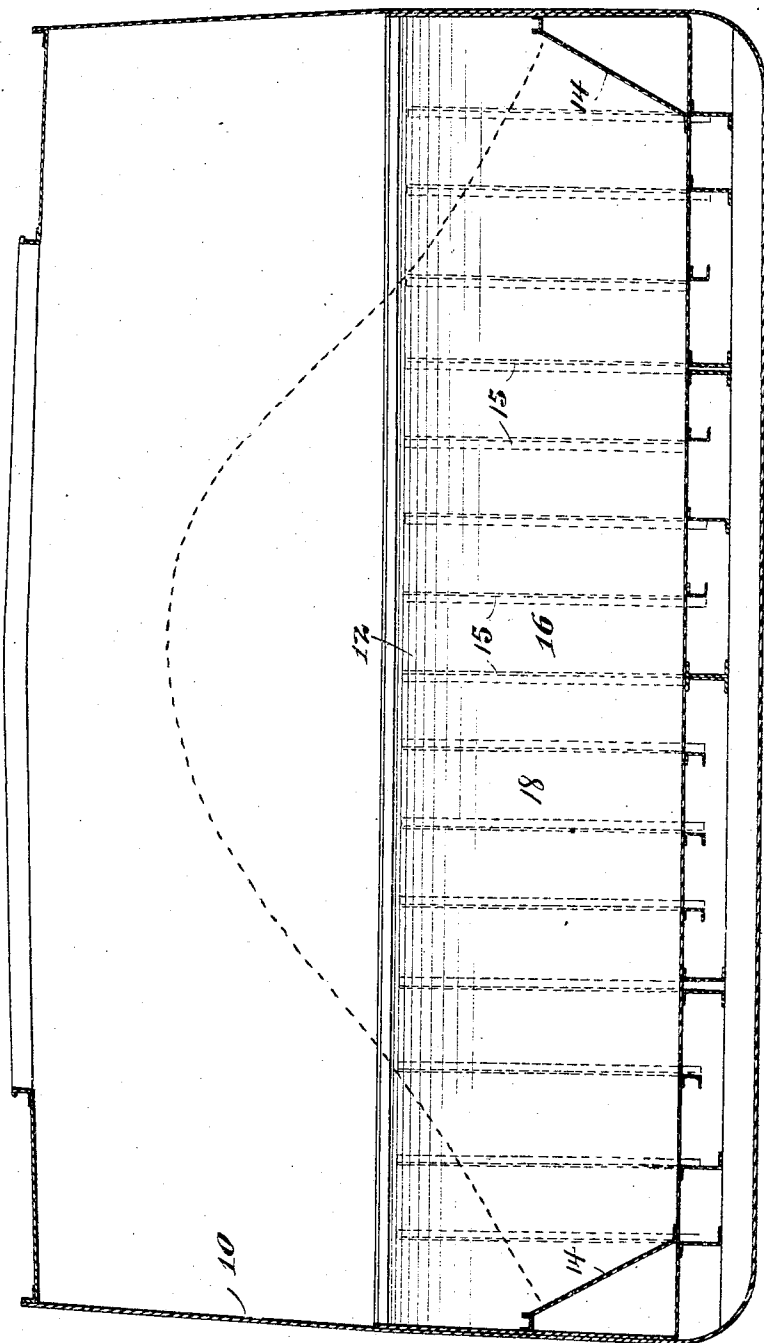
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3 SHEETS—SHEET 3.

Fig. 4.



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UNITED STATES PATENT OFFICE.

FRANK K. HOOVER AND ARTHUR J. MASON, OF CHICAGO, ILLINOIS.

VESSEL FOR CARRYING ORE OR LIKE MATERIAL.

SPECIFICATION forming part of Letters Patent No. 784,943, dated March 14, 1905.

Application filed February 17, 1903. Serial No. 143,758.

To all whom it may concern:

Be it known that we, FRANK K. HOOVER and ARTHUR J. MASON, citizens of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Vessels for Carrying Ore or Like Material, of which the following is a specification.

Our invention relates to improvements in steel vessels, and has reference more particularly to vessels of that type which are adapted for the transportation of iron ore and generally similar material, although our improvements are equally applicable to advantage in vessels designed for the transportation of coal, grain, and any granular or broken material designed to be transported in a loose condition.

The steel boats at present employed in the transportation of iron ores, coal, and like materials are substantially long narrow steel shells interiorly strengthened by vertical transverse and diagonal braces and provided in their decks with a series of transversely-extending hatchways spaced at uniform intervals, through which the material constituting the cargo is introduced and subsequently withdrawn. The unloading of such boats is at present extensively conducted by the use of self-loading grabs or buckets, which are lowered through the hatchways and dropped into the material therebeneath, the bucket being subsequently elevated through the hatchway, withdrawing a load of the material for deposit in ore piles, pockets, cars, or other receptacles or carriers. In the unloading of such boats the operation of the self-loading buckets is a comparatively easy and simple one until the buckets have withdrawn all of the material lying directly beneath the hatchways. When this has been done, it is evident that there still exists a considerable quantity of ore lying in the form of pyramidal piles between adjacent hatchways. In order to remove this residue of the material, it is necessary to first transfer it to positions directly beneath the hatchways in order that the self-loading buckets may pick it up, and for this purpose manually or machine operated shovels or scrapers have been employed. This operation, however, requires consider-

able time, and to such extent delays the complete discharge of the cargo.

Our invention has for its primary object to provide a vessel for the purpose stated which shall, by virtue of its peculiar construction, eliminate the necessity for this transfer of the ore lying between adjacent hatchways to points directly beneath the hatchways, and which shall enable the self-loading buckets to completely discharge the cargo through the hatchways by a continuous and uninterrupted operation, doing away entirely with the necessity of transferring any portions of the load to points at which the buckets can pick up and remove such portions.

A secondary object of our invention is to provide a construction wherein the present interior bracing of the shell is so modified as to present much less of an obstruction to the operation of the unloaders.

Still another general object of our invention is to provide a construction wherein the above-described advantages may be attained, together with the retention of the ballast-chamber between the inner and outer shells, without any addition to the weight of the vessel as compared with present construction or any consequent sacrifice of load-carrying capacity.

To these and other ends our invention consists in a steel boat for the purposes described having the peculiarities of construction and advantages of operation substantially as hereinafter described, and definitely ascertained in the claims.

In the accompanying drawings, which illustrate a preferred manner of carrying out our invention, Figure 1 is a top plan view, transversely broken, of a steel vessel constructed in accordance with our invention. Fig. 2 is a side elevational view of the same, a portion of the side of the vessel being broken out to illustrate diagrammatically the leading novel feature of the interior construction. Fig. 3 is a fragmentary view, enlarged, in central vertical longitudinal section, illustrating the detail interior construction; and Fig. 4 is a similar view in transverse section.

Referring to the drawings, 10 designates as an entirety the shell of the vessel, which is of

the usual form and construction common in steel ore-carrying vessels of this type and need not be particularly described. Formed through the deck of the vessel are the usual series of transversely-extending hatchways 11.

The common form of steel vessel at present in use is constructed with a double bottom throughout—that is to say, there is an outer shell which rests directly in the water, and within this shell and separated therefrom by a considerable space is an inner or load-receiving shell. The purpose or object of this space thus provided is twofold. In the first place, in case the vessel strikes a rock or other submarine obstruction which pierces the outer shell, the vessel will still float by virtue of the fact that the inner shell is still intact, this expedient thus providing a useful safeguard against wreck and loss. In the second place this space is on the return trips, when the vessel is empty, adapted to be filled with water, thereby constituting the required ballast to maintain the vessel stable against rough winds and seas. It is obvious, however, that the space thus devoted to these purposes subtracts considerable from the total interior capacity of the outer shell, while the systems of interior bracing interfere seriously with the ready discharge of the cargo, as above pointed out, not only by reason of the fact that it is more or less in the way of the unloading devices in getting at the ore, but also by reason of the fact that most ores, being somewhat sticky, tend to be retarded by the lower portions of the stanchions and have to be manually removed therefrom. It is not the design of our invention to dispense with this double-shell construction and the space created thereby, since it is a necessity on the score of safety in any boat of this character, but rather to so modify the form and location of this space through a modification of the form of the inner shell that the entire load-carrying space shall be located either directly beneath the several hatchways or shall automatically cause the ore to gravitate toward positions where it may be readily picked up by the unloading-buckets until the last particles of ore are removed. In accordance with this design, therefore, we form the outline dimensions of the inner skin or shell in a series of ridges and valleys extending across the vessel, providing a much narrower annular space between the bottom portions of said shell and the outer skin. We thus form in the base or floor of the inner shell transversely-extending inverted-V-shaped elevations 12, the apices of which are located centrally between adjacent hatchways, while the downwardly-convergent walls of adjacent elevations merge into a narrow horizontal floor 13, which lies directly and vertically beneath the hatchway. There is thus provided beneath each hatchway a V-shaped receptacle having sloping side walls of such a pitch that, as the ore or other material is re-

moved from the central portion thereof, that portion of the material lying against the side walls tends to slide and fall by gravity toward and onto the comparatively narrow base or floor. This idea is also carried out in the formation of the end walls of each apartment, which end walls, as shown at 14 in Fig. 4, are also inclined to produce the same effect upon the material. The whole space between the inner skin 16 and the outer shell 10 is constructed tight and suitable for the reception of water-ballast. A further advantage of our invention resides in the fact that the peculiar described construction of inner shell in itself affords an efficient and, as we believe, superior substitute for the systems of interior bracing heretofore employed. It will be seen that our proposed construction presents, in effect, a truss extending from one side of the boat to the other and of a depth approximately equal to one-half the total depth of the shell or hull of the vessel, whereby the latter is greatly strengthened against transverse breaking strains. Our invention is not concerned with the particular or specific construction of the inner shell when formed as above described; but an efficient and preferred construction thereof consists in the provision of a series of inverted-V-shaped yokes, (indicated by dotted lines at 15 in Fig. 4,) the framework thus constructed being completely covered by a metal plate skin or sheathing (indicated at 16) which extends to the outer skin and is fastened thereto.

The outline position of the load beneath each of the several hatchways is clearly indicated by dotted lines in Figs. 3 and 4, wherefrom it appears that the load is most favorably situated for removal by the self-loading bucket entering through the hatchway. As the load is removed that portion of the material lying in contact with the side and end walls of the compartment obviously tends to slide and fall by gravity toward the bottom, so that the material is thus brought and constantly maintained automatically within reach of the unloader until it is withdrawn. On the return-trip the series of tanks underlying the several V-shaped partitions 13 may be flooded with water, thereby creating the necessary ballast to insure the safety of the vessel when traveling empty.

The advantages of our proposed construction may be briefly recapitulated as follows:

First. It affords such a positioning of the load within the hold of the vessel as enables the load to be entirely removed by self-loading buckets through the hatchways without the necessity of manually transferring any portion of the load from a position between the hatchways to a position directly therebeneath, so that it may be got at by the unloading-buckets, this operation taking place automatically under the action of gravity in association with inclined walls.

Second. It dispenses entirely with the necessity of such interior braces as have heretofore proved a detriment in the work of unloading, being in the way of the unloading-buckets and of the load-shifting devices heretofore employed to transfer the load to positions directly beneath the hatchways, substituting therefor a system of bracing-in and constituting a part of the permanent inner shell of the vessel which affords superior results and gives greater strength than heretofore.

Third. It enables the load to be withdrawn much more quickly than has heretofore been the case, effecting a very material saving of both time and labor in such operation.

Fourth. In heavy cargoes like iron ore the center of gravity of the load is raised, thus favorably affecting the strains in the structure of the hull during rough weather.

So far as we are aware our present invention represents the earliest proposed construction of a boat for the purposes described having a permanent load-carrying floor constituting an integral part of the boat structure and of such a formation as to both supply the necessary interior transverse bracing and automatically maintain the cargo beneath the hatchways and within reach of the unloading devices so long as any portion of the cargo remains within the hold. Our invention is not, therefore, limited to the particular formation of vessel as herein shown and described, but may be considerably varied—as, for instance, in the pitch or inclines given to the partitions and otherwise, according to the character of the material carried, within the spirit and purview of our invention.

We claim—

1. A boat of the character described, the deck whereof is provided with hatchways, said boat having beneath each hatchway a compartment provided with permanent inclined downwardly-converging walls for the reception of the cargo and constituting interior bracing of the boat, substantially as and for the purpose described.

2. A boat of the character described having the deck thereof provided with a series of transversely-extending hatchways, said boat having formed beneath said hatchways a corresponding series of load-receiving compartments each having permanent inclined downwardly-converging side walls constituting in-

terior bracing of the boat and each compartment having a maximum width equal to the distance between two adjacent hatchways, substantially as and for the purpose described.

3. A boat of the character described the hull whereof is provided with a permanent double bottom inclosing a water-ballast chamber and the deck with hatchways through which the cargo is introduced and withdrawn, the inner bottom being made of a form to provide beneath each hatchway a load-receiving compartment having inclined downwardly-converging side walls, substantially as and for the purpose described.

4. In a boat of the character described, the combination with the outer shell or hull and a deck having hatchways formed transversely therethrough, of a series of transversely-extending partitions connected along their upper and lower margins, said partitions connectedly constituting the inner shell or bottom of the boat and adjacent partitions being oppositely inclined, whereby there is created beneath each hatchway a substantially V-shaped receptacle for the cargo and between adjacent hatchways a substantially inverted-V-shaped tank for water ballast, substantially as described.

5. In a boat of the character described, the combination with the outer shell or hull and a deck having hatchways formed therethrough, of a permanent inner bottom constructed to present alternate ridges and valleys extending across the vessel, the valleys lying directly beneath the hatchways and serving to contain the cargo, and the ridges lying between the hatchways and serving as internal bracing to strengthen the hull, substantially as described.

6. In a boat of the character described, the combination with the outer shell or hull and a deck having hatchways formed therethrough, of a water-ballast tank in said shell or hull having its top formed by a series of transverse ridges and valleys extending from side to side of the shell or hull, substantially as described.

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