No. 897,374. PATENTED SEPT. 1, 1908.

H. A. KAUERMANN.

COAL BUNKER FOR MEN-OF-WAR.

APPLICATION FILED NOV. 15, 1906.

3 SHEETS—SHEET 1.

Fig. 1.

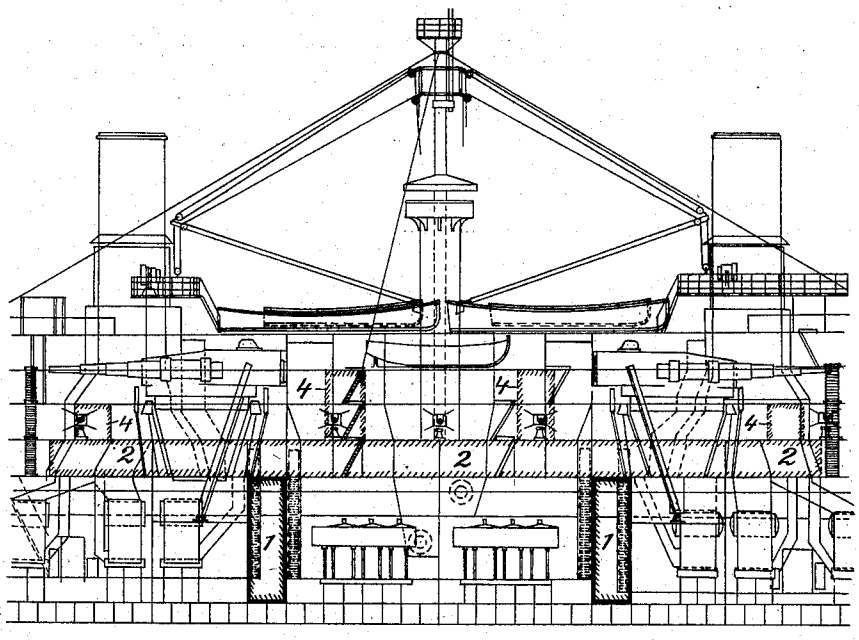
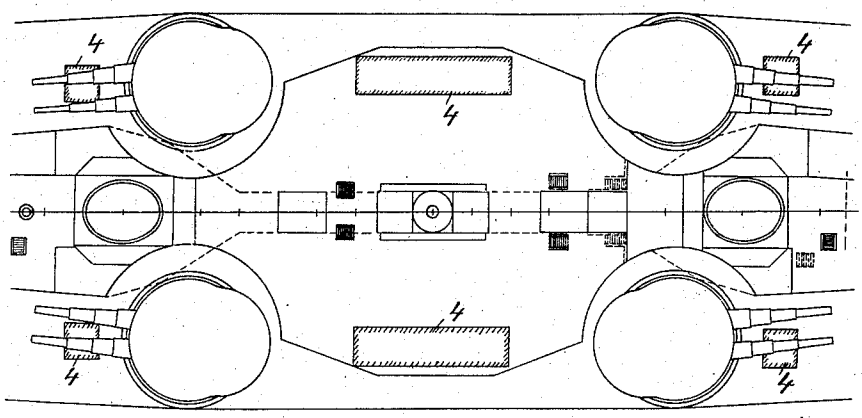


Fig. 2.



WITNESSES:
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Fig. 3.

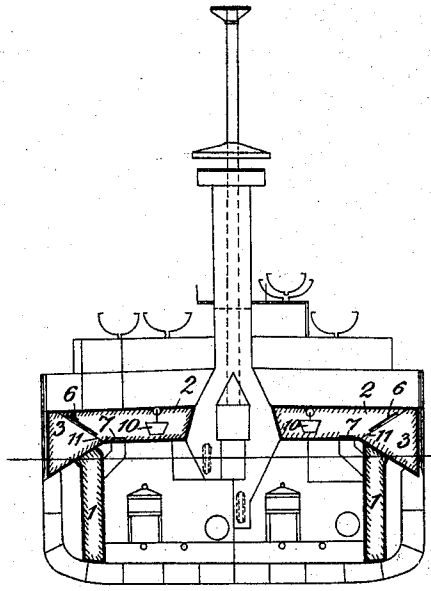


Fig. 4.

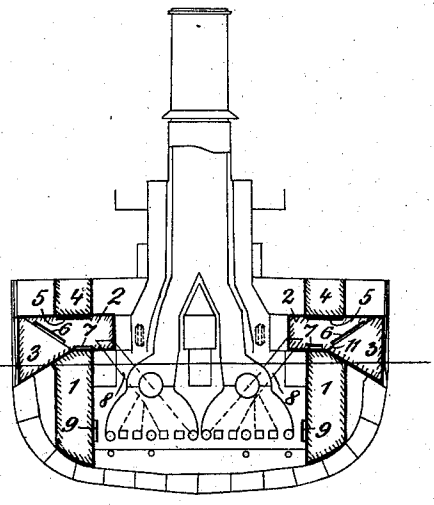
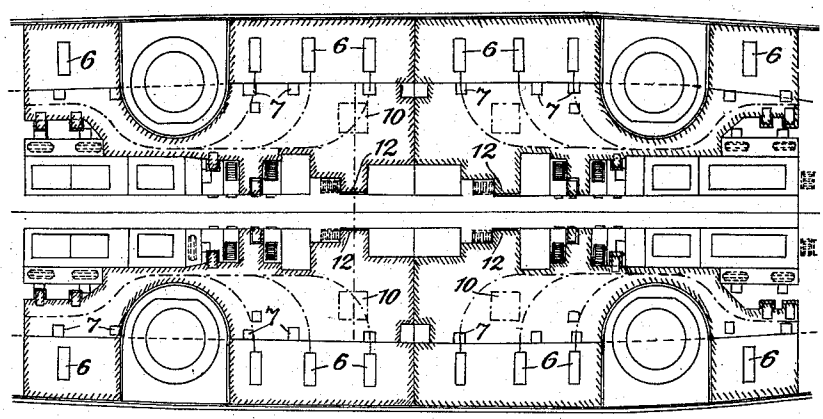


Fig. 5.



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3 SHEETS—SHEET 3.

Fig. 6.

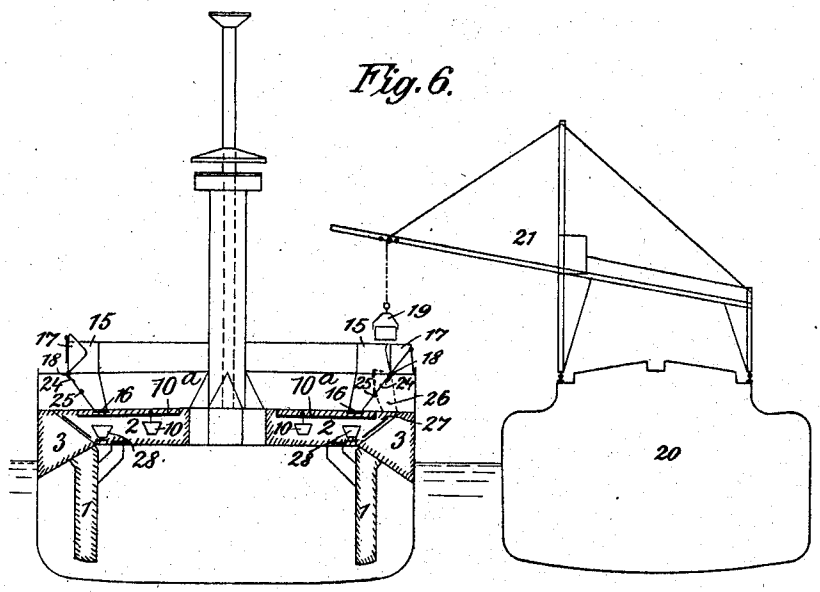
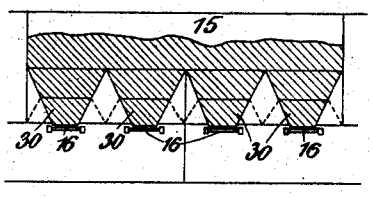


Fig. 7.



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UNITED STATES PATENT OFFICE.

HEINRICH AUGUST KAUERMANN, OF DUISBURG, GERMANY, ASSIGNOR TO THE FIRM OF DUISBURGER MASCHINENBAU AKTIENGESELLSCHAFT VORM. BECHEM & KEETMAN, OF DUISBURG, GERMANY.

COAL-BUNKER FOR MEN-OF-WAR.

No. 897,374. Specification of Letters Patent. Patented Sept. 1, 1908.

Application filed November 15, 1906. Serial No. 343,555.

To all whom it may concern:

Be it known that I, HEINRICH AUGUST KAUERMANN, a subject of the German Emperor, residing at 42 Realschulstrasse, Duisburg, Germany, have invented certain new and useful Improvements in Coal-Bunkers for Men-of-War, of which the following is a specification.

On board warships the coal has hitherto been stowed in longitudinal and cross bunkers, called hold-bunkers, which were arranged around engine- and boiler-holds. From these hold-bunkers the coal is conveyed through the bunker-sliding-doors directly into the stoke hole. Coal which cannot find room in these hold-bunkers, is kept above the armor-decks in special lower-deck bunkers, serving generally as reserve bunkers. These lower-deck bunkers usually discharge into the stoke holes through the hold-bunkers, after these have been emptied.

The known methods of arranging the bunkers show various disadvantages: owing to the great drop, the coal is very much broken; the trimming of the coal in the bunkers is greatly impeded; by opening the bunker-doors the stoke-holes are in great danger of being flooded; the stability of the vessel loses greatly by the coal being taken from the lower bunkers only.

The purpose of the present invention is to avoid these and other disadvantages. The problem is to connect the lower-deck bunkers, situated above the hold-bunkers, directly with the stoke-holes by means of chutes, so that they no more represent reserve-bunkers, and it is rendered possible to use them at the same time with the lower longitudinal and cross bunkers. In this instance the lower-deck bunker will also serve as distributing means for distributing the supply of coal into all bunkers, without the latter communicating in series. The distribution of the coal from the lower-deck bunkers can be suitably effected by means of longitudinal or cross conveyers, which may reach across the whole breadth of the vessel. Furthermore the possibility is given to mechanically charge the coal-trucks from collecting tanks, arranged above the between deck bunkers. Such arrangement of collecting tanks further renders it possible to carry out the supply of coal from outside and its distribution on board the vessel independently of each other, and to facilitate the conveyance to the wing bunkers and the sides of the lower-deck bunkers by means of suitable arrangements. This might be obtained by reversing arrangements provided on the collecting tanks.

The new arrangement of the bunkers offers considerable advantages from various points of view: The coal can be shipped from the coaling vessel by means of any kind of conveyance and is greatly facilitated. With the known arrangement of the bunkers the numerous narrow coal chutes distributed along the length of the hold-bunkers necessitate the coaling to be done both from the shore and from a coaling vessel, in baskets or bags, as by means of these the coal is in the easiest manner distributed to the numerous coal-chutes of the coaling-deck. If the service bunkers are situated above the armor-deck, and can be made accessible from the coaling decks by large hatchways, the refilling of the service bunkers will be far easier, and in place of bags and baskets automatic conveyers, as clam-shell buckets and the like can be employed.

It is further of importance, that the coaling and the distribution of the coal can be carried out independently of each other. The war ships can uninterruptedly take over coal from the coaling vessel or from the shore, as there is sufficient space where the coal taken on board can be dumped previous to being stowed away in the bunkers.

If, as it was the custom hitherto, the coal for feeding the boilers is drawn first from the hold bunkers, it becomes very disadvantageous to refill these bunkers in so far, as they are situated below the armor-deck and far away from the coaling deck. As according to the present invention the lower-deck bunkers are used as service bunkers it is considerably easier to refill the service bunkers; these are besides situated nearer to the coaling point, and access is obtained to them through wide coal-hatchways. As the coal-hatchways are easily made of great length the coal will almost stow away itself automatically on being taken over. It will besides be of advantage, that the coal is no more treated so roughly, as it needs no more to be dumped from such a height and the trimming becomes more easy. Dumping or dropping the coal can be even entirely avoid-

ed by conveying the coal through the hatchways direct into the bunkers without first unloading it on deck. This is also of importance, as heretofore by refilling the coal in bags or baskets, by discharging it into the coal chutes and dropping it from a height of 6–12 m. into the hold bunkers the coal was very much broken. By the present invention such breaking of the coal is greatly reduced. The consequence of this reduction in breaking the coal is the fact that the coaling of the vessel can be carried out with far greater cleanliness. The generation of dust is also greatly reduced.

The number of coal-holes through which the coal taken over is conveyed into the bunkers can be greatly reduced.

If with the known arrangement of the hold bunkers, these are not refilled after they have been emptied, the coal from the lower-deck bunkers must be trimmed through the hold bunkers into the furnace hold, an operation which is so troublesome, that deck hands have to be called upon for assistance, in order to supply coal in sufficient quantity for the fires. The hitherto employed bunker arrangement therefore requires many trimmer hands and reduces the value of the coal by the latter being broken by the trimming, so that the attendance of the fires becomes more tedious, the economic efficiency of the boiler and the radius of action of the war ship are reduced. With the new bunker arrangement the coal is supplied to the fires over the shortest way and by the simplest means, so that trimming is greatly reduced.

A considerable advantage consists in much time being saved owing to the taking over and the distribution being independent of each other, and this saving is particularly valuable on board of war ships. As it is not affected by the distribution of the coal, the coaling can be carried out in a rapid and uninterrupted manner. The coal can be rapidly distributed into the bunkers, as in the spacious lower-deck bunkers a mechanical conveyance by means of traveling cranes and dumping buckets traveling on overhead rails with switches, to the furnace-hold chutes, is possible. Such mechanical conveyance renders it further possible to uniformly charge the bunkers, even if the coal is taken over from a coaling vessel on one side of the ship only. It is of importance that by providing cross truckways in the spacious lower-deck bunkers the coal can also be conveyed to the opposite side of the vessel. The coal can be conveyed in the service bunkers athwart the ship, so that in case coal can be taken over on one side of the vessel only, a list of the ship is nevertheless avoided. As besides the hold-bunkers are drawn upon only in case of emergency, a danger of the stoke-holes being flooded is almost out of question, as the bunker-doors remain closed. The space which might be flooded in the lower-deck bunkers are besides considerably smaller as they are separated by inclined bunker bulkheads from separate wing bunkers, so that the vessel will list less in case of flooding, whereas with the hitherto employed bunker arrangement the between deck bunker reaches up to the shell of the vessel.

The coal supply points in the furnace holds can be increased, as the lower deck bunkers are employed as service bunkers and the danger of flooding becomes less. Therefore coal can be supplied to the fires in sufficient quantity, which is of particular importance in case of forced service. In cases of emergency both bunkers (service and reserve bunkers) can be drawn upon. It is possible to draw coal from the lower deck bunkers as well as from the hold bunkers. Until now this was generally not possible; only the coal from the hold bunkers was at the disposal of the fires, while the coal from the lower deck bunkers could be used only after the hold bunkers had been emptied.

It is further important, that the coal can be conveyed directly to the fires, and this not only if drawn from the hold bunkers but also when drawn from the lower deck bunkers.

The new bunker arrangement is particularly favorable, where the engines are arranged amidships and the boilers fore and aft the engine-holds. In such instances the entire lower-deck above the engine holds, except the ventilation shafts and a central passage can be employed as service-bunker. In consequence if a given quantity of coal is to be stowed in the lower deck bunkers, the height of the lower deck bunker can be reduced, and in certain war ships, as in small cruisers, the armor deck can be raised and thereby the space available for engines and the like be increased.

A considerable disadvantage of the known bunker arrangements consists in the stability of the vessel, and particularly in case of action, being reduced by the consumption of the coal in the deeply situated hold-bunkers. As according to the present invention the coal is first drawn from the lower deck bunkers, thus from above, the stability of the vessel increases both in steaming and in action. The hold bunkers remain full for a long time and thereby afford a favorable protection against projectiles, torpedoes, underwater explosions and the like. Also the coal protection behind the side armor above the incline of the armor deck is obtained by an inclined bunker wall being provided from the knee of the armor deck up to the next deck above, on which inclined wall the coal will slip down both while filling and while emptying the bunkers.

The interruptions in the armor deck for the coal transport are more amidships and

are therefore less dangerous, than in the position they had heretofore, where they were situated more towards the sides of the vessel. The other coal-holes remain closed during the journey and only need be opened for charging the hold bunkers. If the shell plating of the war ships above and below water line has been destroyed, the danger of flooding is considerably smaller. The hands required for taking over and handling the coal can be reduced in number, as on the one hand automatic discharging devices and on the other mechanical conveyers on board the vessel can be employed. Also in other respects advantages are obtained, which will become evident from the following description.

In the accompanying drawing the new bunker arrangement is exemplified in two designs.

Figures 1–5 show an arrangement with coal shafts without collecting tank above the lower deck bunker. Fig. 6 is an arrangement with collecting tank. Fig. 7 is a design of a collecting tank.

In the first form the longitudinal bunkers —1— inclose the engine and boiler holds on the sides. Above these are arranged the lower deck bunkers —2—, and on the sides of the latter the wing bunkers —3— are arranged, being separated therefrom by an inclined partition, as shown. Collecting tanks —4— serve for charging the lower deck bunkers and may be closed by doors —5—. The lower deck bunker —2— communicates with the wing bunker —3— by means of water-tight doors —6— in the said inclined partitions and with the hold bunkers by armor hatchways —7—. The doors 5 of the collecting tanks 4 are arranged opposite the doors 6 in the inclined partitions, so that the coal can be discharged directly into the wing bunkers when desired. From the lower deck bunker coal chutes —8— lead directly to the stoke holes. The longitudinal bunkers —1— can be emptied into these holds through sliding-doors —9—. In the lower-deck bunkers —2— are provided with conveyers 10 on suspension ways 10^a, serving to distribute the coal in the lower deck bunkers and convey it to the wing and longitudinal bunkers and the chutes —8— leading into the furnace hold.

The wing bunker —3— is arranged in such a manner, that partition or wall —11— rises from the knee of the armor deck obliquely up to the next deck above. The watertight door —6— can be so arranged and of such size that the suspension and conveyance trucks can run right into bunker —3— or into such a position, that they are easily emptied.

The charging from outside is carried out in the coal being supplied through collecting tanks —4— to the lower deck bunker —2— and is from here taken by conveyers or trimmers to bunkers —1— and —3—. Hereby it is of importance, that the coal can be conveyed through doors —12— (Fig. 5) in the inside chute of the lower deck bunker to the other side of the vessel, so that the coal taken over on one side of the vessel is uniformly distributed on both sides.

Generally the consumption of coal can be wholly supplied from the lower deck bunker —2— and this bunker be refilled. In cases of emergency and when the boilers are worked under forced service, coal can also be drawn from bunker —1— through door —9—, eventually also from cross bunkers, not shown in the drawing but arranged in the same manner as bunker —1—. Coal is drawn from wing bunkers —3—, after bunkers —2— have been emptied, through door —6— by means of the conveyers and chutes —8—.

The form shown in Fig. 6 differs from the above described form by the arrangement of the collecting tanks —15—, which communicate by means of doors 16 with the coal bunkers —2—. Each collecting tank —15— is provided with a portion —17— pivoted at —18— so as to be swung into the position shown at the left or to the position shown at the right of Fig. 6. When the part —17— is in the position shown at the right of said figure, it forms an extension for the upper part of the collecting tank, which reaches to the side of the vessel, so that the upper end of the said tank is enlarged, thereby facilitating the charging of the tank from the conveyer buckets —19—.

In the form shown the coaling vessel 20 is supposed to have a derrick crane —21— so that the coal can be conveyed by means of travelers and conveyer buckets —19— of any type into the collecting tank —15—; after the coaling is completed, part —17— can be swung back into the position shown on the left hand side of said figure, so as to leave a free side passage on the upper deck, and not to infringe on the range of the guns. Below the swiveling part —17— of the collecting tank is a trap-door —24— turning on pin —25—. If this trap-door is turned towards the inside as shown by dotted lines on the right hand in the drawing the coal can pass through the shaft —26—, into the corner —27— of the lower deck bunker —2— or if door —6— of the bulwark —11— is opened, directly into the wing-bunker —3—.

The arrangement offers the particular advantage that the coal can be kept to such a height in the collecting tank, that it need not drop when door —16— is opened. On the contrary the coal can be conducted through this bottom door —16— of the collecting tank directly into the conveyer buckets or trucks, as shown in the drawing in form of lorries —28—. By means of these con-

veyances the coal can be moved both lengthwise and across the vessel. It is of importance that the lower deck bunker —2— be charged only after the other bunkers have been filled so that it may serve both as service bunker and as distributing bunker for charging the other bunkers.

In Fig. 7 is shown a type of collecting tank —15—, the bottom of which terminates in four hoppers —30— which can each be closed by a separate door —16—. This arrangement means a further facilitating of the supply and handling of the coal.

The above described bunker arrangement can be modified in various respects. So the wing bunker —3— might be extended towards the inside beyond the incline of the armor deck, so that a chute on the horizontal part of the armor deck will lead direct into the stoke hole, and the wing bunkers —3— need not be emptied through the bunker —2—. The conveyers and truck-lines in the lower deck bunker may be of any type. The reversing arrangements on the collecting tank may be omitted and the collecting tanks can be made to fold together, also they can be made of any suitable type; instead of folding doors or lids sliding doors or the like may be used.

Having now described my invention what I claim and desire to secure by Letters Patent of the United States is:

1. A war-ship provided with one or more boilers in the middle of the ship, hold bunkers, lower deck-bunkers, and oblique chutes leading thwartships from the lateral deck bunkers to the middle of the ship and directly into the firing rooms.

2. A war-ship provided with one or more boilers in the middle of the ship, hold bunkers, lower deck bunkers divided by bulkheads into inner and outer compartments, and oblique chutes leading thwartships from one of the compartments of the deck bunkers to the middle of the ship and directly into the firing rooms.

3. A war-ship provided with one or more boilers in the middle of the ship, hold bunkers, lower deck bunkers, oblique chutes leading thwartships from the lateral deck bunkers to the middle of the ship and directly into the firing rooms, and collecting tanks above the deck bunkers and communicating with the same.

4. A war-ship provided with hold bunkers, a lower deck bunker divided by an inclined partition into inner and outer compartments, said partition having a door therein, a chute leading from one of the compartments of the deck bunker directly to the stoke hole of the furnace, and a collecting tank arranged above the inclined partition of the deck bunker and provided in its bottom with a door opposite the door in the said inclined partition, so that the outer compartment of the deck bunker can be directly filled from the collecting tank.

5. A war ship provided with hold bunkers, lower deck bunkers, chutes leading from the deck bunkers directly to the stoke holes of the furnace, and collecting tanks above the deck bunkers and communicating with the same, said collecting tanks having a hinged section adapted to be swung inwardly to leave a side passage on the deck, the section when the tank is in use extending to the side of the ship.

6. A war ship provided with hold bunkers, lower deck bunkers above the hold bunkers, chutes leading from the deck bunkers directly to the stoke holes of the furnace, conveyer trucks in the deck bunkers, and collecting tanks above the deck bunkers and communicating therewith.

7. A war ship provided with hold bunkers, lower deck bunkers above the hold bunkers and divided by a partition into inner and outer compartments, chutes leading from the inner compartments of the deck bunkers directly to the stoke holes of the furnace, and suspension conveyer-ways extending across the entire breadth of the deck bunkers.

8. A war ship provided with a bunker at each side of the hold, a lower deck bunker above each hold bunker and having at the bottom of its outer portion downwardly and outwardly inclined, downwardly and inwardly inclined partitions in said bunkers dividing the same into two compartments, doors in the partitions, hatchways establishing communication between the inner compartment of the deck bunkers with the hold bunkers, and chutes leading from the said inner compartments of the deck bunkers to the stoke holes of the furnace.

9. A war ship provided with a lower deck bunker and a collecting tank on the deck above the bunker, said tank having a door in its bottom and provided with a hinged section adapted to be swung inwardly to leave a side passage on the deck, the section when the tank is in use extending to the side of the ship.

10. A war ship provided with a lower deck bunker, and a collecting tank on the deck above the bunker, said tank having a hinged section adapted to be swung inwardly to leave a side passage on the deck, said section when the tank is in use extending to the side of the ship, the tank having a door in its bottom and side below the hinged section.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses this 3rd day of November—1906.

HEINRICH AUGUST KAUERMANN.

Witnesses:
M. ENGELS,
ALFRED POHLMEYER.