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(72) Inventors:  
• **WANG, Jianhua**  
**Guangzhou**  
**Guangdong 510382 (CN)**  
• **HE, Guangwei**  
**Guangzhou**  
**Guangdong 510382 (CN)**

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(74) Representative: **Nony**  
**11 rue Saint-Georges**  
**75009 Paris (FR)**

(71) Applicant: **Guangzhou Shipyard International Company Limited**  
**Guangzhou, Guangdong 511462 (CN)**

(54) **BALLAST TANK VENTILATION DUCT**

(57) Disclosed is a ballast tank ventilation duct, including ventilation boxes (1) arranged closely to the ballast tanks. Each of the ventilation boxes is in a long strip shape, length directions of the ventilation boxes are set along a direction of a central axis of a ship, a length of each of the ventilation boxes is at least greater than a length of two ballast tanks arranged along the direction of the central axis, the ventilation boxes are connected

with the ballast tanks through ventilation pipes (2), main ventilation pipes (3) are respectively arranged at a front end and a rear end of each of the ventilation boxes, and the main ventilation pipes extend onto a main deck. The ballast tank ventilation duct overcomes problems of too many ventilation ducts and overweight of the ducts in the past.

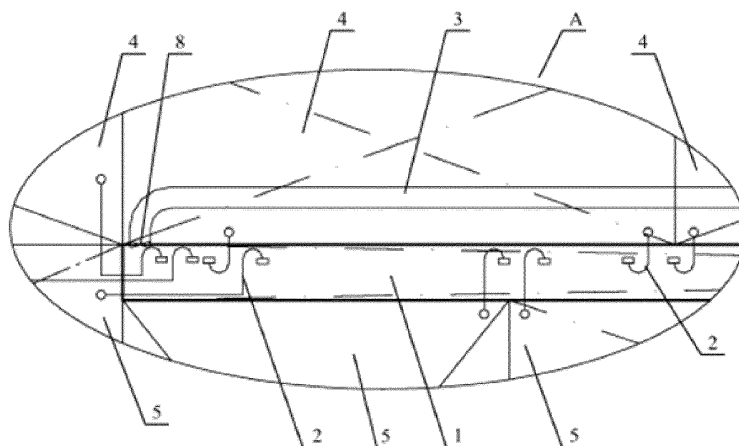


FIG. 2

## Description

[0001] The present application claims priority to a Chinese Patent application No. 201510487689.X, filed with the Chinese Patent Office on August 10, 2015, by Guangzhou Shipyard International Ltd., Co., entitled 'ballast tank ventilation duct', disclosures of which are incorporated herein by reference in their entireties.

## TECHNICAL FIELD

[0002] The present invention relates to the technical field of ship design, and in particular relates to a ballast tank ventilation duct.

## BACKGROUND

[0003] Ballast systems are widely applied to various ships and offshore platforms. Ballast tanks arranged at all parts in substructures of hulls or platforms are ballasted or unloaded, so that the draft and steady and safe metacentric height along a longitudinal direction and a transverse direction of the hulls can be adjusted, thereby being conducive to improving the stability of sailing in ballast or towing of the ships and the offshore platforms, reducing deformation of the hulls, avoiding overlarge bending moments and shearing force, reducing the vibration of the hulls and improving the seaworthiness of the empty tanks, so as to avoid violent swing in stormy waves. Ventilation systems communicated with atmosphere are arranged in the ballast tanks, so that pressure in the ballast tanks can be kept balanced when in ballast or unloading operation.

[0004] A ventilation pipe is guided from a top of each of the ballast tanks for ventilation of existing ballast tanks, and the ventilation pipe is guided to a rear wall or a chimney of an upper building area. However, the above design results in problems of too many ducts, too long ducts and the like, causing defects of difficult layout of the ducts, heavy weight of an empty ship and the like.

## SUMMARY

[0005] The present invention aims at proposing a ballast tank ventilation duct, which can simplify a layout of the duct and reduce the weight of the duct, so as to reduce weight of an empty ship and increase loading capacity of cargos.

[0006] In order to achieve the purpose, the present invention adopts following technical solution.

[0007] The ballast tank ventilation duct includes ventilation boxes arranged closely to the ballast tanks, wherein each of the ventilation boxes is in a long strip shape, length directions of the ventilation boxes are set along a direction of a central axis of a ship, a length of each of the ventilation boxes is at least greater than a length of two ballast tanks arranged along a direction of the central axis, the ventilation boxes are connected with the ballast

tanks through ventilation pipes, main ventilation pipes are respectively arranged at a front end and a rear end of each of the ventilation boxes, and the main ventilation pipes extend onto a main deck.

[0008] The rear ends of the ventilation boxes can be close to the front end of the ballast tank located at stern of the ship, and the front ends of the ventilation boxes can be close to the rear end of the ballast tank located at prow of the ship.

[0009] Rear walls of the ventilation boxes and a front wall of the ballast tank located at the stern of the ship are located on a same cross section of the ship, and the front walls of the ventilation boxes can be close to an engine room of the ship.

[0010] The ballast tanks include a larboard ballast tank, a starboard ballast tank and a middle ballast tank, two ventilation boxes that are symmetric along the central axis of the ship are arranged on the ship and include a larboard ventilation box and a starboard ventilation box, the larboard ballast tank and the middle ballast tank are communicated with a larboard ventilation box by the ventilation pipes, and the starboard ballast tank and the middle ballast tank are communicated with the starboard ventilation box by the ventilation pipes.

[0011] A shape of a cross section of each of the ventilation boxes may be a rectangular frame shape.

[0012] A stop valve may be arranged between each of the main ventilation pipes and each of the ventilation boxes.

[0013] The ventilation boxes and the ballast tanks may be connected by the ventilation pipes through a shortest path.

[0014] The present invention has the beneficial effects that:

[0015] the ballast tank ventilation duct, proposed by the present invention, includes the ventilation boxes and the ventilation pipes for communicating the ventilation boxes and the ballast tanks; since a plurality of ballast tanks can be simultaneously communicated with the ventilation boxes by the ventilation pipes, each of the ventilation boxes is in a long strip shape and vertical distances from the ventilation boxes to the plurality of ballast tanks are shorter, the ballast tanks can be communicated with the ventilation boxes by the shorter ventilation pipes; the ventilation boxes extend onto the main deck by the main ventilation pipes arranged on the ventilation boxes, thereby overcoming the problem of too many ducts since all the ventilation pipes connected with all the ballast tanks need to extend onto the main deck in the past, simplifying the duct, lightening the weight of the duct and increasing the cargo capacity of the ship.

## BRIEF DESCRIPTION OF DRAWINGS

[0015]

Fig. 1 is a schematic structural diagram illustrating a ballast tank ventilation duct provided by an embod-

iment of the present invention;

Fig. 2 is a partially enlarged view illustrating a position A in Fig. 1; and

Fig. 3 is a schematic diagram illustrating partial structure of a cross section of a ballast tank ventilation duct provided by an embodiment of the present invention.

**[0016]** In the drawings: 1, ventilation box; 2, ventilation pipe; 3, main ventilation pipe; 4, larboard ballast tank; 5, middle ballast tank; 6, starboard ballast tank; 7, engine room; 8, stop valve.

## DETAILED DESCRIPTION

**[0017]** A technical solution of the present invention is further described below in combination with drawings and through a specific implementation manner.

**[0018]** Terms of 'front' and 'rear' in the present invention respectively refer to that a direction pointing to prow is 'front', and a direction pointing to stern is 'rear'.

**[0019]** As shown in Figs. 1-3, an embodiment of the present invention provides a ballast tank ventilation duct, including ventilation boxes 1 arranged closely to the ballast tanks, each of the ventilation boxes 1 is in a long strip shape, length directions of the ventilation boxes are set along a direction of a central axis of a ship, and a length of each of the ventilation boxes 1 is at least greater than a length of two ballast tanks arranged along the direction of the central axis. Preferably, rear ends of the ventilation boxes 1 are close to the front end of the ballast tank located at stern of the ship, and front ends of the ventilation boxes 1 are close to the rear end of the ballast tank located at prow of the ship. Further preferably, rear walls of the ventilation boxes 1 and front wall of the ballast tank located at the stern of the ship are located on a same cross section of the ship, and the front walls of the ventilation boxes 1 are close to an engine room 7 of the ship. Through the above two settings, a ventilation need can be ensured, and a reasonable design for a structure can also be ensured.

**[0020]** The ventilation boxes 1 are connected with the ballast tanks by ventilation pipes 2 connecting the ventilation boxes 1 and the ballast tanks through a shortest path, thereby simplifying the duct and lightening the weight of the duct. Main ventilation pipes 3 are respectively arranged at the front end and the rear end of each of the ventilation boxes 1, and the main ventilation pipes 3 extend onto a main deck, thereby overcoming the problem of too many ducts since all the ballast tanks are directly lead onto the main deck by the ventilation pipes 2. A stop valve 8 is arranged between each of the main ventilation pipes 3 and each of the ventilation boxes 1, and the stop valves can control communication of the ventilation boxes 1 with outside.

**[0021]** Specifically, the ballast tanks include a larboard ballast tank 4, a starboard ballast tank 6 and a middle ballast tank 5, two ventilation boxes 1 that are symmetric

along the central axis of the ship are arranged on the ship and include a larboard ventilation box and a starboard ventilation box, the larboard ballast tank 4 and the middle ballast tank 5 are communicated with a larboard ventilation box by the ventilation pipes 2, and the starboard ballast tank 6 and the middle ballast tank 5 are communicated with the starboard ventilation box by the ventilation pipes 2, therefore, the structure is simple and reasonable, there is no need to arranged too many ventilation boxes 1, and the length of each of the ventilation pipes 2 is not increased due to the arrangement of the two ventilation boxes 1.

**[0022]** A shape of a cross section of each of the ventilation boxes 1 is a rectangular frame shape, therefore, the structure is simple, and the manufacturing is convenient and simple.

**[0023]** In another embodiment of the present invention, a structure of a ballast tank ventilation duct may be basically the same as a structure of the ballast tank ventilation duct given in the above embodiment. However, no stop valve is arranged between each of main ventilation pipes 3 and each of ventilation boxes 1, and only an opening is formed, so as to keep communication of the ventilation boxes with outside.

**[0024]** The present invention further provides an embodiment. The structure of a ballast tank ventilation duct may be basically the same as the structure of the ballast tank ventilation duct given in any of above embodiments. The ventilation duct includes ventilation boxes 1 arranged closely to the ballast tanks, each of the ventilation boxes 1 is in a long strip shape, the length directions of the ventilation boxes are set along the direction of the central axis of a ship, the length of each of the ventilation boxes 1 is at least greater than the length of two ballast tanks arranged along the direction of the central axis, the ventilation boxes 1 are connected with the ballast tanks by ventilation pipes 2, main ventilation pipes 3 are respectively arranged at the front end and the rear end of each of the ventilation boxes 1, and the main ventilation pipes 3 extend onto a main deck.

**[0025]** The present embodiment differs from above embodiments in that: the material and the specific structure of the ventilation boxes 1 are not limited, the material and the specific structure of the main ventilation pipes 3 are not limited, as long as the ventilation boxes 1 can collect the ventilation pipes 2 led out of a plurality of ballast tanks, the number of the ventilation pipes 2 can be decreased, the layout of the duct can be simplified, and the weight of the duct can be lightened.

**[0026]** Apparently, above embodiments of the present invention are only examples made for clear description of the present invention, rather than limits to the implementation manners of the present invention. Those ordinary skilled in the art can also make other different forms of changes or variations based on the above description. Herein, all implementation manners are not and cannot be listed. Any modification, equivalent replacement, improvement and the like made within the spirit

and the principle of the present invention should be included in a protection scope of claims of the present invention.

7. The ballast tank ventilation duct according to claim 1, wherein the ventilation boxes (1) and the ballast tanks are connected by the ventilation pipes (2) through a shortest path.

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## Claims

1. A ballast tank ventilation duct, comprising ventilation boxes (1) arranged closely to the ballast tanks, each of the ventilation boxes (1) is in a long strip shape, length directions of the ventilation boxes are set along a direction of a central axis of a ship, a length of each of the ventilation boxes (1) is at least greater than a length of two ballast tanks arranged along the direction of the central axis, the ventilation boxes (1) are connected with the ballast tanks by ventilation pipes (2), main ventilation pipes (3) are respectively arranged at a front end and a rear end of each of the ventilation boxes (1), and the main ventilation pipes (3) extend onto a main deck. 10 15 20
2. The ballast tank ventilation duct according to claim 1, wherein the rear ends of the ventilation boxes (1) are close to the front end of the ballast tank located at stern of the ship, and the front ends of the ventilation boxes (1) are close to the rear end of the ballast tank located at prow of the ship. 25
3. The ballast tank ventilation duct according to claim 2, wherein rear walls of the ventilation boxes (1) and a front wall of the ballast tank located at the stern of the ship are located on a same cross section of the ship, and the front walls of the ventilation boxes (1) are close to an engine room (7) of the ship. 30 35
4. The ballast tank ventilation duct according to claim 3, wherein the ballast tanks comprise a larboard ballast tank (4), a starboard ballast tank (6) and a middle ballast tank (5), two ventilation boxes (1) that are symmetric along the central axis of the ship are arranged on the ship and comprise a larboard ventilation box and a starboard ventilation box, the larboard ballast tank (4) and the middle ballast tank (5) are communicated with a larboard ventilation box by the ventilation pipes (2), and the starboard ballast tank (6) and the middle ballast tank (5) are communicated with the starboard ventilation box by the ventilation pipes (2). 40 45
5. The ballast tank ventilation duct according to claim 1, wherein a shape of a cross section of each of the ventilation boxes (1) is a rectangular frame shape. 50
6. The ballast tank ventilation duct according to claim 1, wherein a stop valve (8) is arranged between each of the main ventilation pipes (3) and each of the ventilation boxes (1). 55

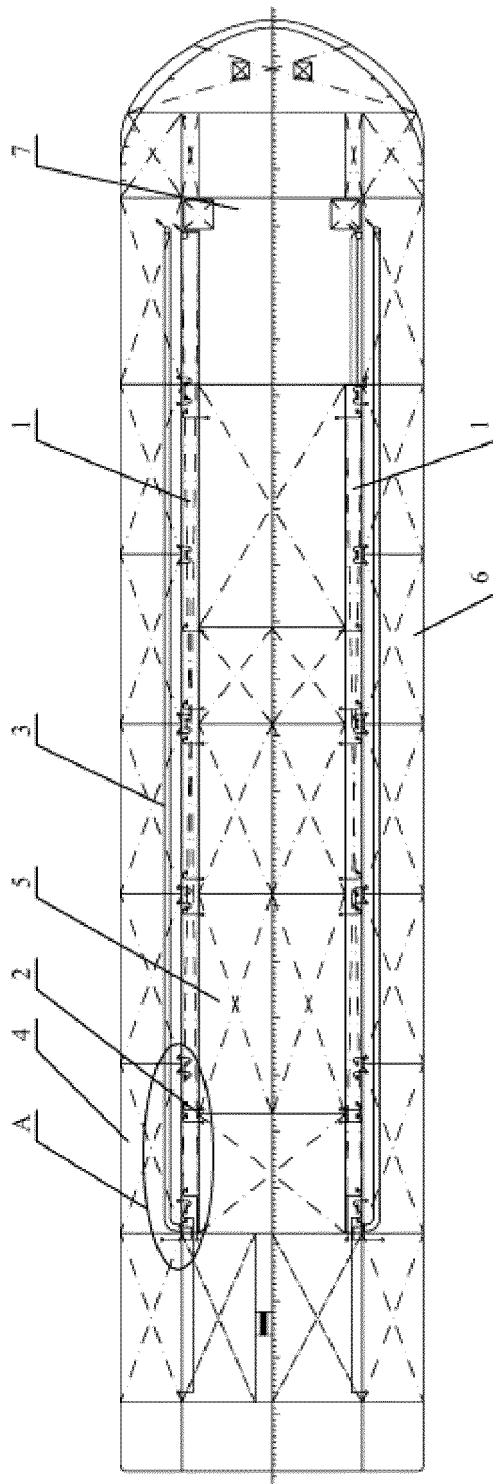


FIG. 1

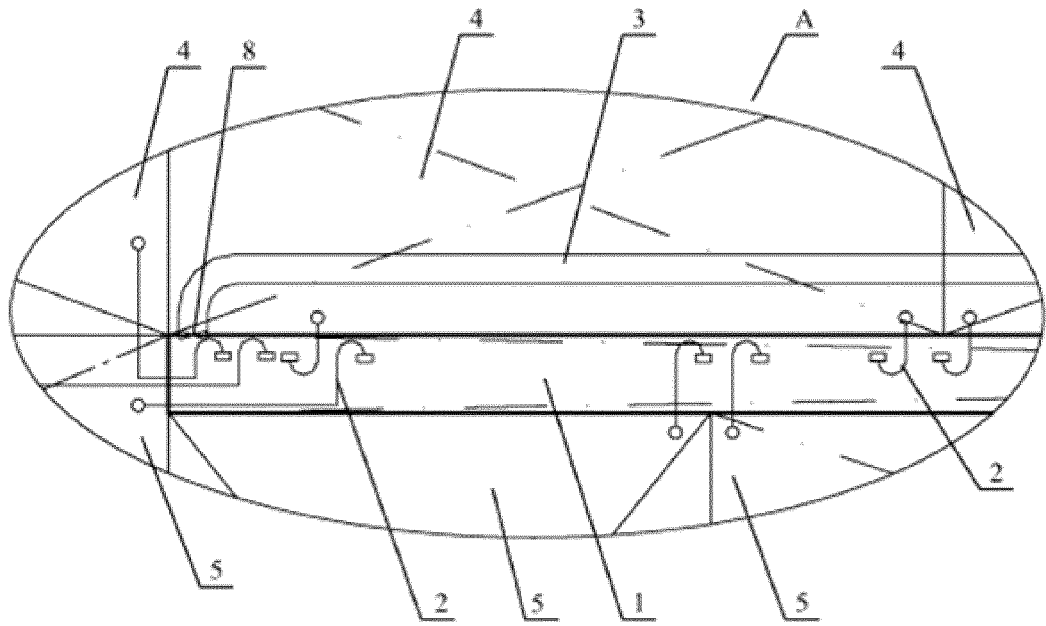


FIG. 2

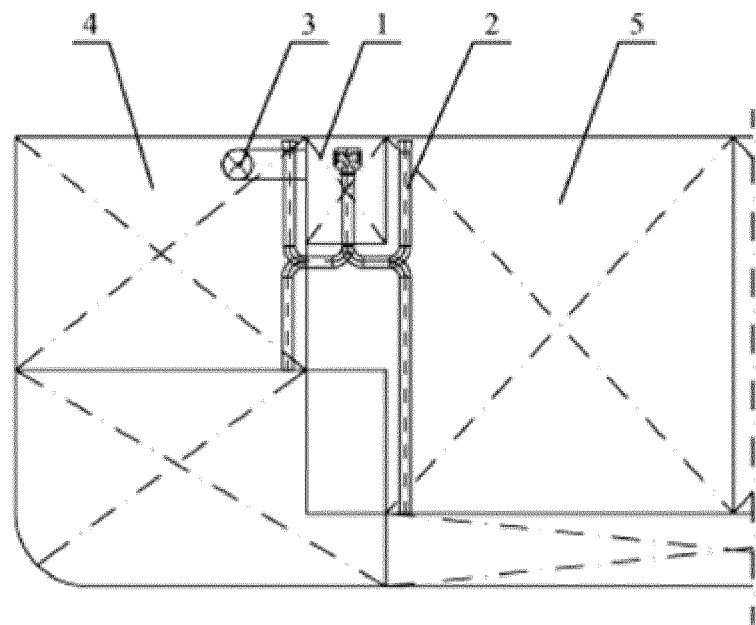


FIG. 3

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2015/099891

## A. CLASSIFICATION OF SUBJECT MATTER

B63J 2/10 (2006.01) i

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

B63J

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

CNPAT, EPODOC, WPI, CNKI: ventilate, exhaust, box, ballast, vent, ship

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☐ Further documents are listed in the continuation of Box C.☒ See patent family annex.

\* Special categories of cited documents:

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“&amp;” document member of the same patent family

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Name and mailing address of the ISA/CN:  
 State Intellectual Property Office of the P. R. China  
 No. 6, Xitucheng Road, Jimenqiao  
 Haidian District, Beijing 100088, China  
 Facsimile No.: (86-10) 62019451

Authorized officer

WANG, Xiabing

Telephone No.: (86-10) 62085146

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**INTERNATIONAL SEARCH REPORT**  
Information on patent family members

International application No.

**PCT/CN2015/099891**

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