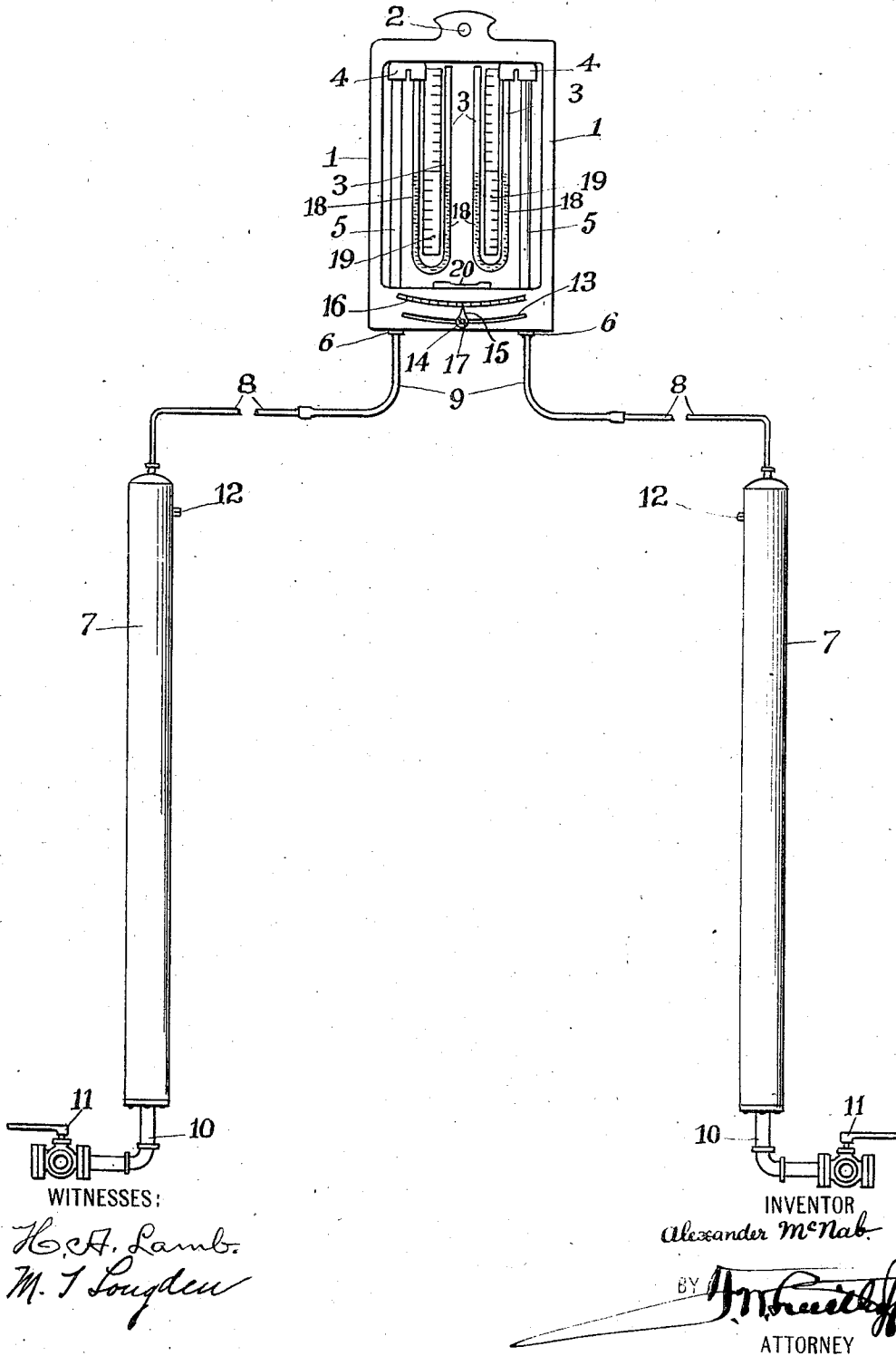


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DRAFT INDICATOR FOR SHIPS.
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UNITED STATES PATENT OFFICE.

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DRAFT-INDICATOR FOR SHIPS.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, ALEXANDER McNAB, a subject of George V, King of Great Britain, and residing in the city of Bridgeport, county of Fairfield, State of Connecticut, United States of America, have invented certain new and useful Improvements in Draft-Indicators for Ships; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to certain improvements in devices for indicating the draft of ships.

In loading a ship, whether by means of separate packages or articles of freight, or by means of grain, ore, or analogous material, which is roughly distributed throughout the hull of a ship, it is very essential to ascertain the draft of the ship when loaded or the list of a ship both before and after loading, so that the ship can run no danger of striking the bottom when traveling throughout shoal spots, and so as to make the best provision for the proper trim of the ship.

My improvement aims to accomplish these results in a very efficient and simple manner, and consists in the details of construction and combination of parts hereinafter fully described and then particularly pointed out in the claims which conclude this description.

In the accompanying drawing the figure is a schematic elevation illustrating the manner in which my improvement is installed.

1 is any suitable box or frame which is pivotally swung at 2 to any convenient support on the ship.

3 are U-shaped tubes secured in position within said frame, these tubes at one end being preferably open while the other ends of said tubes are connected by suitable tubular joints 4 to upright tubes 5 that extend down through the bottom of the frame and are provided with ordinary union nipples 6.

7 are elongated vertically disposed cylindrically shaped hollow chambers, and 8 are pipes which extend from upper portions of these chambers and are connected with the nipples 6 by flexible joints, for instance, sections of rubber tubing 9. From the bot-

toms of these chambers 7 extend pipes 10 at the extremities of which are three way cocks 11, and near the tops of said chambers are air vent valves 12. In the bottom of the frame 1 is an arcuate slot 13 through which a stationary pin 14 freely extends, and rigid with this pin is an index pointer 15 which registers along an arcuately disposed scale 16, that is marked out preferably in degrees, immediately above the slot 13.

17 is a wing nut which engages the free end of the pin 14 and acts to bind said pin and pointer at any adjustment throughout the slot 13 for the purpose presently to be explained.

The U-shaped tubes 3 contain mercury denoted by the numeral 18, and between the legs of each U-shaped tube is a scale 19, the markings of which designate feet. Secured to the frame 1 at the bottom portion thereof is an ordinary spirit level 20. The frame, the U-shaped tubes carried thereby, the scales 19, and in fact all the parts contained within or supported by said frame, constitute what will be hereinafter referred to as the "gages", which latter may be located at any convenient part of the ship, either amidship, forward or aft, and the cocks 11 open one way directly into the water outside the ship at a point below the load water line preferably on a level with the bottom of the keel, and these cocks are preferably located one at the forward portion and the other at the aft portion of the ship.

The upright tubes 5, the flexible connections 9, the chambers 7, the pipes 8, and the pipes 10 constitute closed tubular systems, and when there is an upward pressure within these systems such pressure will be communicated directly to the outer legs of the columns of mercury in the U-shaped tubes, so as to force these legs downwardly and drive the inner legs upwardly, and the tops of these inner legs of mercury register along the scales 19.

The operation of my improvement is as follows:—The stationary pin 14 extends from any suitable backboard from which the frame 1 is pivotally swung, or this pin may extend from any suitable wall or partition or furnishing of the ship, and owing to the provision of the flexible connections 9 any list of the ship prior to loading will

cause a swinging movement of this frame, the wing nut 17 being of course loosened to permit this, and since the pointer 15 is rigid with the pin 14, said pointer will register this list along the scale 16, and the officer in charge will note this so that his books of record will show that before loading there was a list of a certain number of degrees. This list of course may be corrected during the process of loading, and the nut 17 may be left loose for this purpose. In determining whether there is a list or not the officer merely glances at the spirit level and should the latter show an appreciable list of the ship, the nut 17 is loosened and the frame 1 allowed to swing to a vertical position, so that the columns of mercury in the gages will stand perfectly level, and the nut is then tightened.

It is necessary, for the purposes of installing my improvement, that the light draft water line be known, since the columns of mercury in the U-tubes should balance at that marking on the scale 19 which denotes this light draft water line. When my improvement is installed on a ship with the cocks 11 open directly into the water outside the ship, the water will rise in the closed systems and will of course create a pressure of air therein which will cause the mercury in the inner legs of the tubes to be forced upwardly beyond the registrations which correspond with the light draft water line. The air vents 12 are then opened which relieves the pressure and allows the water to rise inside these closed systems to the level of the outside water line and then said vents are closed and the columns of mercury will then stand level at the registration which corresponds with the light draft water line, which, in the present instance as shown, is six feet. As the loading of the vessel continues the mercury in the inner legs of the U-tubes rises and will register along the scales 19, the markings of which latter are of course in feet. Should the mercury rise in one tube much higher than in the other tube this will signify that the loadings forward and aft are not such as would place the vessel in proper trim, and therefore this improper loading may be readily corrected until the registrations in these tubes are substantially the same. When such registration of the mercury has indicated that the draft of the vessel is sufficient and that more draft might possibly be dangerous, the loading is discontinued, and the air vents 12 may be opened, if desired, and the columns of mercury restored to their normal positions, the officer in charge having of course made a record of the ship's draft, or, the pressure may be maintained in these closed systems, and the registrations allowed to remain. Any listing of the ship during loading will in-

stantly be detected by the spirit level, and may be compensated for as far as the gages are concerned, by loosening the nut 17 and allowing the gage frame to assume a vertical position, and the measuring of the degree of list will be noted on the scale 16 and recorded by the officer in charge as hereinbefore set forth. Of course several of these gages may be located at different parts of the ship, and the closed systems may open into the outside water at any desired location, without departing from the spirit of my invention.

When a light draft water line is known, the markings for the gages will of course be denoted to correspond with such draft; for instance, if such draft is eleven feet, the markings on the scale 19 at which the mercury columns are balanced would be "11", and the upward or downward markings would then be changed to 12, 13, 14, 15, &c. It will be noted that the registrations on the scale are both upward and downward, and the spacing of the markings on this scale is predetermined by the pressure caused within these closed systems by each foot of draft of the ship. I prefer that the inner legs of the U-tubes should be open as hereinbefore set forth although above the mercury they may inclose a vacuum hermetically sealed, if desired. After a vessel has been loaded the cocks 11 are closed so that the closed systems will not communicate with the water outside the ship and the closing of these cocks opens these systems directly to the bilge of the ship into which the water in said systems may drain, and the air vents 12 are opened to permit this.

While I prefer to use mercury in the gages since its specific gravity is so great that the spacing on the gage scales may be at a minimum, nevertheless it will be clear that any comparatively heavy liquid may be utilized in these gages and the length and spacing of the scales increased accordingly. Also, the chambers 7 may be horizontally disposed, if desired, and in some instances it might be better to arrange these chambers horizontally because the column of water above the sea cocks would be shorter and would not materially resist the inflow of the water through the cocks. I therefore do not wish to be limited to any particular disposition of these chambers 7.

Having thus described my invention what I claim as new and desire to secure by Letters Patent is:—

1. A draft indicator for ships, comprising a U-shaped tube partly filled with a liquid whose specific gravity is comparatively great, a closed tubular system having its upper extremity connected to one end of said tube while its lower extremity opens into the water outside the ship, an air vent valve in said system, and a three way cock

located in the lower extremity of said system whereby the latter may be opened to the water outside the ship or closed thereto and the water in the system allowed to drain
5 into the bilge of the ship.

2. A draft indicator for ships, comprising similar U-shaped tubes provided with registering scales adjacent thereto and partly filled with a liquid whose specific gravity is
10 comparatively great and whose normal level is denoted on such scale as the light water draft line of the ship, separate closed tubular systems each having its upper extremity connected to one end of said tubes while the
15 other extremity opens into the water outside the ship at suitable locations and on a level with the keel thereof, air vent valves in said systems, and three way cocks located in the lower extremities of said systems and adapted
20 to be operated to open the latter to the water outside the ship or to close the same thereto and allow the water in the systems to drain into the bilge of the ship.

3. A draft indicator for ships, comprising
25 a suitable frame pivotally connected to a stationary support on the ship and suitably located, U-shaped gage tubes secured within said frame, registering scales adjacent said tubes, closed tubular systems, flexible
30 connections which connect the upper extremities of said systems with one leg of said tubes, the lower extremities of said systems opening into the water outside the ship at suitable locations and on a level with the
35 keel thereof, and cocks within the lower extremities of said systems whereby the latter may be opened or closed.

4. A draft indicator for ships, comprising a frame pivotally connected to a stationary
40 element on the ship and having at its lower extremity an arcuately disposed slot and an arcuate scale above the latter, a stationary pin extending freely through said slot and carrying an index pointer which registers
45 with said scale, a set screw driven on said

pin whereby the latter may be secured at any location throughout said slot, a spirit level carried by the lower portion of said frame, a pair of U-tubes supported in vertical disposition by said frame and partly
50 filled with a liquid whose specific gravity is comparatively great, gage scales secured in position between the legs of said tubes, closed tubular systems which open at their lower extremities into the water outside the
55 ship and on a level with the keel thereof, flexible tubular connections between the upper extremities of said systems and one of the legs of said U-tubes, air vent valves in said systems, and three way cocks located in
60 the lower extremities of said systems and adapted to be opened to permit the flow of outside water in said systems or be closed against such flow and thereby afford drainage from the systems into the bilge of the
65 ship.

5. An indicator for ships comprising a pivotally mounted support, means carried thereby for indicating the inclination of a ship, means carried by the support for indicating the fore and aft draft of the ship,
70 and sea water admitting means for actuating the fore and aft draft indicating means.

6. An indicator for ships comprising means for indicating the draft of a ship, a
75 pressure chamber, means connecting the chamber to the draft indicating means, an intake for causing sea water to create a pressure in the chamber that will actuate the draft indicating means, means carried by the
80 chamber for controlling the pressure therein, and controlling and draining means carried by the intake.

In testimony whereof I affix my signature in presence of two witnesses.

ALEXANDER McNAB.

Witnesses:

F. W. SMITH, Jr.,
M. T. LONGDEN.