J. M. COLE.

SHIP'S DRAFT GAGE.

APPLICATION FILED FEB. 4, 1916.

1,218,525.

Patented Mar. 6, 1917.

2 SHEETS—SHEET 1.

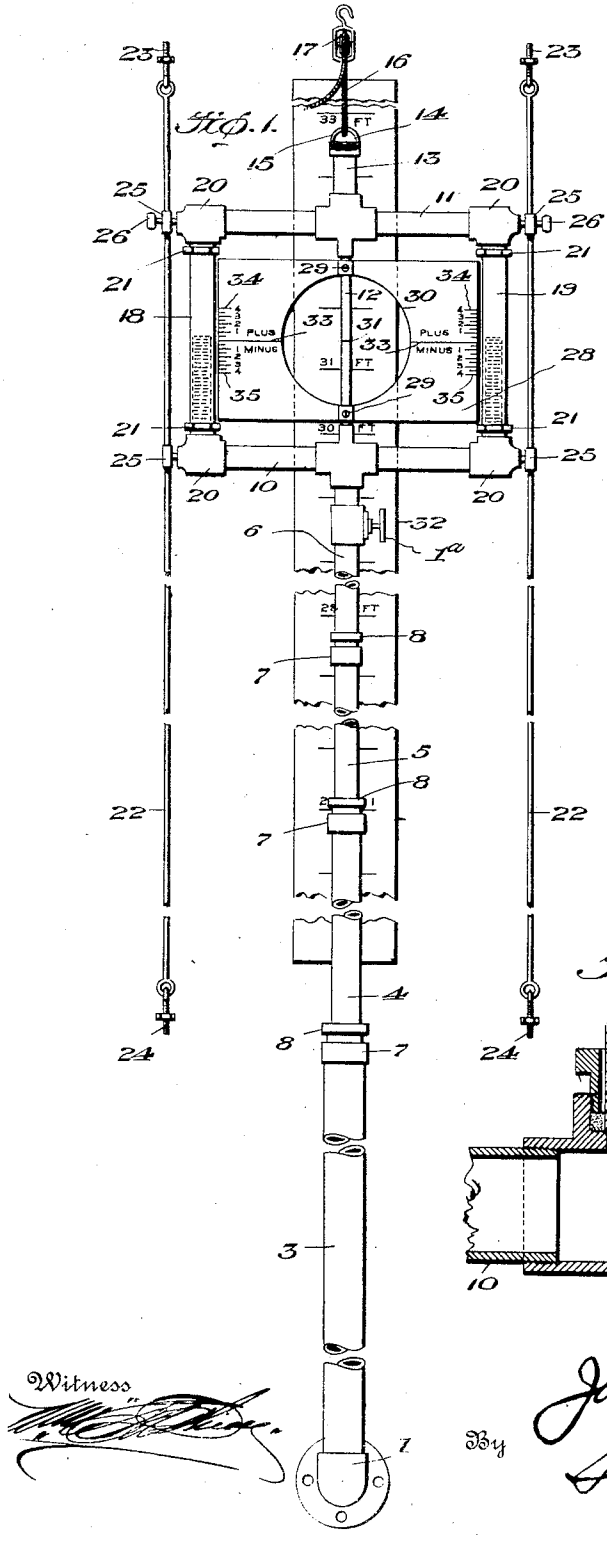


Fig. 1.

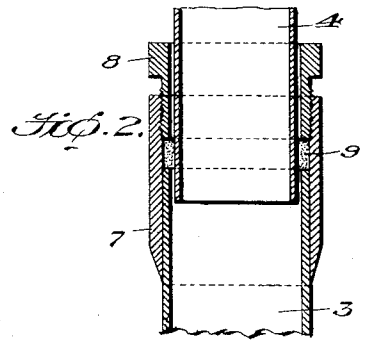


Fig. 2.

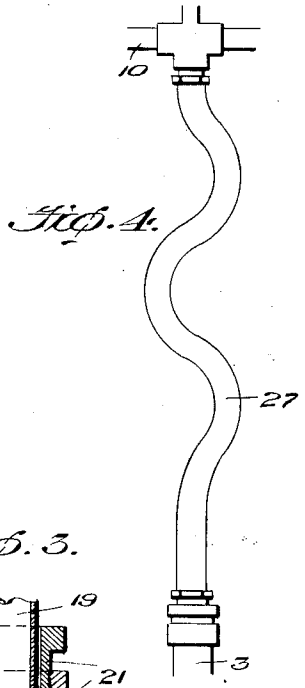


Fig. 4.

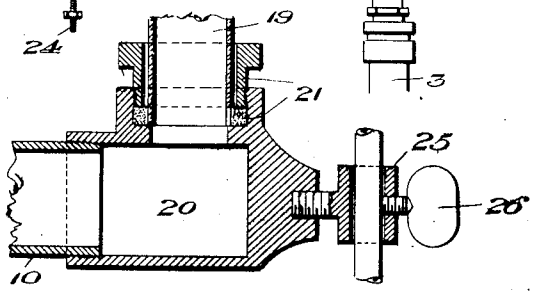


Fig. 3.

Witness

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2 SHEETS—SHEET 2.

Fig. 5.

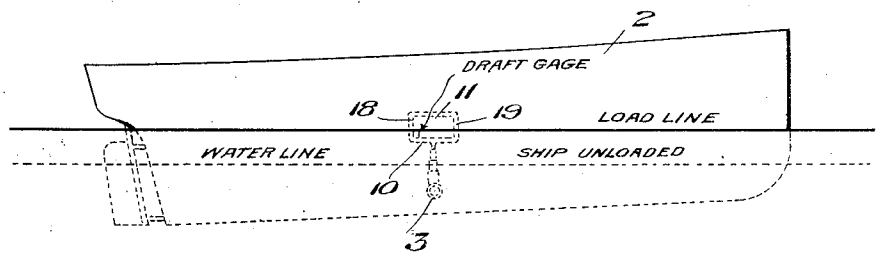


Fig. 6.

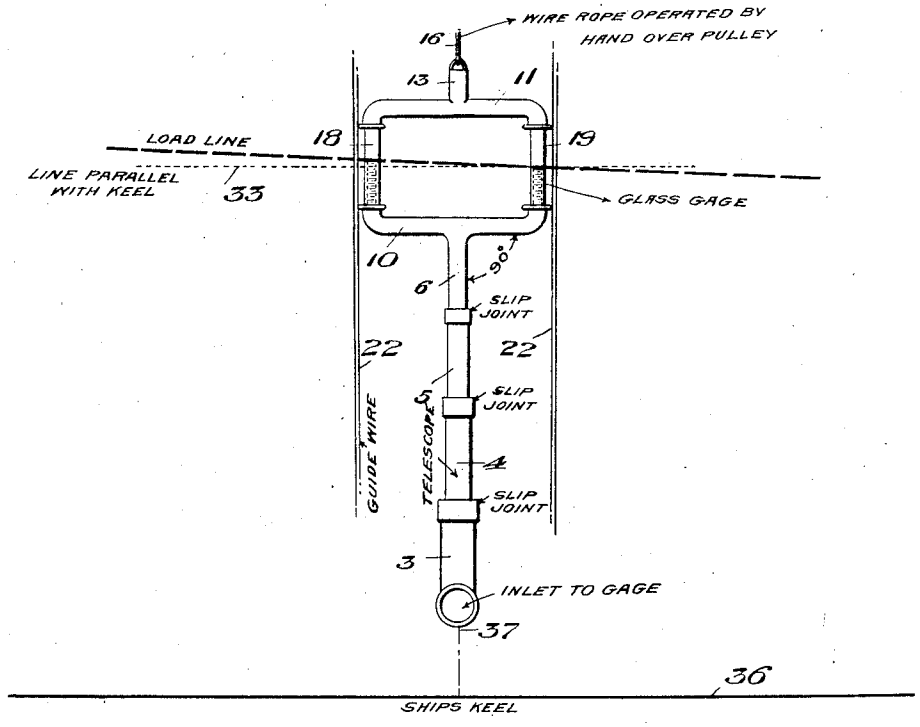
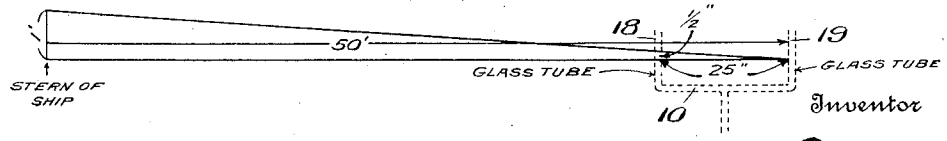


Fig. 7.



Witness

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SHIP'S DRAFT-GAGE.

1,218,525. Specification of Letters Patent. Patented Mar. 6, 1917.

Application filed February 4, 1916. Serial No. 76,133.

To all whom it may concern:

Be it known that I, JOSEPH M. COLE, a citizen of the United States, residing at New York, county of New York, and State of New York, have invented certain new and useful Improvements in Ships' Draft-Gages, of which the following is a specification.

This invention relates to ships' draft gages.

My object is to provide a gage for use on ships or other marine craft by which the draft in feet and inches, or other measurement, at the bow or stern, and hence, the mean draft, can be determined from within the ship whether at sea or in port, and by which determination may be readily made as to whether the ship is on an even keel or the keel at an angle to the water line.

My invention contemplates the provision of novel means for carrying out the foregoing objects and it consists, generally stated, in the provision of a sight gage adapted to be raised or lowered at will, a yieldable, flexible or a telescopic tube for directing the water to the sight gage in any of its different positions, a "difference scale," and a stationary scale, all combined together in a novel manner.

The invention is susceptible of modification in various respects and may be used with two sight gages and one "difference" scale, or, with two "difference" scales, according to circumstances. The invention may be modified in other respects and I do not, therefore, limit myself to those particular forms of the invention which are hereinafter described and disclosed in the accompanying drawings, as they are to be deemed only as illustrative, and not restrictive, of the invention.

In the accompanying drawings:—

Figure 1 is a front elevation, with parts broken away, showing the invention;

Fig. 2, a detail of one of the slip joints for the telescopic tube;

Fig. 3, a detail of the construction at one corner of the head frame;

Fig. 4, a detail showing the use of a flexible hose in lieu of the telescopic tube;

Figs. 5 and 6, diagrammatic views showing how the invention is used; and

Fig. 7, a diagram showing how the markings of the "difference" scales may be found.

The inlet 1 for the gage is in communication with the water outside the ship or other craft 2 (Fig. 5). A section of fixed piping 3 connects to the inlet 1 and is arranged in upright position, into which the sections 4, 5, 6 of the telescopic water supply tube, telescope. The slip joints for the different sections may be of the construction shown in Fig. 2, as provided with an external sleeve 7 connected to a gland 8 and provided with packing 9. Carried by the uppermost telescopic section 6 are laterally extending metal tubes 10 and 11 which constitute a head frame connected by a metal binding rod 12. A tubular upper extension 13 is provided with an air vent 14 and has a bail 15 to which is connected a cable or flexible lifting device 16 running over a suitable pulley 17 and operated by a windlass or by hand in any desired manner for the purpose of raising or lowering the head frame 10, 11 and the telescopic tubes 4, 5, 6. Glass sight gages 18 and 19 are seated at their upper and lower ends in the fittings 20 in the manner shown in Fig. 3, being suitably packed by packing and glands 21. The head frame with the glass sight tubes move as a unit when the gage is raised and lowered by operating the cable 16. Located conveniently adjacent the head frame is a valve 1^a for controlling the flow of water to the gages 18 and 19.

Guide wires or rods 22 which are suitably secured to the ship 2 at their upper and lower ends by the eye-bolts or other devices 23 and 24, run through the guide loops or arms 25 which are carried by the fittings 20, certain ones of which may be provided with clamping screws 26 for the purpose of securing the head frame and sight gages to the guide rods or wires 22 to hold the gage in any desired position when it has been adjusted by operating the cable 16.

In substitution for the telescopic tube sections 4, 5, 6, I may provide a flexible pipe or hose 27, as shown in Fig. 4 having an ordinary hose coupling to the pipe 3 and frame 10.

A metallic sight disk 28 lies within the space circumscribed by the parts 10, 11, 18 and 19 and in the general plane thereof, this disk being fastened to the rod 12 at 29 so that it also moves as a unit with the head frame and the glass sight tubes. The central portion of the disk 28 is provided with a sight opening 30, and centrally of the height of the complete head frame is an index mark or graduation 31. Immediately back of the movable parts previously de-

scribed, is a vertically arranged scale 32 which is secured in a stationary position in the vessel or other craft 2 and is marked in actual feet and inches to indicate the different drafts possible between the maximum and minimum drafts the ship may have. The indication 31 reads directly on the scale 32. The disk 28 has its edges which are adjacent the sight tubes 18 and 19 provided with a zero or normal graduation or marking 33 in line with the marking 31. Above and below the line 33 are graduations 34 and 35 which constitute "difference" scales which read in feet and inches to indicate, for the bow and stern, respectively, the variation from an even keel.

The cross tube 11 is provided with the vent tube 13 so that if the gage at any time is in a position below the water line and the controlling valve (not shown) is open, there will be no overflowing at the upper ends of the glass tubes, but it will be apparent that this cross-connection could be dispensed with and the pull of the cable 16 made direct on the lower cross tube 10. The vent 14 allows escape of air when the gage is filling with water.

The guides 22 should be arranged so that the general extent of the upright feed pipe of the gage and the sight gages 18 and 19 should be exactly at right-angles to the keel 36, as shown by the dot and dash line 37 in Fig. 6, so that the zero or normal graduation or marking 33 will always be parallel to the keel 36, Fig. 6.

In operating the gage, the cable 16 is raised or lowered until the top of the column of water in one of the sight tubes 18, 19, coincides with the zero line 33. The clamp screws 26 may then be tightened and observation made of the position of the top of the column of water in the other glass tube or gage. If it is opposite the zero line 33, it is then clear that the ship rests on an even keel since the zero line 33 is parallel with the keel 36, Fig. 6. The draft may then be read directly from the draft board or scale 32 according to the position of the indication 31 in relation thereto. However, if the top of the column of water is above or below the zero line 33, then the "difference" scale 34, 35, will indicate, in connection with the top of the column of water, the difference in draft in feet and inches between the point where the gage is located and the end of the ship, bow or stern, to which the particular sight tube 18 or 19 refers. The indication on the "difference" scale may be added or subtracted according to whether the scale is the "plus" or the "minus" part on which the indication is read, such addition or subtraction in relation to the reading of the index 31 on the draft board or scale 32 giving the draft of the ship at the bow or stern, as the case may be.

The graduations on the "difference" scales may be determined according to the ratio existing between the distance the gage is located from the stern or bow of the ship and the distance between the sight tubes 18 and 19, as illustrated in the diagram in Fig. 7 in connection with which it may be assumed that the right-hand sight tube 19 is located fifty feet from the stern of the ship and the distance between the sight tubes 18 and 19 is twenty-five inches. The calculation would then be made as follows:

$$1:50::X:25$$

or,

$$X=\frac{25}{50}=\frac{1}{2}\text{ in.}$$

Therefore, if the glass sight tubes 18 and 19 are twenty-five inches apart and the sight gage 19 is located fifty feet from the stern, one-half inch on the stern "difference" scale will represent one foot draft at the stern.

The gage may, consequently, be located at any convenient point of the length of the vessel, but if it is not located exactly intermediate the bow and stern, it is necessary to figure out two separate sightings of the graduations at the right and left of the disk 28 for the "difference" scales 34, 35. If, however, the gage is located exactly halfway between the stern and the bow, it is only necessary to provide one "difference" scale. On the other hand, both "difference" scales may be used in connection with one of the glass tubes and in that event, only one sighting of the gage, for the purpose of obtaining both bow and stern readings, is necessary.

I wish it understood, therefore, that the invention is not limited to the use of two sets of "difference" scales. Furthermore, the parts 11, 13 and 14 could be omitted and the sight tubes 18 and 19 merely projected up freely from the fittings 20 on the lower cross tube 10. It is not necessary to employ the precise form of slip joint shown in Fig. 2, nor the construction shown in Fig. 3. Either the flexible hose 27 of Fig. 4, or the telescopic tubes of Fig. 1 may be used.

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

1. A ship's draft gage comprising a main draft scale, a pair of sight tubes adapted to be raised and lowered in relation to said scale for reading of the draft in connection with the water columns in the sight tubes, a difference scale movable with the sight tubes for reading in connection with the water column in the sight tubes, and a pipe or tube adapted to communicate with the water outside the ship for admitting water to the sight tubes, said sight tubes being spaced

apart, whereby the difference in level of the water columns therein, in connection with the location of the tubes on the ship, will indicate the difference in draft at different points of the ship.

2. A ship's draft gage comprising a main draft scale, a pair of sight tubes adapted to be raised and lowered as a unit in relation to said scale for reading of the draft in connection with the water columns in said sight tubes, and a pipe or tube adapted to communicate with the water outside the ship for admitting water to the pair of sight tubes, said sight tubes being spaced apart, whereby the difference in level of the water columns therein, in connection with the location of the tubes on the ship, will indicate the difference in draft at different points of the ship.

3. A ship's draft gage comprising a main draft scale, a pair of sight tubes adapted to be raised and lowered as a unit in relation to said scale for reading of the draft in connection with the water columns in said sight tubes, draft difference scales movable with the respective sight tubes for reading in connection with the water columns in said sight tubes, and a pipe or tube adapted to communicate with the water outside the ship for admitting water to the sight tubes, said sight tubes being spaced apart, whereby the difference in level of the water columns therein, in connection with the location of the tubes on the ship, will indicate the difference in draft at different points of the ship.

4. A ship's draft gage comprising a primary draft scale, a pair of sight tubes, upper and lower cross pipes or tubes connecting said sight tubes at their upper and lower parts, thus constituting a unit adapted to be raised and lowered in relation to the primary draft scale, draft difference scales respectively disposed adjacent the sight tubes and movable up and down with them for direct reading in connection with the water columns thereof, means carried by said unit adapted for direct reading on the primary scale aforesaid, and a pipe or tube adapted to communicate with the water outside the ship for admitting water to the pair of sight tubes, said sight tubes being spaced apart, whereby the difference in level of the water columns therein, in connection with the location of the tubes on the ship, will indicate the difference in draft at different points of the ship.

5. A ship's draft gage comprising a primary draft scale, a pair of sight tubes, upper and lower cross pipes or tubes connecting said sight tubes at their upper and lower parts, thus constituting a unit adapted to be raised and lowered in relation to the primary draft scale, an upright cross rod connecting the upper and lower cross tubes, an apertured disk carried by said unit, said cross rod and disk having "zero" markings for reading on the primary scale and the columns of water in the sight tubes, draft "difference" scales on the disk disposed adjacent the respective sight tubes for reading in connection with the water columns thereof, and a pipe or tube adapted to communicate with the water outside the ship, having a controlling valve, adapted for admitting water to the sight tubes, said sight tubes being spaced apart, whereby the difference in level of the water columns therein, in connection with the location of the tubes on the ship, will indicate the difference in draft at different points of the ship.

6. A ship's draft gage comprising a main draft scale, a pair of sight tubes adapted to be raised and lowered as a unit in relation to said draft scale for reading of the draft in connection with the water columns in said sight tubes, a pipe or tube adapted to communicate with the water outside the ship for admitting water to the pair of sight tubes, and a controlling valve for said pipe or tube, said sight tubes being spaced apart, whereby the difference in level of the water columns therein, in connection with the location of the tubes on the ship, will indicate the difference in draft at different points of the ship.

In testimony whereof, I hereunto affix my signature.

JOSEPH M. COLE.