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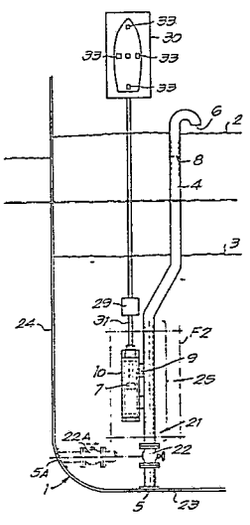
(54) Device for the draught measurement of vessels.

(57) The device mainly consists in a tube (4) which ends in the water at its lower end through the hull (1) of the vessel and shows a bleed opening (6) on its top end and a measuring device (7) located below the lowest occurring water line (3) for the measurement of the water level (8) within the tube 4), where the measuring device (7) is installed independently of the tube (4) and is connected with latter by means of a duct (9)

Fig. 1



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Description

Device for the draught measurement of vessels

Present invention pertains to a device for the draught measurement of vessels.

In order to load and unload ships in a safe way, one must carefully pay attention that the ship does reach or not exceed the (specified) draughts.

To check the draught of a ship, it is known that Plimsoll lines are drafted on the ship's hull. However, it is quite difficult to make a correct reading of the draught from the ship's deck. Moreover, such a reading is often hampered by the wave beating and swell on the water whereby a precision reading becomes completely impossible.

In order to define a ship's draught, the use of draught meters is also known. Several of such draught meters can be placed around the complete ship, while their readings occur on a single control panel, in such way that the ship's stability can be monitored during loading and unloading of same.

The known draught meters consist of a tube placed vertically whose bottom opening is placed into the water and which is equipped with a bleed opening on top. It is evident that a water column is created within the tube whose level reflects the local draught of the ship and where the height of the water column is proportional to the draught. Locating a measuring device for water pressure measurement, which is connected with a control panel or similar, at the bottom of the tube, more particularly below the lowest occurring level, and which in this way produces a signal proportional with the height of aforementioned water column or thus with the draught, is also known.

Whenever a swell or wave beating occurs, which undoubtedly is the case in sea harbours, the draught varies and of course the level within aforementioned tube, resulting in the impracticability to obtain a correct reading on the control panel. This disadvantage can theoretically be easily solved by performing multiple readings over an appropriate period of time and to report the average thereof. Notwithstanding this possibility it has been established that the known draught meters report an incorrect value when levels fluctuate, for instance as a result of swell or wave beating. This incorrect measurement value arises as a result of flow phenomena which occur in aforementioned tube, and more particularly around the measuring devices installed therein. Variances in level within the tube make indeed the water column move up and down. More so during the downward movements of the water, suction effects originate around the pressure sensitive measuring device resulting in an incorrect reading.

Present invention pertains to a device for the draught measurement of vessels which does not show the aforementioned disadvantage. For this purpose present device mainly consists in a tube which exits underneath the water level and showing a bleed opening on top and a measuring device placed below the lowest occurring water line for the measurement of the water level inside the tube, where the measuring device is installed separately with respect to the tube and which is connected with latter by means of a duct. As the measuring device is not placed in aforementioned tube, it is not susceptible to flow phenomena and an accurate measurement is achieved.

In a preferential embodiment of the device according to the invention the measuring device is fitted in a housing which, by means of aforementioned duct, preferably directed horizontally and ending at the top end of the housing, connected with the tube in which the water can rise.

In a particular embodiment a membrane has been installed in the duct while the space behind the membrane, in other words in the housing, is filled with a non corrosive liquid. In this way the advantage arises that the housing in which the measuring device is housed, and the measuring device as such, cannot be polluted and cannot be affected by corrosion, for instance by salt water.

Other advantages of the device according to the invention will appear from further descriptions.

For more clarification in better showing the characteristics according to the invention, some preferable embodiments are described hereafter as a non restrictive illustration, with reference to the enclosed drawings, in which :

figure 1 is a schematic representation of the device according to the invention ;

figure 2 represents a cross section of the part indicated with F2 in figure 1 ;

figure 3 represents a variant of the part of the device indicated with F3 in figure 2 ;

Figure 1 schematically represents the hull 1 of a vessel, as well as the highest possible and lowest possible occurring water lines, respectively 2 and 3. The device according to the invention herewith mainly consists in a tube 4 which at the bottom by means of an opening 5 in the hull 1 ends in the water and on top, obviously above the highest water line 2, showing a bleed opening 6 and, placed below the lowest occurring water line 3, a measuring device 7 for the measurement of the water level 8 within the tube 4, where the measuring device 7 is installed independently of the tube 4 and is connected with latter by means of a duct 9 or similar.

As schematically shown in figure 1, the measuring device 7 is placed in a housing 10, which is connected by means of aforementioned duct 9 with tube 4. In this way the advantage arises that the measuring device 7 is completely safeguarded from flow phenomena which could occur due to water movements in tube 4.

As shown in figure 2, the housing 10 mainly consists in, a cylinder 12 located at a small distance from tube 4 and affixed to it by means of connecting pieces 11, which is closed at both ends by means of removable elements, such as screw caps 13 and 14 which are equipped with sealing rings 15 and 16. The measuring device 7 preferably is a part of a body 17 which is installed at the centre in the housing 10 and which is kept in location by the tightening of

aforementioned elements 13 and 14, where possible use can be made of tightening parts 18, elastic or not. The use of removable elements 13 and 14 allows for easy installation and removal of the body 17 and of the measuring device 7, for instance in the case that latter have to be cleaned or repaired.

As shown as well in figure 2, aforementioned duct 9 is located horizontally and ends exactly at the top of the housing 10, in such way that air entrapment in the housing 10 is virtually impossible. Nevertheless, at the same time a bleeding opening 20 which may be shut off can possibly be installed in the area 19 enclosed by the housing 10. At the time the device is being operated or, in other words when the tube 4 and the housing 10 are being filled with water the bleeding opening 20 can serve to let the air escape from the housing 10.

As the device has to resist to the effects of salt water, which in some cases is polluted as well, the housing 10 will preferably be manufactured in corrosion resistant material, for instance out of bronze.

As shown in figure 1, a valve or sea cock 22 is installed, between the bottom end 21 of the tube 4 and the opening 5, with which the tube 4 can be closed at the bottom. The sea cock 22 is located immediately next to the admission opening 5. The admission opening 5 can be located either in the keel plate 23, as shown with a full line, or at the bottom of the sidewall 24, as shown with a dashed line bearing reference 5A.

Preferably, the housing 10 and the tube 4 part 25 located next to it are manufactured as a removable unit, where the concerned part 25 of the tube 4 shows connection means at both ends, which, for instance, consist respectively of screw thread 26 for the fastening of the remaining part of the tube 4 and a flange 27 which allows installation on a standard flange of a sea cock 22.

It is obvious that independently of present invention various kinds of measuring devices 7 can be considered. Preferably, a pressure sensitive measuring device 7 is utilized, which is located in the body 17 and which is exposed to the water pressure within the housing 10 by means of an opening 28. The measuring device 7 can, for instance, consist in a strain gauge, a pressure sensitive electric or electronic component or similar, which is connected electrically by means of a connection box 29 to signal processing and display equipment 30. The electric connection of the pressure sensitive measuring device 7 is preferably led outside of the housing 10 by means of a polyurethane coated cable 31. This cable 31 passes through the screw cap 14 for which the required sealing means 32 are provided.

To the equipment 30, it is obvious that different devices according to the invention can be connected which report respective draughts at different locations on the vessel. The draught display preferably happens by means of digital elements 33. Equipment 30 contains as such known electronic circuits in order to define the draught's average within short intervals, in order that a stable reading in metres, decimetres, centimetres and if necessary millimetres becomes possible.

Equipment 30 can of course also be equipped with an electronic circuit and a measuring device, developed in function of the density or salt content of the water that is in the tube 4 and/or surrounds the vessel.

In a particular embodiment of present invention a membrane 34 is placed between the tube 4 and the measuring device 7, preferably in duct 9, as shown in figure 3. This eliminates the building up of dirt in the housing 10 and on the measuring device 7 which can cause erroneous measurement readings. The water pressure of the water column is of course transferred by the membrane 34.

Preferably, the space 19 behind the membrane 34 is being filled with a clean, non corrosive liquid, in such way that the measuring device 7 cannot be affected. This liquid can, for instance, be pure water or fluid glycerine.

Finally, it is to be noted as well that the flow aperture of aforementioned duct 9 is preferably being chosen as being considerably smaller than the flow aperture of tube 4.

While a vessel is not moving the device according to the invention can produce measurement values on draught with an accuracy of ± 0,1 % on the entire draught scale.

Present invention is in no way restricted to the embodiments shown as examples and represented in the figures, but such devices for the draught measurement of vessels can be realized in all kinds of forms and dimensions without leaving the scope of present invention.

Claims

1.- Device for the draught measurement of vessels, characterized in that it mainly consists in a tube (4) which ends in the water at its lower end through the hull (1) of the vessel and shows a bleed opening (6) on its top end and a measuring device (7) located below the lowest occurring water line (3) for the measurement of the water level (8) within the tube (4), where the measuring device (7) is installed independently of the tube (4) and is connected with latter by means of a duct (9)

2.- Device according to claim 1, characterized in that the measuring device (7) is located in a housing (10), which is connected by means of aforementioned duct (9) with aforementioned tube (4).

3.- Device according to claim 2, characterized in that the duct (9) is horizontal.

4.- Device according to claim 2 or 3, characterized in that the duct (9) ends in the top end of the housing (10).

5.- Device according to one of the claims 2, 3 or 4, characterized in that the top of the housing (10) possesses a bleeding opening (20) which may be shut off.

6.- Device according to one of the aforementioned claims, characterized in that between the tube (4) and the measuring device (7) a

membrane (34) is installed.

7.- Device according to claim 6, characterized in that the space (19) behind the membrane (34), in other words, in which the measuring device (7) is located, is filled with a pure, non corrosive liquid.

8.- Device according to one of claims 6 or 7, characterized in that the membrane (34) is installed in the duct (9).

9.- Device according to one of the claims 2 through 8, characterized in that the housing (10) mainly consists in a cylinder, in which at least one extremity is closed by a removable element (14-13) and in which the measuring device (7) is a part of a body (17) that is installed centrally in the housing (10) and is maintained in location by the screwing on of the removable element, respectively the removable elements (14-13).

10.- Device according to one of the claims 2 through 9, characterized in that the housing (10) is made out of bronze.

11.- Device according to one of the aforementioned claims, characterized in that the measuring device (7) consist in a pressure sensitive electric or electronic component, whose electric connection occurs up to the outside of the housing (10) by means of a cable (31) coated with polyurethane, and by which the measuring device (7) is connected with the signal processing and display equipment (30).

12.- Device according to one of the claims 2 through 11, characterized in that the housing (10) is affixed at a small distance of tube (4) by means of connecting pieces (11).

13.- Device according to claim 12, characterized in that the housing (10) and the part (25) of the tube (4) located next to it are manufactured as removable unit, in which the concerned part (25) of the tube (4) shows connection means (26-27) at both extremities.

14.- Device according to one of aforementioned claims, characterized in that the flow aperture of the duct (9) is considerably smaller than the flow aperture of the tube (4) in which the water can rise.

Fig.1

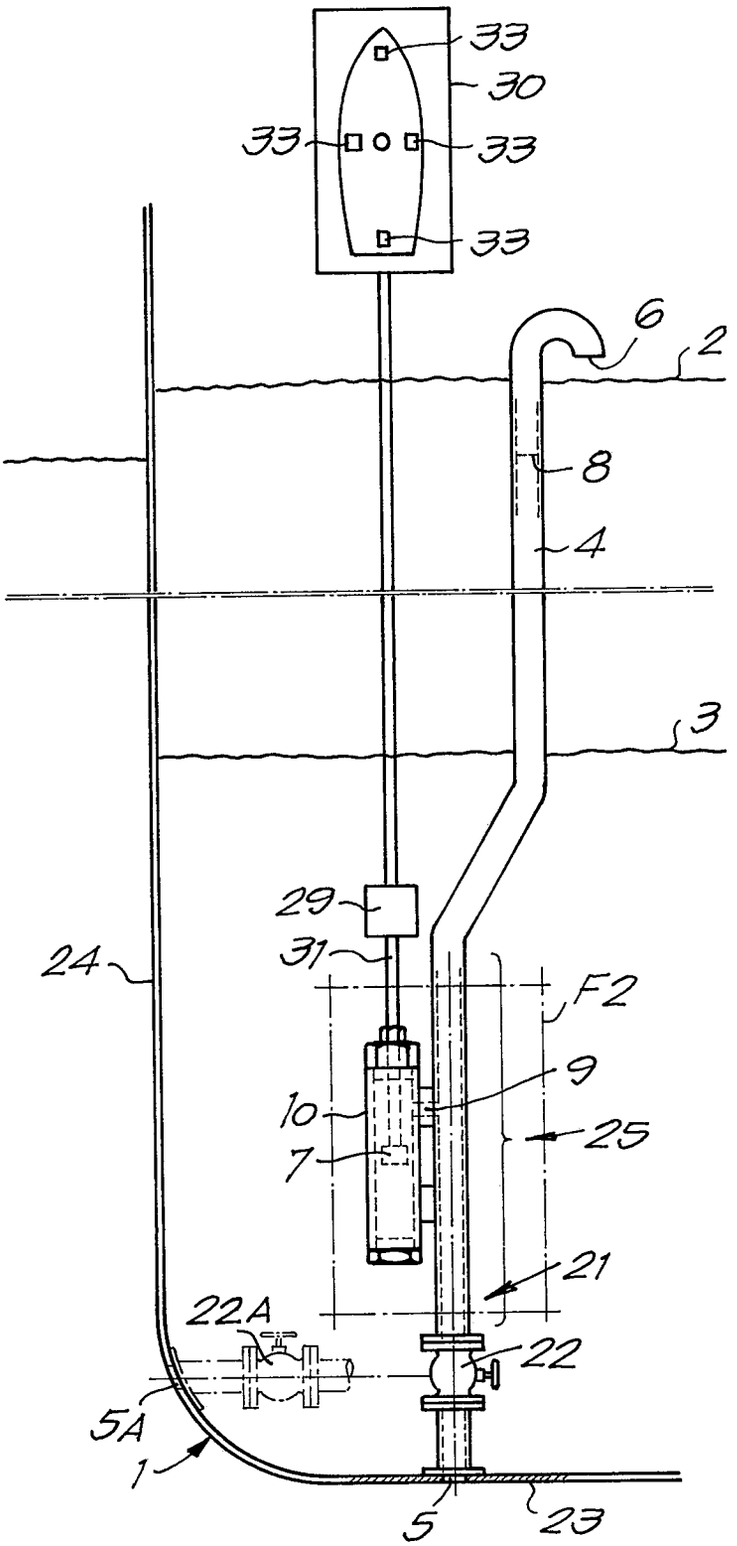
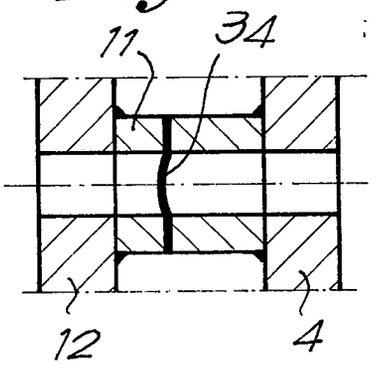


Fig.3



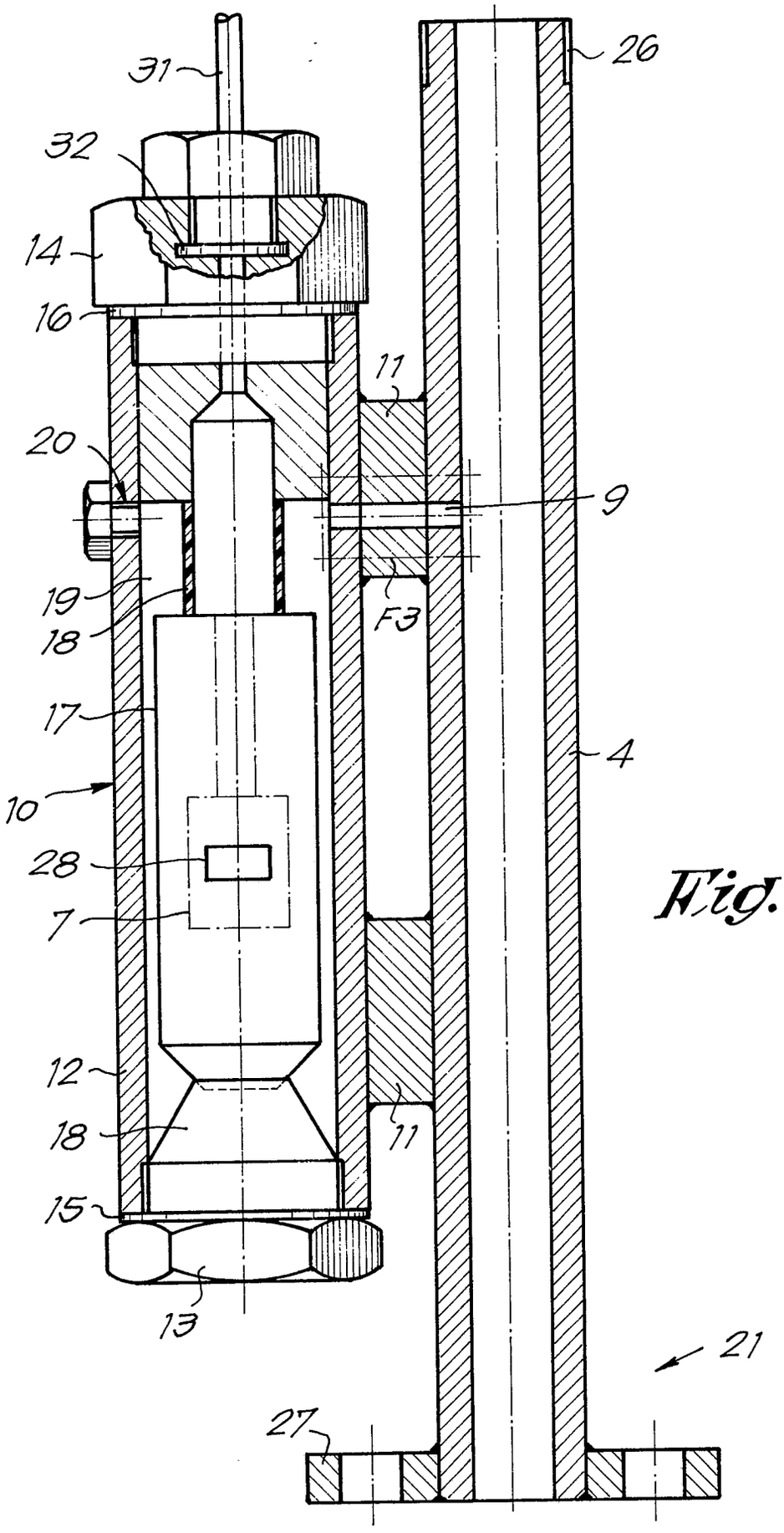


Fig. 2

European Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 89 87 0007

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
A	GB-A- 189 991 (ALEXANDER) * Page 2, lines 70-79; figure 7 *	1	B 63 B 39/12
A	US-A-4 432 238 (TWARD) * Whole document *	1,2,3,5,6,7,8,9,12	
A	GB-A- 183 719 (MERRITT)		
A	NL-A- 13 684 (FROGER)		
A	GB-A- 759 355 (MALONE)		
A	EP-A-0 114 089 (CAUS)		

TECHNICAL FIELDS SEARCHED (Int. Cl.4)

B 63 B
G 01 F 23/18

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	12-04-1989	DE SCHEPPER H.P.H.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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A : technological background
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