Jan. 19, 1937. V. H. GODFREY 2,067,914

SALINOMETER

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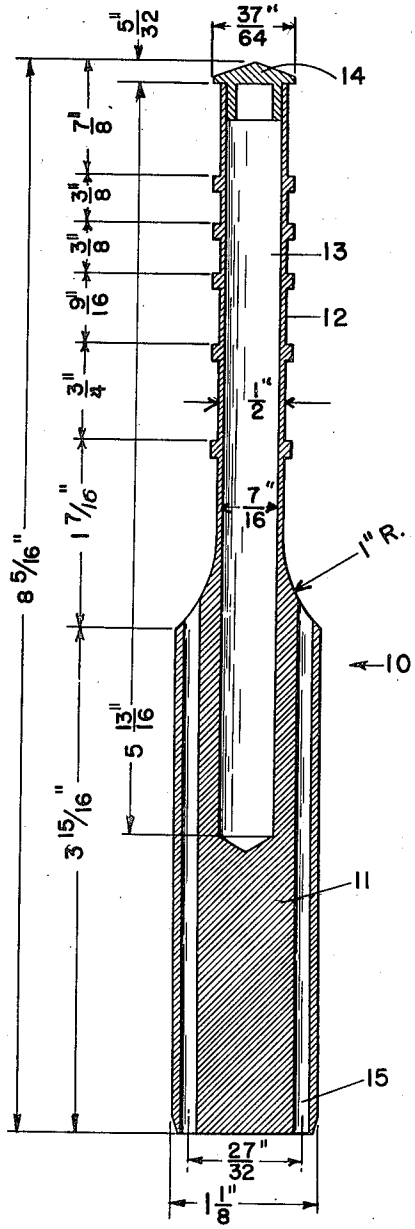



FIG. 1

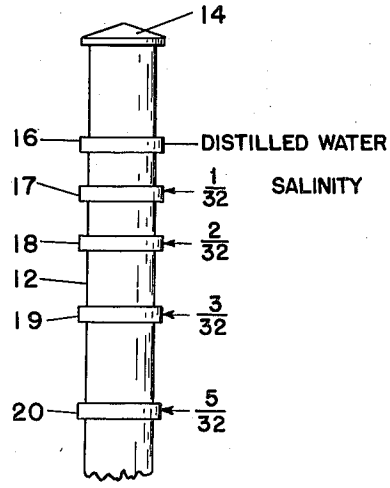



FIG. 2

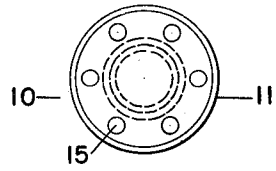



FIG. 3

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## SALINOMETER

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3 Claims. (Cl. 265—45)

(Granted under the act of March 3, 1883, as amended April 30, 1928; 370 O. G. 757)

This invention relates to a salinometer and has for an object an improved salinometer of non-shatterable material especially intended for determining the salinity of evaporator water.

It has been discovered that hydrometers and salinometers of the prior art are variably inaccurate. Such inaccuracy is due to the fact that the materials and forms in which the same have heretofore been constructed have a coefficient of expansion substantially different from that of the liquid whose characteristics they are designed and employed to indicate.

A further object of this invention is an improved salinometer of a formed material whose coefficient of expansion changes with temperature at substantially the same rate as that of 2/32 salinity water so that the change in temperature will not affect the accuracy of the salinometer.

A further object of this invention is an improved salinometer which may be used in waters of varying degrees of salinity from that of pure distilled water to that of 5/32 salinity and is especially intended for use in evaporators such as used for distilling pure water from sea water. In evaporation of this nature the water temperature may vary from 60 to 180 degrees and the salinity may vary from zero up to as high as 5/32 salinity.

A further object of this invention is an improved single salinometer which can be used under these various conditions, taking the place of the plurality of salinometers previously necessary under these various conditions.

With the foregoing and other objects in view, this invention comprises the construction, arrangement and features hereinafter disclosed, claimed, and illustrated on the accompanying drawing wherein:

Fig. 1 is a vertical sectional view through my improved salinometer;

Fig. 2 is an elevational view of the upper stem of the salinometer; and

Fig. 3 is a bottom plan view of Fig. 1.

As will be apparent, the value of a salinometer depends upon its accuracy, and the more nearly a salinometer has the same coefficient of expansion as that of water of the average salinity with which it is to be used, the more accurate it will be. It has been found that a salinometer made according to the following directions has substantially the same coefficient of expansion as water of 2/32 salinity through a range up to 180 degrees Fahrenheit.

The salinometer shown at **10**, is preferably made from a hard rubber rod, 1⅛ inches in diameter, and having a weight of 5½ pounds per linear foot. The salinometer **10** has a body **11**, $3\frac{15}{16}$'' long of the full diameter of the rod joined to stem **12** whose diameter has been reduced to ½ inch. Stem **12** is hollowed out as at **13** to a diameter of $\frac{7}{16}$ inch and this hollowed portion extends into the body from the end of the stem for a total distance of $5\frac{13}{16}$ inches, as shown in the drawing. The entire length of the salinometer is $8\frac{5}{16}$ inches. The hollowed end of the stem is closed by a stopper **14**, 37/64'' wide preferably made of the same material.

In order to secure relative stability with further lightness in the salinometer, the body **11** is provided with six equally spaced holes **15** of about ⅛ inch in diameter. Situated along the stem **12** are a plurality of division marks, **16**, **17**, **18**, **19** and **20**, these division marks being spaced along the stem preferably at the dimensions shown in Fig. 1. It has been found that the salinometer made up of this material according to the dimensions shown on the drawing has a coefficient of expansion substantially equal to that of water up to a range of 180 degrees, which is the limit desired for use in evaporator water. The salinometer will sink into distilled water to the division mark **16**. The division mark **17** shows that the water has $\frac{1}{32}$ salinity; the division mark **18** shows 2/32 of salinity; the division mark **19** shows $\frac{3}{32}$ of salinity; the division mark **20** shows $\frac{5}{32}$ of salinity, furthermore, the salinometer becomes unstable and turns over at this division mark **20**, showing that the evaporator water has reached the maximum allowable salinity and should be discarded.

The combination of the material employed and the dimensions shown in the drawing above referred to have been found by actual experiment to produce a salinometer having the desired characteristics of being non-frangible and of reading accurately through various degrees of salinity of water, from distilled water to $\frac{5}{32}$, irrespective of temperature variations up to 180 degrees Fahrenheit; that is, this salinometer has a coefficient of expansion substantially equal to that of water with these various degrees of salinity up to this maximum temperature point. It is therefore possible with this salinometer to determine the salinity of evaporator water throughout the maximum range of salinity allowed and throughout the maximum range of temperature variations, eliminating the necessity for using different salinometers for different temperature ranges.

While the salinometer of this invention is not to be considered to be confined to the exact

dimensions above disclosed and shown on the drawing, it has been found that a salinometer made according to these dimensions or to proportions corresponding to these dimensions does perform the desired function satisfactorily. It will be understood, however, that the dimensions and even the proportions may be varied within reasonable limits without affecting the operation of the invention and further that the size of the salinometer may be varied to much greater limits if desired so long as substantially the same proportions are retained.

The holes **15** assist in providing stability of the base or body **11** until the salinity of the water has reached $\frac{5}{32}$, at which point the salinometer overturns. If the holes **15** were omitted and the same amount of material were used in the base, it is obvious that the stability of the salinometer would be affected so as to cause it to overturn at a lesser degree of salinity, while on the other hand, if the base were enlarged at the diameter and larger holes placed therein so as to increase the stability with the same amount of material, then the salinometer would be more stable and would not overturn until a higher degree of salinity were present.

The invention herein described may be manufactured and used by or for the Government of the United States of America for governmental purposes without the payment of any royalties thereon.

What is claimed is:

1. A salinometer made solely of non-frangible material of the same density throughout having substantially the same coefficient of expansion as the liquid in which it is to be used, said salinometer comprising a base portion and a stem portion extending from said base portion and a hollow extending through said stem portion partly into said base portion, a plurality of spaced division marks on said stem portion, the diameter of said base portion being greater than double the diameter of said stem portion.

2. A salinometer made solely of non-frangible material of the same density throughout having substantially the same coefficient of expansion as the liquid in which it is to be used, said salinometer comprising a base portion and a stem portion extending from said base portion and a hollow extending through said stem portion partly into said base portion, a plurality of spaced division marks on said stem portion, the diameter of said base portion being greater than double the diameter of said stem portion, there being a plurality of apertures extending through said base portion.

3. A salinometer made solely of hard rubber of uniform density for use in testing evaporator water, said salinometer comprising a rod-like member including a base portion and a reduced stem portion extending from said base portion, the diameter of said reduced stem portion being less than one-half the diameter of said base portion, a hollow extending through said stem portion and partly through said base portion, a plurality of spaced division marks encircling said stem portion and there being a plurality of stabilizing apertures in said base portion.

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