

J. W. GILLIE.
ARTIFICIAL HORIZON.
APPLICATION FILED OCT. 30, 1908.

971,189.

Patented Sept. 27, 1910.

2 SHEETS—SHEET 1.

Fig. 2.

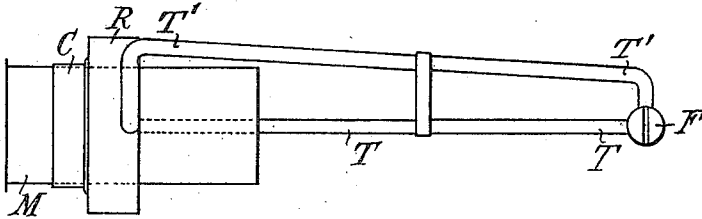


Fig. 1.

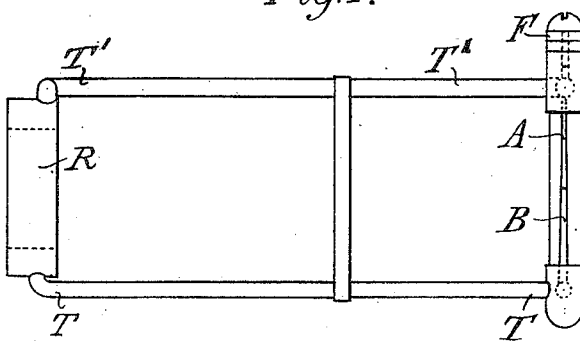
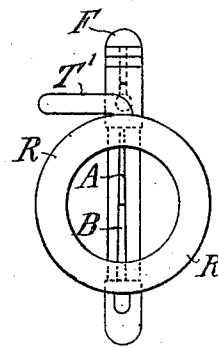


Fig. 3.



Witnesses:
L. E. Barkley
C. G. Gibbs

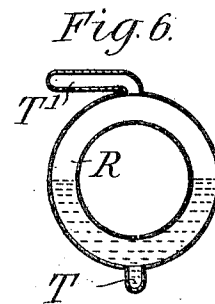
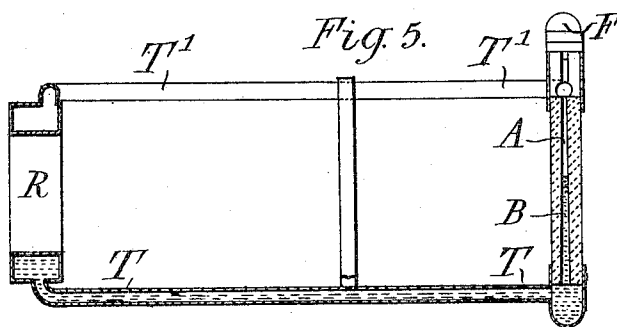
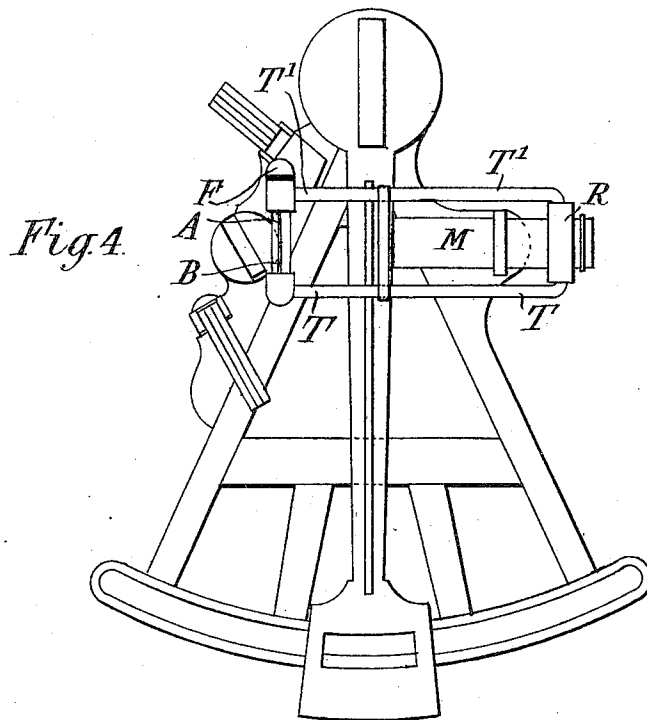
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John Wilson Gillie
By Francis Appelman
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2 SHEETS—SHEET 2.



Witnesses:
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UNITED STATES PATENT OFFICE.

JOHN WILSON GILLIE, OF NORTH SHIELDS, ENGLAND.

ARTIFICIAL HORIZON.

971,189.

Specification of Letters Patent. Patented Sept. 27, 1910.

Application filed October 30, 1908. Serial No. 460,278.

To all whom it may concern:

Be it known that I, JOHN WILSON GILLIE, a subject of the King of the United Kingdom of Great Britain and Ireland, residing at the New Quay, North Shields, Northumberland, England, have invented a new and useful Improved Artificial Horizon, of which the following is a specification.

Many forms of levels both pendulum and liquid have been tried in the attempt to construct an artificial horizon which will give accurate results at sea hitherto without success, owing frequently to the momentum of moving parts and the necessity of noting the altitude of the celestial body at the instant when the pendulum or liquid level was at a center zero point, and consequently the difficulty at sea of bringing 3 lines or points into contact at the same time.

If it were possible for an observer to place himself so that his eye was in the center of the surface of a liquid undisturbed by the motion of the air or by the shape or movement of the vessel containing the liquid, then it will be readily seen that the edge of the upper surface seen by the eye would form an artificial horizon which could be used when the distant horizon was invisible owing to fog or other cause. My invention is an attempt to make this practicable. For the purpose of an artificial horizon it is unnecessary to surround the eye with liquid, it would be sufficient if the eye could occupy the center of a liquid surface which extended directly in front and directly behind the eye. It is practically impossible to construct a reservoir which would extend equally behind and before an observer, so that his eye may be in the center of the axis of the contained liquid. The same result, however may be obtained by constructing a reservoir extending in front of the observer, and increasing the apparent rise and fall of the farther edge of the liquid by capillary attraction, the absolute height of the liquid at the end of the reservoir farthest from the eye remaining the same for a small movement of the reservoir upward or downward about the eye as a center, this being a result of the aforesaid capillary attraction, resulting from the shape of the interior of the extremity of the reservoir. Without such a contrivance, a downward movement of the reservoir about the eye as center, carries the upper

surface of the liquid beneath the horizon line, and an upward movement carries the surface above the horizon line. But by approximating the interior surfaces of the reservoir farthest from the eye, where the liquid is exposed to view, the liquid surface is suspended by capillary attraction when otherwise it would be carried downward with the reservoir. The degree of inclination of the aforesaid interior surfaces and consequently the amount of the capillary attraction is such, that so far as the eye and the measurement of altitudes is concerned, the liquid surface takes the place of the distant horizon line. I now proceed to describe one method by which I accomplish this, and for this purpose I will refer to the accompanying drawings where—

Figure 1 is a side view of such an artificial horizon as I have described, Fig. 2 is a view from above and Fig. 3 is an end view such as an observer would obtain when taking an observation. Fig. 4 is a side elevation of a sextant provided with the artificial horizon shown in Figs. 1 to 3, Fig. 5 a vertical longitudinal section through the artificial horizon, and Fig. 6 a vertical transverse section through the annular compartment R.

Referring to Figs. 1 to 6 A. B. is a short glass tube with a conical bore firmly cemented into two end pieces into which the tube T. T. and T' T' run from the annular chamber R. The tubes A. B. T. T. T' T' and chamber R form one system communicating with each other, the only aperture being that closed by the filling screw F. The chamber R is annular and is made to fit tightly over the telescope tube M. The system of tubes and chamber is filled with liquid, preferably colored alcohol, so that when the lower tube is horizontal, the upper surface of the liquid stands halfway up the glass tube A. B. in which it appears magnified. The tube T' T' is an air tube and is not occupied by liquid when in use. The telescope M has a screwed collar C and may be screwed into the telescope holder of the sextant or into a suitable stand and the instrument then slid into its place with the chamber R close to the collar. The telescope M has a small pin-hole at its eye end through which the observer looks, or this may be replaced by a lens or combination of lenses the principal focus of which is situate in the tube A. B. or used in

combination with lenses used to magnify the movement of the liquid.

The method of use with a sextant for measuring the altitude of the sun or star when the real horizon is invisible is as follows. The observer takes up his position with his sextant in front of the artificial horizon with the latter in such a position that he can see the tube A. B. through the telescope pin-hole or lens, and proceeds to bring down the image of sun or star seen in the smaller mirror of his sextant until it appears to touch the liquid surface seen in A. B., using the latter in place of the real horizon. The height of the liquid can be adjusted to compensate for any error by adding liquid through the hole closed by the screw F.

I may use this device in conjunction with the sextant by attaching it to the sextant telescope by a connecting collar so that the distance between the centers of the two telescopes equals the pupillar distance of the observer, enabling the latter to view the liquid surface with one eye and the sun's image with the other, making contact by binocular vision. When used in this way, the sextant telescope should preferably be without lenses, such as is always supplied by the makers.

It is of course to be understood that in the following claims the term "telescope" covers a sighting tube either with or without lens, and that in general the combination with a telescope of an artificial horizon comprises the arrangement of the same in any operative manner, whether the horizon be mounted on the telescope or be detached from the same.

What I claim as my invention and desire to secure by Letters Patent is:—

1. The combination with a telescope of an artificial horizon comprising a U-tube having two limbs containing liquid, only one of which limbs is visible in the field of view of the telescope.

2. The combination with a telescope of an artificial horizon comprising a U-tube containing a liquid, one of the limbs of said U-tube having a tapered bore in the region where the upper surface of the liquid is situated, said tapered bore being in the field of view.

3. The combination with a telescope of an artificial horizon comprising a U-tube containing a liquid, one of the limbs of said U-tube having a tapered bore in the region where the upper surface of the liquid is situated, said tapered bore being in the field of view and the other limb being in the form of an annular chamber surrounding the telescope, and a tube interconnecting the upper portions of said two limbs.

4. The combination with a telescope of an artificial horizon comprising a U-tube having two limbs containing a liquid, one of the limbs of said U-tube being in the field of view and the other limb being in the form of an annular chamber surrounding the telescope, and a tube interconnecting the upper portions of said two limbs.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JOHN WILSON GILLIE.

Witnesses:

AMY DORA TODD,
FREDERICK ABRAHAM JOLLY.