

M. WHEELER.

SUN-DIALS.

No. 177,305.

Patented May 9. 1876.

Fig. 1.

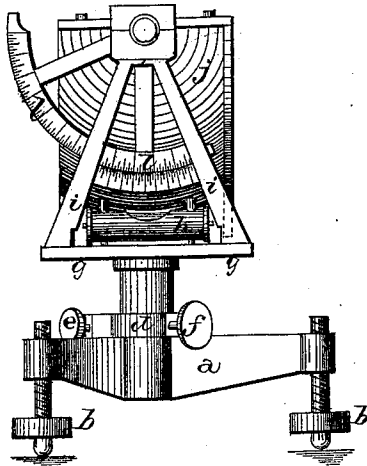


Fig. 2.

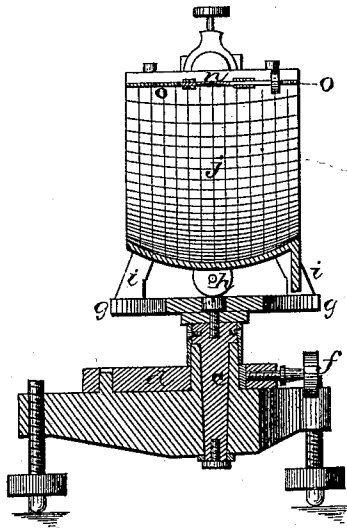
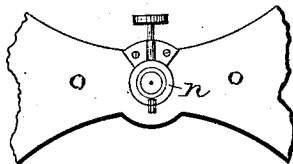


Fig. 3.



WITNESSES.

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per
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UNITED STATES PATENT OFFICE.

MARSHAL WHEELER, OF GRAND RAPIDS, MICHIGAN.

IMPROVEMENT IN SUN-DIALS.

Specification forming part of Letters Patent No. **177,305**, dated May 9, 1876; application filed April 17, 1876.

To all whom it may concern:

Be it known that I, MARSHAL WHEELER, of Grand Rapids, in the county of Kent and State of Michigan, have invented certain new and useful Improvements in Solar Chronometer; and I do hereby 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 pertains to make and use it, reference being had to the accompanying drawings, which form part of this specification.

My invention relates to an improvement in solar chronometers; and it consists in the arrangement and combination of devices that will be more fully described hereinafter, whereby the instrument is made more accurate, and the easier to read.

The accompanying drawings represent my invention.

a represents a suitable triangular frame or base, which is supported upon and adjusted by the screw-feet *b*. Passing down through this frame is the shaft *c*, upon which the whole instrument proper freely turns. Passing around this shaft is an adjusting-plate, *d*, that is provided with screws *e*, for adjusting it back and forth, and a screw, *f*, for clamping it rigidly to the shaft. Secured to the top of this shaft is a long plate, *g*, upon which are placed two levels, *h*, at right angles to each other, so as to show when the plate is perfectly level. Upon the extreme ends of this plate are placed the standards *i*, upon which the journals of the semicircle *j* rest. These journals are held in suitable boxes, so that the semicircle can turn freely through a portion of a circle, and thus accommodate itself to the rolling motion of a ship.

By thus suspending the semicircle from its center of gravity, instead of pivoting it at its lower edge, and attaching the graduated arc *l* to one of the journals, so that the arc and semicircle will move together, latitude can be read from the arc instead of a horizontal bar.

By means of the arc the declination-lines are made at equidistant spaces, rendering the construction of a vernier easy to read to any desired fraction of a degree.

The semicircle *j*, instead of being made straight in cross-section, or the segment of a cylinder, is made on a true curve, or the segment of a hemisphere, whereby all the lines drawn on its surface can be placed at equidistant spaces apart. Where the surface is flat, as in those heretofore made, these lines cannot be placed equidistant, and hence it is difficult to use a vernier in reading the sun's declination. In the center of the top plate *o* is pivoted the revolving solar plate *n*, through which is made a minute-hole, through which the sunlight passes, and falls upon the curved surface of semicircle. In this hole there may or may not be a lens.

By having this plate made movable the plate may be so turned as to throw the bead of light on any part of the semicircle, giving a full round image of the sun at all hours of the day between 6 a. m. and 6 p. m.

Having thus described my invention, I claim—

1. The semicircle *j*, having its surface made on a curve, so as to form the segment of a hemisphere, substantially as shown.

2. The revolving solar plate, in combination with the semicircle, substantially as specified.

3. In a solar chronometer, the combination of a pivot, *c*, plate *g*, standard *i*, semicircle *j*, having journals upon its ends, graduated arc, and revolving solar plate, substantially as shown and described.

In testimony that I claim the foregoing I have hereunto set my hand and seal this 6th day of April, 1876.

MARSHAL WHEELER. [L. S.]

Witnesses:

JOHN M. BUTLER,
A. G. STEINER.