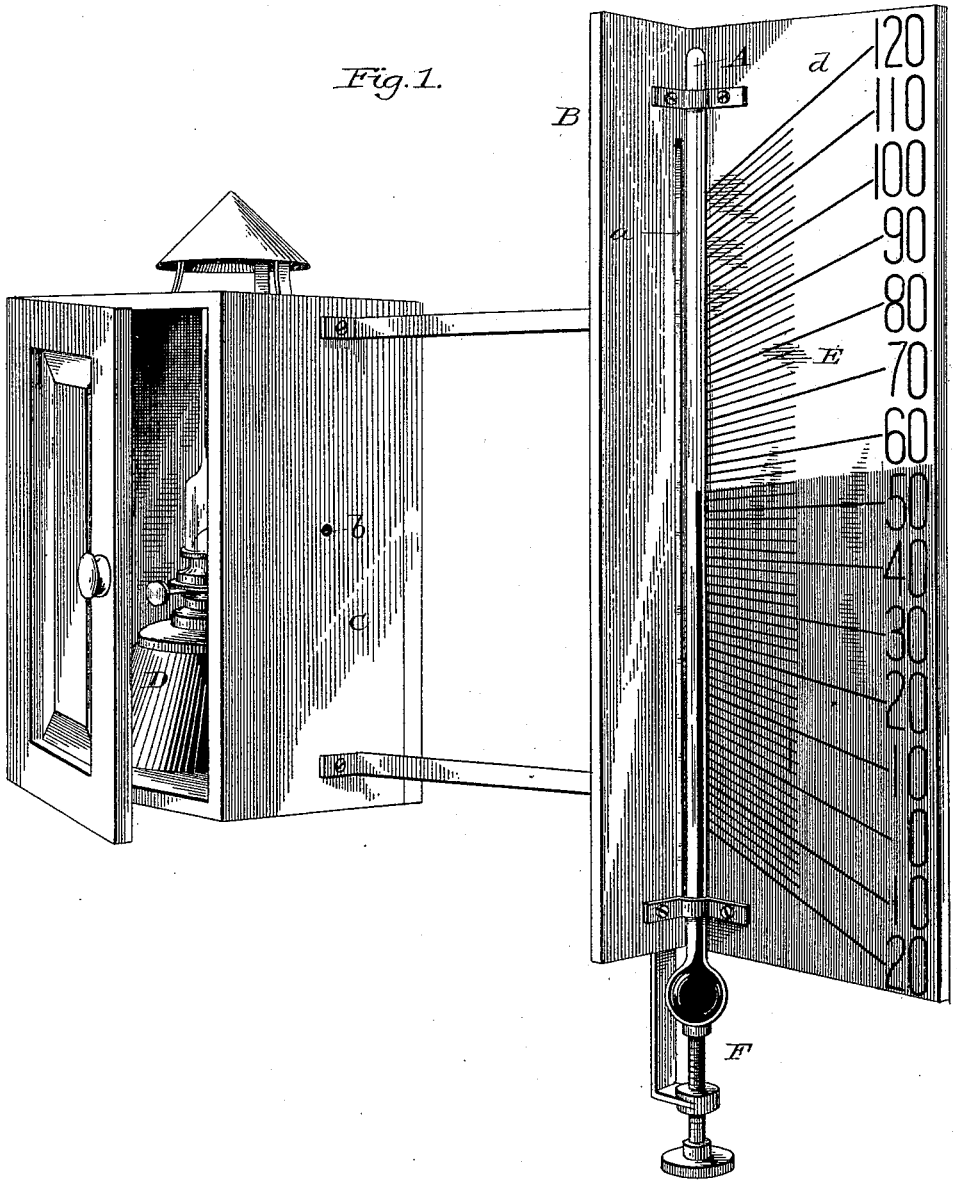
(No Model.) 3 Sheets—Sheet 1.

J. T. BRAYTON.

THERMOMETER OR LIKE INSTRUMENT.

No. 345,106. Patented July 6, 1886.

Fig. 1.



Witnesses:
James F. DuHamel
Walter D. Dodge.

Inventor:
James T. Brayton,
by Dodger Son,
his Attys.

(No Model.) 3 Sheets—Sheet 2.

J. T. BRAYTON.

THERMOMETER OR LIKE INSTRUMENT.

No. 345,106. Patented July 6, 1886.

Fig. 2.

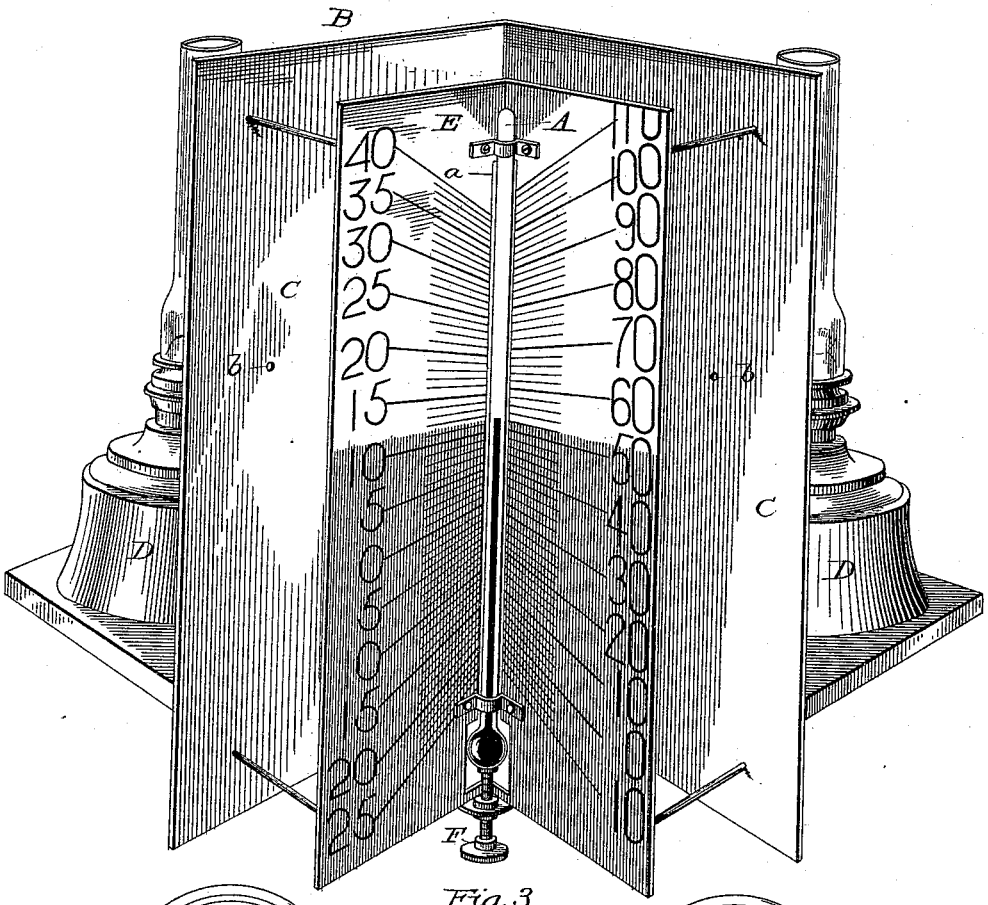
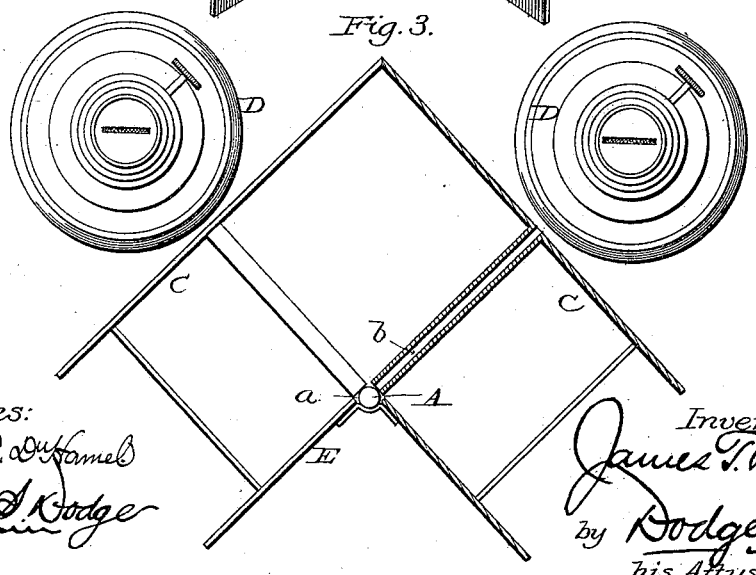


Fig. 3.



Witnesses:
James F. DeHamel
Walter D. Dodge

Inventor
James T. Brayton,
by Dodger Sun
his Attys.

(No Model.) 3 Sheets—Sheet 3.

J. T. BRAYTON.

THERMOMETER OR LIKE INSTRUMENT.

No. 345,106. Patented July 6, 1886.

Fig. 6.

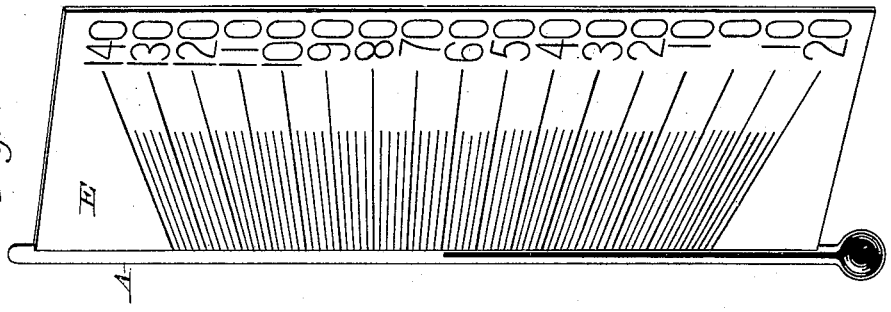


Fig. 5.

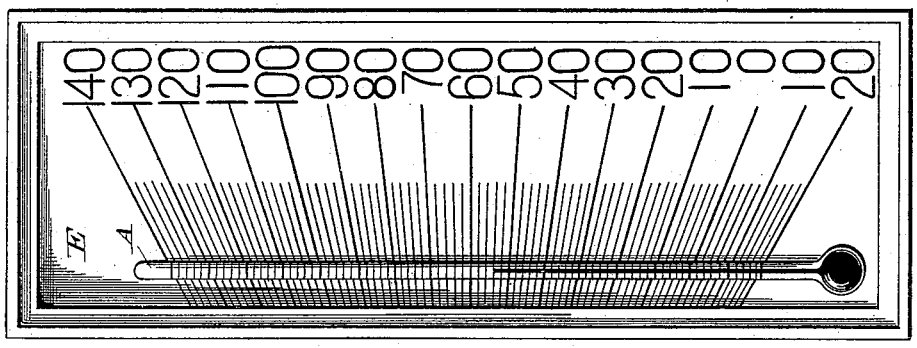
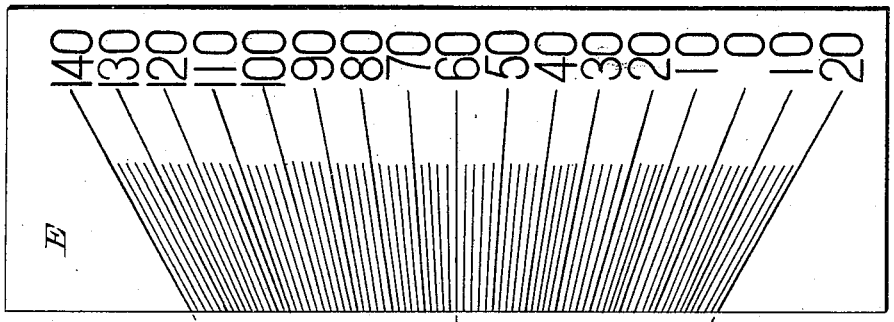


Fig. 4.



Witnesses:
James L. DuHamel
Walter S. Dodge.

Inventor:
James T. Brayton
by
his Attys.,
Dodgeson,

UNITED STATES PATENT OFFICE.

JAMES T. BRAYTON, OF GENEVA, NEW YORK, ASSIGNOR OF ONE-HALF TO SAMUEL G. HART, OF SAME PLACE.

THERMOMETER OR LIKE INSTRUMENT.

SPECIFICATION forming part of Letters Patent No. 345,106, dated July 6, 1886.

Application filed April 17, 1883. Serial No. 91,986. (No model.)

To all whom it may concern:

Be it known that I, JAMES T. BRAYTON, of Geneva, in the county of Ontario and State of New York, have invented certain Improvements in Thermometers or Like Instruments, of which the following is a specification.

My invention relates to thermometers, barometers, and other instruments in which a liquid column is employed; and it consists, first, in combining with the tube of such instrument a scale-plate having diverging lines extending from the tube to a figure-scale, more or less removed therefrom; and it consists, secondly, in combining with such tube a lamp or light-giving device adapted to throw a ray of light upon the tube and through that portion of the same not occupied by the liquid column, thus lighting one portion of the scale-plate or dial, and leaving the remaining portion in shadow, and thereby directing the eye of the observer to the figures of the scale corresponding to the point occupied by the movable end of the liquid column.

Other and minor features will also be pointed out in the following description.

The two features above explained may be combined in one instrument, or they may be separately employed—that is to say, the instrument may be so constructed that in daytime, when no artificial light is required, the eye shall be directed from the top or end of the liquid column to the corresponding point or figure on the figure-scale by the lines drawn or produced upon the scale-plate, and that at night, when the column cannot be seen without artificial light, the light of a lamp or other light-giving object may be made to pass through the tube and across the end of the column, thereby forming a line of division between the light and shadow from the end of the column to the figure-scale; or, if the device be only intended for night use, the drawn lines may be omitted from the scale-plate, because produced by the light; and if intended only for day use the lamp may be omitted, and the lines, of course, retained. It is, however, manifest that there is no necessity for omitting the lines in any case, and as they tend to increase the possible usefulness of the instrument they will preferably be supplied in all cases.

Referring now to the annexed drawings, Figure 1 is a perspective view of the invention as embodied in a thermometer for day and night use; Fig. 2, a perspective view of such an instrument with a double scale and two lamps, the arrangement being intended for showing the markings on both Fahrenheit and centigrade scales at one time; Fig. 3, a top plan view of the form shown in Fig. 2; Fig. 4, a view of the scale-plate alone; Fig. 5, a view of the scale-plate with a tube attached thereto and crossing the lines; Fig. 6, a view showing the scale with the tube applied at the edge of the scale-plate or dial.

I will first describe the instrument as constructed for use both by day and by night, referring to Fig. 1, and also to Figs. 2 and 3.

A indicates a thermometer-tube, behind which is placed a shield, B, having a slit or opening, *a*, in line with the tube, and of a width about equal to the bore thereof or to the width of the liquid column.

C indicates a screen located in rear of the shield and provided with an opening, *b*, through which light may pass from a lamp, D, or other light-giving object or device, as will be readily understood by referring to Figs. 1 and 2. Any suitable form of lamp or lighting device may be employed. The light passing through the openings *b* of the screen and through the slit or opening *a* is intercepted by the liquid column in tube A, so that the dial or surface E, on which the markings are made, is thrown in shadow below the top or moving end of the column, while the light is permitted to pass through said tube above or beyond the end of said column and to illuminate the same and that portion of the dial not thrown in shadow by the column.

From the foregoing it will readily be seen that as the liquid column lengthens or shortens the line separating the illuminated portion from the portion in shadow will vary in direct accordance with such lengthening and shortening. Lines *d*, representing the graduations or markings of the instrument, may be extended out to any desired distance, and may be thrown or produced upon a surface specifically prepared to receive them, or upon the walls of a room or building, as desired. For very large

instruments, or where it is desired to make the markings readable from a long distance, relatively speaking—as in public halls, or for street use—the surface will be made wide and the lines carried out until the divergence is sufficient to afford space for very large figures; but where the instrument is designed for use in ordinary dwellings the width and divergence of the lines and the size of the figures will be made to meet the requirements of such rooms—that is to say, the figures are to be in all cases large enough to enable them to be easily read at a distance of several feet, at least, and from that up to many feet, instead of requiring close examination of the instrument in reading it, as is the case with those now commonly in use. It will be seen that by this plan small instruments of comparatively trifling cost are adapted to be read from a greater distance than large and expensive instruments of ordinary construction.

In some cases it may be desirable to make the instrument with two scales—as centigrade and Fahrenheit—and to accomplish this object I adopt the construction illustrated in Figs. 2 and 3—that is to say, the parts shown in Fig. 1 are duplicated, except the tube A, which is here placed in the angle formed by the meeting of the two shields B B, which under this construction constitute also the dials E E, each serving as a shield for one and as a dial or scale-plate for the other of the two lamps D, which are placed as in Figs. 2 and 3.

To prevent the light from being diffused too generally about the instrument and falling upon the dials, thereby interfering with the clearness and distinctness of the dividing-line between light and shadow on the dials, each lamp is advisably inclosed, as in Fig. 1, and the effect will be still better if a narrow space leading from the hole *b* to slit *a*, and parallel with tube A, be inclosed by suitable walls.

With the instrument constructed as above set forth, either with the single or the double dial, the indications may be read in day-time without the aid of the lamp or other artificial light by simply following the line extending from the end of the column out to the figure-scale.

To provide a column which shall the more perfectly shut out the light by night, and which may be the more easily read by daylight, I preferably employ a tube having a flat bore and wide column; and for instruments having the lamp I so mount the tube that it may be turned to present the flat face of the column to the rays of the lamp by night and to the eye of the observer by day. If the lamp or other light-giving device be placed close to the tube, there is more or less liability of interference with the proper marking of the instrument, by reason of undue expansion of the liquid column. To compensate for this I provide an adjusting-screw, F, by which the tube may be moved longitudinally. The amount of expansion due to the proximity of the lamp will be accurately determined in making and setting up the instrument, and the proper positions of the tube when working with and without the lamp will be duly determined by a standard thermometer indicated on the dial or shield, and by means of the screw the tube will be adjusted to one or the other position, as required. This is, however, a precaution ordinarily unnecessary, as the lamp will usually be placed far enough away to prevent perceptible influence upon the liquid column.

When the instrument is designed only for day use, or for day use and use in lighted rooms, the lamp and shield B may be omitted, and thus the instrument will be adapted for general and ordinary use.

The dial E, Fig. 4, will, in each form of the device, be essentially as shown separately in Fig. 4 and combined with the tube in Figs. 5 and 6, the figure-lines being carried entirely across the space between the tube and figure-scale, and the intermediate lines extending a less distance, in order that the reading may be facilitated. It is important that the lines begin close to or pass under the tube in the finished instrument, because otherwise it is difficult or impossible to ascertain accurately from any considerable distance the point on the tube to which the line corresponds or from which it is supposed to start. In practice, I ordinarily use a clear tube, because said tubes are somewhat cheaper than those having an opaque background for the liquid column, and there is nothing beyond the liquid column to interfere with the passage of light through the tube under any possible adjustment of the latter, but particularly because the tube, by reason of its cylindrical or convex shape, causes the radiating lines back of the tube to appear to the eye of the observer as straight or perpendicular to the axis of the tube, thus greatly facilitating the reading of the instrument and rendering unnecessary any marks or other means of directing the eye from the radiating line to the point with which it corresponds on the tube.

At the present time it is the almost universal custom to make thermometer-tubes with a backing for the liquid column, formed by introducing into the glass, preparatory to drawing the tube, a species of white enamel, which is drawn out with the body of the tube and covers the rear side. While good results may be attained with such tubes, and while I do not limit myself to the use of tubes clear and transparent throughout, I prefer such clear tubes, because of the peculiar effect above described in presenting the lines to the eye of the observer. If preferred, however, the tube may be placed against the edge of the scale, as in Fig. 6. The dials or scale-plates have the lines all radiating from a common center, as more clearly indicated in Fig. 4, and hence the same dial or plate may be used for any one of a large number of tubes of varying range. If the movement of the liquid for given change of temperature be slight, the tube is placed closer to the center of radiation; or, if the

movement be more considerable, the tube is set farther from such center and where the spaces are wider. In this manner I avoid the necessity in making a specially divided or graduated dial or plate for each tube. After finding the proper line for the location of the tube, said tube may be placed upon the dial; or the portion thereof containing the smaller spaces may be cut off and the tube placed against the edge of the scale or dial, as in Fig. 6. The graduation-lines or the figures, or both, may be made with luminous paint, so as to facilitate their being read at night.

Having thus described my invention, what I claim is—

1. In combination with tube A, shield B, provided with slit *a*, screen C, provided with opening *d*, dial E, having graduations radiating from the opening *b*, and lamp D, substantially as shown.

2. In combination with tube A, the shields B B, meeting each other at an angle, and each provided with a slit, *a*, screens C C, each provided with an opening, *b*, lamps D D, located in rear of the screens, and dials E on opposite sides of the tube, graduated according to different systems of measurement.

3. The combination, in a thermometer or like instrument, of a vertical liquid-tube and a graduated plate, to which the tube is secured, having diverging lines leading from said tube to an enlarged figure-scale printed or otherwise produced upon the plate at the wider end of the spaces between the graduation-lines.

4. The combination, in a thermometer or like instrument, of a liquid-tube and a plate having diverging lines extending from points at the tube corresponding to different degrees to corresponding points in an enlarged figure-scale at a distance from the tube.

5. In combination with a scale-plate having diverging lines, a liquid-tube made of clear glass without contrasting background for the column, said tube crossing the diverging lines of the scale-plate, and serving, by refraction of the light, to present said lines to the eye of the observer substantially perpendicular to the axis of the tube where the tube crosses them, as explained.

JAMES T. BRAYTON.

Witnesses:
D. B. BACKENSTON,
HYLAND C. KIRK.