

G. H. LEE.
HYGROMETER FOR INCUBATORS.
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934,409.

Patented Sept. 14, 1909.

Fig. 1

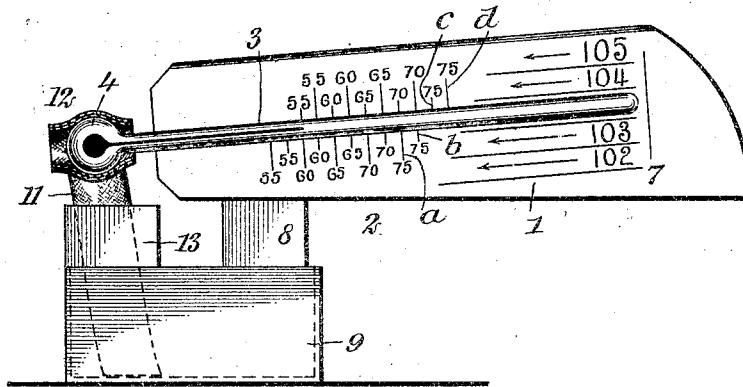


Fig. 3

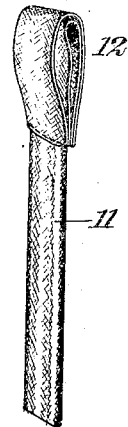
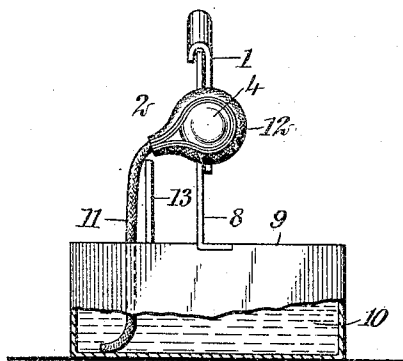


Fig. 2



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GEORGE HOWARD LEE, OF OMAHA, NEBRASKA.

HYGROMETER FOR INCUBATORS.

934,409.

Specification of Letters Patent. Patented Sept. 14, 1909.

Application filed June 3, 1908. Serial No. 438,410.

To all whom it may concern:

Be it known that I, GEORGE HOWARD LEE, a citizen of the United States, and a resident of Omaha, in the county of Douglas and State of Nebraska, have invented a new and Improved Hygrometer for Incubators, of which the following is a full, clear, and exact description.

This invention relates to hygrometers, and the object of the invention is to produce a hygrometer which will have a high degree of accuracy.

More particularly the invention relates to hygrometers known as "wet bulb" hygrometers, and the invention provides improved means for holding the evaporating fluid around the bulb. As such hygrometers are usually constructed, a simple wick is wrapped tightly around the bulb, and the end of the wick depends into a reservoir. Such hygrometers have the disadvantage that small particles of solid matter are left in the fibers of the wick around the bulb of the thermometer as the evaporation takes place, and these particles of solid matter clog the interstices and fibers of the wick material, so as to render them less absorbent; in this way the amount of evaporation becomes much reduced and the accuracy of the instrument is in consequence much impaired. By my invention I provide an improved means for securing the wick to the bulb, the efficiency of which cannot be readily impaired, and the construction of which enables the wick to be readily detached and removed when desired.

The invention also resides in the scale of the hygrometer which especially adapts it for use in an incubator.

The invention consists in the construction and combination of parts to be more fully described hereinafter and particularly set forth in the claims.

Reference is to be had to the accompanying drawings forming a part of this specification in which similar characters of reference indicate corresponding parts in all the figures.

Figure 1 is a side elevation of a hygrometer constructed according to my invention, a portion of the device being shown in cross section; Fig. 2 is an end elevation viewed from the left of Fig. 1, certain parts being broken away and shown in cross section; and Fig. 3 is a perspective of the wick

or capillary member which raises the liquid from the reservoir to the thermometer bulb where the evaporation takes place.

Referring more particularly to the parts, 1 represents the shield or face plate of the thermometer 2, having a tube 3 and a bulb 4 at the end thereof and projecting from the face plate or shield 1, as shown. The face plate of the thermometer is provided with a scale indicating percentages of atmospheric saturation. The division lines *a, b, c, d*, of this scale are formed on both sides of the tube and are alternately long and short, as indicated. Furthermore, the scale is formed so that a long division mark on one side of the tube lies opposite to a short division mark on the opposite side of the tube. In placing the numbers on the scale, the same number is given to four divisions beginning at the bottom and progressing upwardly and toward the right so that in reading the scale, the lowermost row (*a*) will be understood to correspond to the 102° temperature on a dry-bulb reading, the next one above (*b*) will correspond with the 103° temperature and so on. In taking the reading of the thermometer as illustrated in Fig. 1, if the incubator temperature were 103°, the hygrometer reading would be 57½; if at a temperature of 104°, then the hygrometer reading would be 55 and so forth.

The thermometer 2 is supported by a suitable bracket 8 above a small tank or reservoir 9 containing a liquid 10, such as water. In this water a capillary member, such as a wick 11, depends, and the upper end of this wick is attached to a sleeve 12. This sleeve is made of two folds of silk, or similar material, which folds are not attached together, but are simply placed one over the other, as shown. In this way an inner sleeve and an enveloping outer sleeve is formed. The ends of the sleeve are open so that the sleeve is adapted to be slipped over the bulb of the thermometer, as indicated most clearly in Fig. 1. The upper part of the reservoir 9 is provided with a guard plate or shield 13, over which the wick 11 passes so as to hold the sleeve 12 in an inclined position. This guard or shield operates to protect the bulb 4 from changes of temperature which might be due to evaporation taking place in the body of the wick, so that the temperature at the bulb due to evaporation is affected only by the evaporation that takes place in the

sleeve itself. The sleeve is preferably formed of silk which is doubled into a loop so that the ends may be stitched to the wick. After the sleeve is applied to the bulb as indicated, evidently the space between the two layers of the material forming the sleeve acts in a capillary manner so as to draw up the water from the wick, and forms as it were, a thin film of water enveloping the bulb and constantly evaporating. In this way I depend not so much upon the capillarity of the fibers of which the sleeve is formed, as I depend upon the capillary action of the narrow space between the two layers. This gives a constant quantity of evaporating water at the bulb and is little affected by the deposit of solid particles in the fibers of the layers which form the sleeve. The wick may be readily removed from the thermometer bulb so as to enable its sleeve to be readily cleaned. The cleaning of the sleeve is much facilitated by reason of the fact that its layers are not attached together except at their point of connection with the wick body.

Special attention is called to the fact that the sleeve is slipped lightly into place; it does not fit tightly and hence the pressure upon the bulb does not tend to detract from the capillarity of the sleeve. Also, both ends of the sleeve are open. The fact that the sleeve is open at its ends in no way interferes with the hygrometric action of the thermometer, for the air within the ends of the sleeve becomes thoroughly cooled and transmits its temperature to the uncovered parts of the bulb. The fact that the sleeve is not attached by bindings or similar devices to the bulb, is advantageous as it enables the bulb to be readily removed for cleaning or when a new wick is to be substituted for an old one.

Having thus described my invention, I claim as new and desire to secure by Letters Patent,—

1. A wet bulb hygrometer comprising a thermometer having a bulb, in combination with a capillary member adapted to conduct a liquid to said bulb, and having a sleeve with its axis disposed laterally to said capillary member, said sleeve being open at both

ends and adapted to be slipped over said bulb.

2. A wet bulb hygrometer comprising a thermometer having a bulb, in combination with a wick having a sleeve attached thereto and formed of layers of material, said sleeve being adapted to receive said bulb, and being open at both ends, said layers forming a capillary space therebetween.

3. A wick for a wet bulb thermometer, having a capillary body, and a sleeve adapted to envelop the thermometer bulb formed of superposed layers of material, said layers forming a capillary space in said sleeve.

4. A wet bulb hygrometer comprising a thermometer having a bulb, in combination with a wick having a sleeve attached to the upper end thereof, said sleeve being formed of two layers and adapted to be thrust over said bulb and maintained thereupon, said layers forming a capillary space surrounding said bulb.

5. A wet bulb hygrometer adapted to be used in incubators, having a thermometer tube, a scale along said tube indicating degrees of saturation, said scale having series of division lines, disposed in sections displaced from alinement with each other longitudinally of said tube, said sections of said division lines corresponding to different dry bulb thermometer temperatures of the incubator.

6. A hygrometer for incubators having a thermometer tube and a face plate, said face plate having a scale thereupon disposed on each side of said tube, said scale having a series of consecutively numbered division lines, each of said division lines being formed of sections offset from each other longitudinally with respect to said tube, and numbers opposite the said section lines and indicating different respective dry-bulb thermometer temperatures.

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

GEORGE HOWARD LEE.

Witnesses:

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