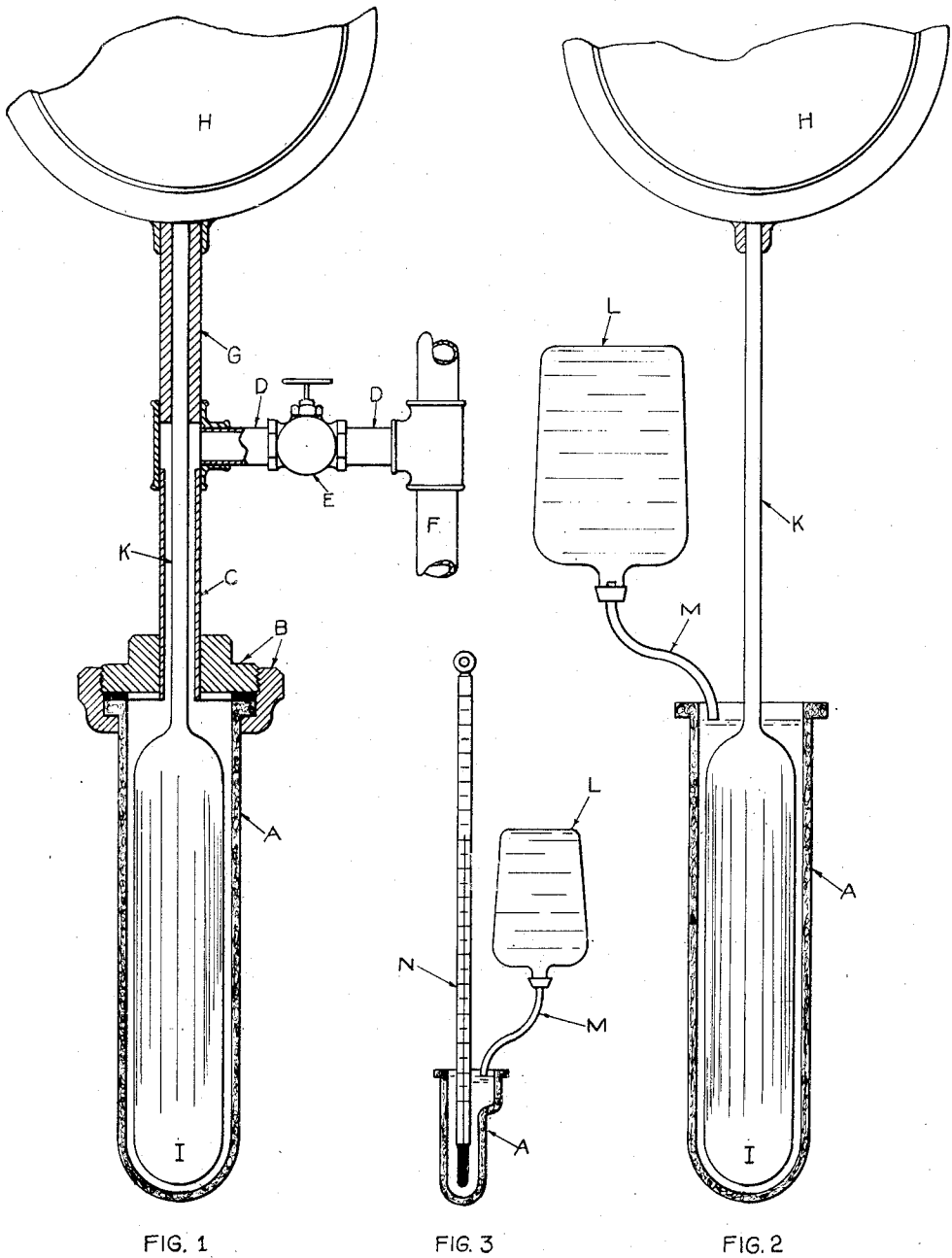


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A. HERMANN ET AL
HYGROMETER

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1,484,129



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UNITED STATES PATENT OFFICE.

ALBERT HERMANN, OF MADISON, WISCONSIN, AND CARL A. MENZEL, OF CHICAGO, ILLINOIS, DEDICATED, BY MESNE ASSIGNMENTS, TO THE PEOPLE OF THE UNITED STATES OF AMERICA.

HYGROMETER.

Application filed March 17, 1923. Serial No. 625,870.

(FILED UNDER THE ACT OF MARCH 3, 1883, 22 STAT. L., 625.)

To all whom it may concern:

Be it known that we, ALBERT HERMANN and CARL A. MENZEL, citizens of the United States of America, and respectively an employee of the Department of Agriculture of the United States of America and a former employee of the Department of Agriculture of the United States of America, residing, respectively, in Madison, Wisconsin, and Chicago, Illinois (whose post-office addresses are, respectively, Forest Products Laboratory, Madison, Wisconsin, and 7812 Normal Avenue, Chicago, Illinois), have invented a new and useful Hygrometer.

This application is made under the act of March 3, 1883, chapter 143 (22 Stat., 625), and the invention herein described and claimed may be used by the Government of the United States, its officers and employees, and by any person in the United States without payment to us of any royalty thereon. We hereby dedicate the same to the free use of the Government and the people of the United States.

This invention consists of a new and useful apparatus for producing and maintaining the psychometric wet bulb temperature in and surrounding the temperature-sensitive elements of instruments which indicate, record, control or regulate temperature through the action of temperature-sensitive elements placed directly in the atmosphere whose temperature is to be measured or humidity controlled. It is well known that a wet surface exposed to a current of air will be cooled to a definite temperature, known as the wet bulb temperature. The amount of cooling (the wet bulb depression) depends upon the amount of humidity in the atmosphere and the humidity can be determined, through the use of tables or formulæ, when the actual or dry bulb temperature and the wet bulb temperature are known. Wet bulb thermometers and thermostats are commonly used for the measurement and control of humidity, there being several means employed for keeping the bulbs or temperature-sensitive elements wet. The most common of these is the wet wick. This wick is usually a piece of cloth or a knitted tube of fibrous hygroscopic material surrounding the temperature-sensitive element and dipping into a water reservoir mounted directly under the

temperature-sensitive element. The wick is kept wet by capillary action so long as the water reservoir is kept supplied and the wick remains reasonably clean. It is found difficult, in practice, to meet both of these requirements and practically impossible, in the case of extension tube recording thermometers and thermostats, to devise a satisfactory portable reservoir and wick arrangement.

In the present invention, a porous receptacle replaces the customary wick and special arrangements are provided for the water supply. This receptacle may be of fibrous or non-fibrous material, with or without hygroscopic properties. It is well known that water contained in porous earthenware vessels set in a breeze will become cooled to a temperature below that of the surrounding atmosphere. This effect is produced by the evaporation of small quantities of water which seep through the porous walls of the vessels. The amount of cooling depends upon the strength of the breeze, the porosity of the vessel and the humidity of the surrounding atmosphere.

Experiments have shown that, using porous receptacles of alundum and an office fan to produce air movement, it is possible to reduce the temperature of the porous receptacle and the water in it accurately to the wet bulb temperature of the surrounding atmosphere. A considerable excess of water dripping from the bottom of the porous receptacle does not interfere with the accuracy of the method. In the practical application of this invention the temperature-sensitive element of the thermometer or thermostat of whatever type is inserted in the porous receptacle which is kept filled with water to a specified level in any convenient manner or is supplied, in certain types, with water under pressure.

In the accompanying drawings, illustrating our invention and its application, Figure 1 shows the adaptation of the invention to an extension tube thermometer or thermostat with pressure water supply; Figure 2 shows the adaptation of the invention to an extension tube thermometer or thermostat with an open-top porous receptacle and vacuum water supply; and Figure 3 shows the adaptation of the invention to a glass indicating thermometer. Similar letters

refer to similar parts throughout the three figures.

In Figure 1, A is the porous receptacle, which may be of earthenware, alundum, carborundum, emery, or other suitable material; B is a packing gland making a water-tight joint between the porous receptacle A and the outside tube C; C is a flexible water-tight conduit through which water is supplied to the porous receptacle A; this conduit acts as a protecting armor or sheath for the capillary extension tube K; both conduit and tube may be of any convenient length, usually from 10 to 100 feet. D is a pipe connecting the conduit C with the water main F; E is a valve in the pipe D, adapted to regulate and control the supply of water to the conduit C; F is the water main or supply line which supplies water at suitable pressure to the pipe D; G is a fitting permitting the capillary extension tube K to pass into the instrument case H and preventing the passage of water from the pipe D or the conduit C into the instrument case A; H is the case of the instrument, which may be either thermostat or thermometer of suitable design; K is the capillary tube connecting the instrument case H with the temperature-sensitive element I; I is the temperature-sensitive bulb the variations in whose temperature actuate the mechanism of the instrument. This temperature-sensitive element may be filled with gas, vapor, mercury, or other suitable substance, or may be of the differential expansion type or other well-known type. K is the capillary extension tube connecting the temperature-sensitive element I with the case H of the instrument. The mechanism within the case H may be of any type used with

indicating and recording thermometers, or self-contained or auxiliary-operated thermostats or humidity regulators, various types of which are in common use. It may likewise be an instrument which both indicates or records temperature and regulates humidity.

In Figure 2, A, H, I, and K are similar to similarly lettered parts in Figure 1. L is a water bottle and M a tube fitted into the water bottle with its lower end extending into the porous receptacle A. This arrangement automatically keeps the water level at the lower end of tube M so long as any water remains in the water bottle L.

In Figure 3, A, L and M are similar to similarly lettered parts in Figure 2. N is a glass indicating thermometer of any one of the usual types.

Having described and illustrated our invention and its application, we claim:

1. A wet-bulb thermometer consisting of a receptacle having porous rigid walls, a thermometer whose temperature-sensitive element is mounted within and spaced from the walls of said receptacle and means associated with said receptacle and adapted at all times to maintain a body of liquid between said element and said porous receptacle.

2. A wet-bulb extension tube thermometer consisting of a receptacle having porous rigid walls, a conduit adapted to supply liquid to said receptacle, and an extension tube thermometer whose temperature-sensitive element is mounted in said porous receptacle and whose extension tube is contained within said conduit.

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