where G = the pounds of water evaporated per sq. ft. per hr.;
e_w = the vapor pressure in inches of mercury corresponding to the temperature of the water;
e_a = the vapor pressure of the moisture in the air;
V = the longitudinal velocity of the air in feet per minute;
r = the latent heat of evaporation.

The way the air current is applied to the surface will make a very marked difference in the coefficient of velocity.

A similar determination, although based entirely on wet bulb temperatures of the water was made by B. H. Coffey and George A. Horne (see Fig. 5). The results of these experiments were presented before The American Society of Refrigerating Engineers in 1917. The surface which they used was not a flat horizontal surface and this accounted for their getting somewhat different values from those of the writer. The writer's data, however, were most certainly well verified by the large number of tests made and the wide ranges of temperature of water used. The test was also made in air in which the temeprature and humidity were automatically regulated to a constant artificial condition. This gives very good data for calculating the rates of evaporation from a free water surface with known humidity and velocity conditions of the air, and from porous materials which contain moisture in excess the maximum hygroscopic moisture content.

The above data may also be made to apply to the calculation of the rate of removal of hygroscopic moisture from material, providing that the vapor pressure corresponding to the moisture content of the material and to its temperature is known. The temperature of the wet material will remain practically at the wet bulb temperature until all of the free moisture is evaporated; then its temperature will gradually rise until the vapor pressure in the material corresponding to the vapor pressure in the surrounding air and the material is at the same temperature as the dry bulb temperature of the surrounding air.

Curve I on Fig. 6 indicates the temperature of the material of known hygroscopic quality, namely cotton, at different percentages of moisture content and subjected to a current of air having a dry bulb temperature of 100 deg. and an observed wet bulb temperature of 70 deg., with a corresponding dew point of 52.9 deg. and a vapor pressure corresponding to its moisture content of 0.4033 in. of mercury. This shows how the temperature of the material rises as the material loses its moisture content and the vapor pressure of the moisture in the material approaches the vapor pressure in the air. It is this tendency of vapor pressures to equalize that permits of

uniform drying of dense and thick materials, such as wood, pottery, etc. As the evaporation from the materials falls off to a small point owing to the free moisture from the surface having been removed, the temperature of the material tends to rise to the dry bulb temperature; then the vapor pressure of the free moisture inside the material tends to approach the vapor pressure corresponding to the dry bulb temperature of the air, which is very much higher than the

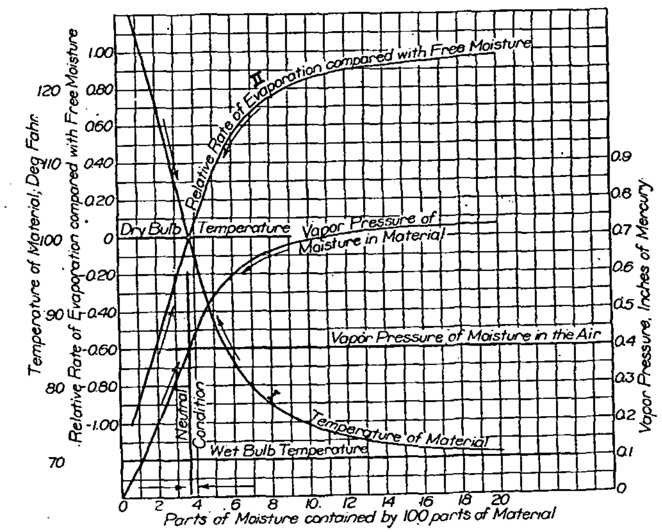

FIG. 6. EFFECT OF MOISTURE CONTENT UPON THE TEMPERATURE AND RATE OF DRYING OF MATERIAL

For American Cotton with air temperature of 100 deg. fahr. (dry bulb) and 70 deg. fahr. (wet bulb)

vapor pressure corresponding to the dew point or even than the vapor pressure corresponding to the wet bulb temperature. This is an actual pressure difference producing diffusion of water vapor and tending to re-establish the equalization of vapor pressures within and without the material.

It will be found by referring to high pressure psychrometric charts, such as those which have been prepared by the writer, that the differences of vapor pressures corresponding to dry bulb temperatures and to dew points respectively, increase very rapidly with the temperature with constant relative humidities so that the rate of diffusion of moisture through dense materials goes on many times as