equipment, in which air is passed through humidifiers or air washers where the water is recirculated and not heated, and it explains the seemingly remarkable effects sometimes produced. For example, in this climate it is sometimes possible to introduce humidified air into a room as much as 25 deg. cooler than the outside air, and maintain the room temperature approximately 15 deg. cooler than the outside dry bulb temperature, or 10 deg. above the outside wet bulb temperature; while in the excessively dry and hot climates of New Mexico and Arizona, where the wet bulb temperature often reaches 40 deg. fahr., telephone exchanges have been cooled in this manner as much as 25 deg. below the outside temperature without any refrigeration. In our cooler and moister Northern climates, however, in buildings, such as offices, restaurants, etc., where relatively small amounts of heat are liberated, the employment of this method of cooling by evaporation with air washers and humidifiers does not work out very satisfactorily. There will be occasional days, however, in summer even in these climates where great benefit will be procured in such buildings by this method of cooling. In all industrial establishments where high humidities are required or where considerable heat is liberated, the beneficial effects secured by this method of cooling are indisputable.

The same phenomenon of a constant wet bulb temperature with a dry bulb temperature dropping toward the wet bulb as the air absorbs moisture is beautifully illustrated in progressive fan system dryers. Here the air is introduced dry and hot at one end and comes out cool and moist at the other end of the drying tunnel. The wet bulb temperature will be found practically the same at all parts of the tunnel except for leakage or cooling by radiation through the tunnel walls.

The wet bulb temperature, or the temperature of evaporation, is thus seen to be a very definite physical quantity. It depends upon the ability of a definite weight of air to give up heat required for the evaporation of sufficient moisture to saturate its space at the temperature to which it is finally reduced in cooling. The difference between the wet and dry bulb temperatures of the air under any given barometric pressure is evidently an exact measure of what is commonly called the ability of the air to "absorb moisture," or more exactly, its ability to cause the evaporation of moisture into the space which the air occupies. It must always be kept clearly in mind that air does not "absorb moisture" as a sponge absorbs water, or through any chemical affinity, but only associates itself with water vapor purely as a gaseous mixture, the water vapor occupying exactly the same space as though there were no air present. The air will, however, occupy under a constant barometric pressure a slightly greater space than before, owing to the fact that it exerts a partial pressure which is less than the total or barometric pressure. The partial air pressure is reduced by an amount exactly equal to the increase of vapor pressure and the volume occupied by a given weight of air is therefore increased in an inverse proportion. This amount of increase, however, is very small at ordinary temperatures, since the possible vapor pressure under atmospheric conditions never exceeds 3 per cent of the total barometric pressure. Under artificial conditions, however, such as in drying and conditioning chambers at high temperatures, this may be several times the above amount.

When air is cooled solely by evaporation of moisture, it has been shown by theory and proven by experiment that the wet bulb temperature does not change appreciably. Conversely, any change in the wet bulb temperature would indicate a change in heat content. (By the heat content, or total heat of the air, we mean the sensible heat in the air due to its temperature above some standard, as 0 deg. fahr., together with the latent and sensible heat of the associated water vapor, but omitting the heat of the liquid, which may be assumed to be introduced or removed at the wet bulb temperature.)

As the air increases in moisture content and cools as a result, the sensible heat liberated by the change in temperature is merely converted into an equivalent amount of latent heat represented by the conversion of water into vapor associated with the air. Thus it is that the wet bulb temperature always indicates precisely the total heat content of the air regardless of its temperature or moisture condition. By calculating the heat content, or total heat of saturated air at various temperatures, the heat content of the air under all wet bulb conditions is definitely established, since the heat content is the same for a given wet bulb temperature as if it were saturated at that temperature. The fact that the wet bulb temperature establishes the heat content of the air is of great importance in calculating the requirements for the cooling and dehumidifying of air and for the humidifying of air, and also in the calculation of the cooling effect which may be secured in a building by the application of humidified air to maintain a definite standard of moisture condition or relative humidity. In problems in cooling and dehumidifying when using outside air, the outside wet bulb temperature is the fact of first importance.

It is of interest to note that the maximum wet bulb temperature in the Northern States rarely ever exceeds 78 deg. The highest outside wet bulb temperature ever observed by the writer was slightly over 81 deg. in New York City in 1917. This, it should be re-