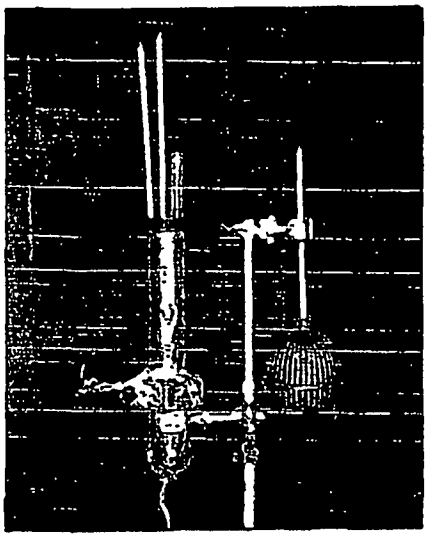

Fig. 28-21. Globe thermometer (right). At left is shielded wet-and-dry bulb thermometer shown in Fig 28-18.

Courtesy Owens-Illinois Glass Company

This chart is a graphical representation of the thermodynamic properties of moist air That shown in Fig 28-20 is a simplified version which shows only the interrelationship of the dry- and wet-bulb air temperatures and relative humidity at sea-level pressure Much more data can be placed on psychrometric charts so that they can be of practical value in the solution of many engineering problems *

3 The velocity of air blowing on the man whose heat load is being found is the *air velocity* Any of several instruments that measure velocities in the range from 25 to 1,500 fpm may be used, for example the swinging-vane anemometer, heated-wire anemometer, or heated-thermometer anemometer

4 The average temperature of the surroundings that can be "seen" from where one is standing is the *mean radiant temperature* (*mrt*) A spherical traverse could be made with a radiometer and the results averaged, but this is too specialized and time-consuming The globe thermometer (Fig 28-21) is commonly used for finding mrt This is a 6-in thin-wall, hollow, copper sphere, painted a dull black on the outside, with an ordinary thermometer inserted through a hole, with rubber stopper, the thermometer bulb being at the center of the sphere For field measurements, a commercial copper toilet float with its outside painted black, is satisfactory It can be hung from a stand by a thread or clamp attached to the thermometer stem The globe thermometer should be given 20 minutes to come to equilibrium before a reading is taken

The globe thermometer reacts to both the mean radiant temperature and to the air temperature, as well as to air velocity If it is well above (or below) the air temperature, the fact that there is a radiant heat (or cooling) problem is immediately apparent These simple readings give information of immense importance, because the methods for combatting a *radiant* heat exposure are totally different from those used against a *convection* heat problem

The mrt is useful when making quick surveys because it can be used to estimate how much of a man's heat load is from convection and how much is from radiation It can be assumed, if the air movement is low, that the mean radiant temperature and the air temperature contribute equally to the heat carried to the man by radiation and convection, respectively Hence, the elevation of mrt above the man's *skin* temperature (95 F in summer) gives the relative radiant component of his heat load, and the elevation of the *air* temperature above *skin* temperature is proportional to the convected component—as in the example

Radiant component·	°F	%
mrt − 95 F = 175 − 95 =	80	73
Convection component		
t −95 F = 125 − 95 =	30	27
	110	100

*For a full discussion of this subject, see Chapter 3, "Psychrometrics," in the *Guide and Data Book*, "Fundamentals and Equipment," published by American Society of Heating, Refrigerating and Air-Conditioning Engineers, New York City, 1963