will give an effective temperature of 75.7 deg. or a total improvement of 10.0 deg.

For cooling produced by velocities other than those given in Figs. 2, 3 and 4, refer to *Practical Application of Temperature, Humidity and Air Motion Data to Air Conditioning Problems*, by Houghten, Teague and Miller (A.S.H.V.E. Transactions, Vol. 33, 1927).

Example 1.—Given dry-bulb and wet-bulb temperature of 75 and 68 deg. First: what is the effective temperature? Second: is this condition warmer or cooler than 80 deg. dry-bulb and 60 deg. wet-bulb?

Answer.—The first condition is given by the intersection of the 75 deg. dry-bulb line and the 68 deg. wet-bulb line. The effective temperature is given by the numerical value of the effective temperature line passing through this point and indicated by the scale along the saturation curve, and is 71.9 deg. effective temperature. The second condition is given by the intersection of 80 deg. dry-bulb and 60 deg. wet-bulb and is 71.7 deg. effective temperature. It is therefore 0.2 deg. effective temperature cooler than the first condition.

Example 2.—Given 76 deg. dry-bulb and 61 deg. wet-bulb how many degrees difference between this condition and the comfort line or 64 deg. effective temperature?

Answer.—The effective temperature of this condition is given by the intersection of the 76 deg. dry bulb and 61 deg. wet-bulb lines and is 70 deg. effective temperature or 6 deg. effective temperature warmer than the comfort line.

Example 3.—Given the dry and wet-bulb temperatures in a room 76 and 54 deg. respectively, what air velocity will be necessary to make this condition ideally comfortable, that is, 64 deg. effective temperature?

Answer.—From Fig. 1 for still air it will be seen that this condition has an effective temperature of 68.1 deg. in still air, while an air velocity of 300 ft. (see Fig. 3) gives an effective temperature of 64.7 deg. A velocity of something more than 300 ft. per minute will give the desired result. The exact velocity may be found by looking through the various tables 2 to 7, for moving air, in the Journal of the American Society of Heating and Ventilating Engineers, November, 1926.

Example 4.—Given a condition having dry and wet-bulb temperature of 90 and 85 deg., respectively, how much cooler will this condition feel if 300 ft. air velocity is supplied instead of still air?

Answer.—From Fig. 1 it will be found that this condition in still air has an effective temperature of 86.6 deg., while if the air has 300 ft. velocity it will be found from Fig. 3 that it will have an effective temperature of 83.8 deg. Cooling of 2.8 deg. will be produced by the 300 ft. air velocity.

There are many applications for these data. In warm weather it is especially desirable to have greater comfort in school rooms, theaters, auditoriums, as well as factories, foundries, iron, steel and glass works, mines and other places where workers are subjected to extreme temperature conditions. Maintaining comfortable conditions indoors in summer when the outside temperature is about 95 deg. is a more complicated problem than maintaining the proper air condition in winter.

HEAT DISSIPATED TO THE ATMOSPHERE FROM THE HUMAN BODY

The heat dissipated from the human body is a factor which must be taken into consideration in conditioning air in audience halls. Research at the Laboratory of the American Society of Heating and Ventilating Engineers[1] has resulted in the data given in Figs. 6, 7, 8 and 9, which are in convenient form for practical application.

[1]Heat and Moisture Losses from the Human Body and Their Relation to Air Conditioning Problems, by F. C. Houghten, W. W. Teague, W. E. Miller and W. P. Yant (A.S.H.V.E. Transactions, Vol. 35, 1929).

Although total heat loss and sensible and latent heat losses are not exact functions of effective and dry-bulb temperature, respectively, for all conditions of humidity and air motion, they are plotted as such in the curves. This is accomplished by approximations not always rigidly accurate, but sufficiently so for application in most practical problems. These data are offered for the use of the engineer in solving most of his practical problems. In some instances, however, in particular cases where extreme accuracy is desired, the variation in the data for different atmospheric conditions as given in the complete laboratory report may be taken into consideration.

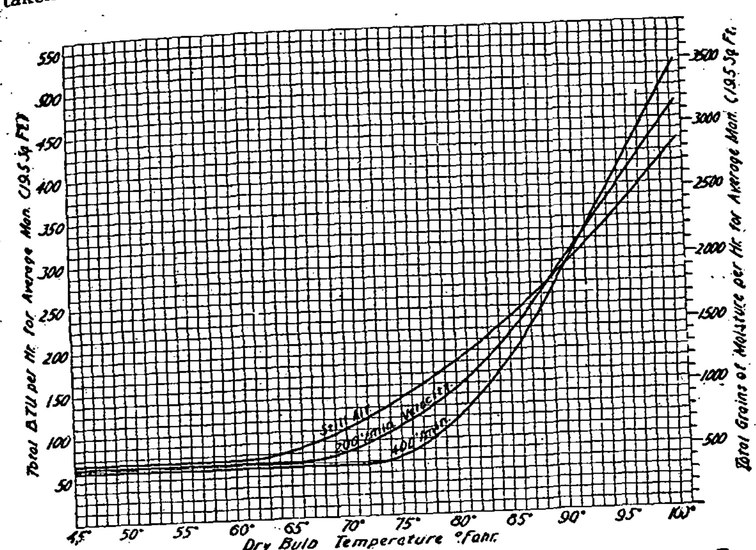

Fig. 8. Relation between Heat and Weight Loss from the Human Body by Evaporation and Dry-Bulb Temperature for Still and Moving Air

An atmospheric condition resulting in sensible perspiration is to be avoided for good air conditions. Tables 2 and 3 give the approximate effective temperature at which perspiration is noticeable in different degrees by most individuals for 95 per cent and 20 per cent relative humidity.

Problems Involving Heat Dissipated from Human Body

Problem 1-A: How much sensible heat, how much latent heat and how much water vapor will be added per hour to the atmosphere of an auditorium by an audience of 1,000 adults, when the dry and wet-bulb temperatures are 75 deg. fahr. and 63.5 deg. fahr., respectively?

Problem 1-B: If the dry and wet-bulb temperatures of the auditorium were 85 deg. and 63 deg., respectively, how much heat and moisture would be dissipated to the atmosphere?

Solution—Problem 1-A: From Fig. 7 find the sensible heat loss per person for 75 deg. dry-bulb and still air to be 265 B.t.u. per hour. From Fig. 8 find the latent heat loss per person for 75 deg. dry-bulb to be 134 B.t.u. per hour and the moisture added to be 905 grains per hour. 1,000 × 265 = 265,000 B.t.u. sensible heat; 1,000 × 134 =