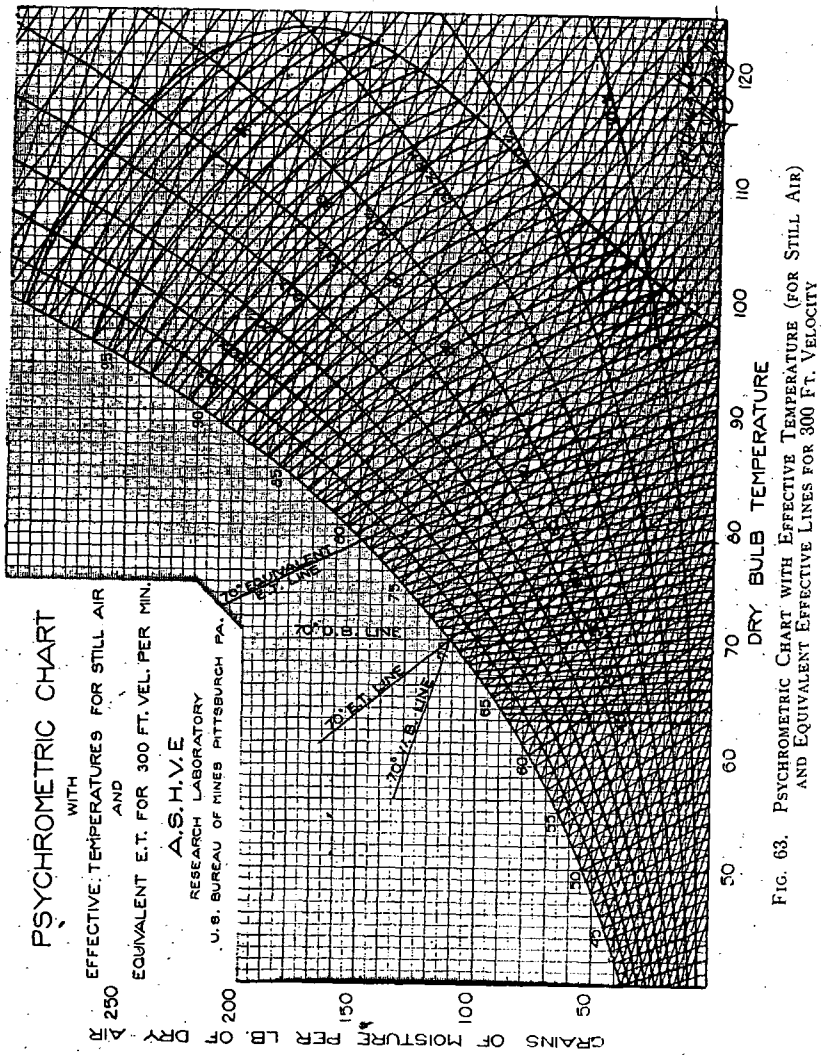

FIG. 63. PSYCHROMETRIC CHART WITH EFFECTIVE TEMPERATURE (FOR STILL AIR) AND EQUIVALENT EFFECTIVE LINES FOR 300 FT. VELOCITY

scale along the saturation curve, and is 71.1 deg. effective temperature. The second condition is given by the intersection of 80 deg. dry bulb and 63 deg. wet bulb and is 70.8 deg. effective temperature. It is therefore 0.3 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 68.2 deg. effective temperature or 4.2 deg. effective temperature warmer than the comfort line.

Example 3.—Given the dry and wet bulb temperatures in a room of 78 and 64 deg. respectively, what air velocity will be necessary to make this condition ideally comfortable, that is, 64 deg. effective temperature?

Answer.—From Table 96 for still air it will be seen that this condition has an effective temperature of 70.4 deg. in still air. Looking through the various Tables 97 to 102 for moving air it will be found that with a 300 ft. velocity this condition will have an effective temperature of 63 deg., and with a velocity of 200 ft. (Table 99) it will have an effective temperature of 64.8 deg. Interpolating between these two velocities the desired velocity is found to be 244 ft. per min.

Example 4.—Given a condition having dry and wet bulb temperatures 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 Table 96 it will be found that this condition in still air has an effective temperature of 86.4 deg., while if the air has 300 ft. velocity it will be found from Table 100 that it will have an effective temperature of 81.9 deg. Cooling of 4.5 deg. will be produced by the 300 ft. air velocity.

There are many applications for this data. In cases where air motion will produce a cooling effect it is a simple and inexpensive method. At high temperatures, however, the benefit is small and the effective temperature should be reduced in other ways before setting the air in motion.

In warm weather it is especially desirable to have greater comfort in school rooms, theaters, auditoriums, also 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 thermometer registers about 95 deg. is a more complicated problem than maintaining the proper condition in winter. Incoming air diffusing into the rooms takes up heat from the bodies of occupants, and the heat liberated by operating machinery so that the temperature is increased considerably.

The cooling effect produced by the evaporation of water has been helpful in air conditioning work particularly where air is quite dry. When it comes in contact with water in passing through a humidifier an appreciable amount of heat is lost resulting in a considerable lowering of the air temperature. As an illustration of the value of saturation and air movement take the following average summer condition of 96 deg. dry bulb, 80 deg. wet bulb in practically still air, which corresponds to an effective temperature of 84.7 deg. A 300 ft. air velocity will improve conditions by only 3.5 deg. effective temperature. Saturating the air will reduce the dry bulb temperature to 80 deg. and with a 300 ft. air velocity applied the resulting condition will theoretically be 72 deg. effective temperature so that the improvement will be 84.7 deg.—72 deg. = 12.7 deg. effective temperature.

In practice these theoretical values will not be fully achieved. Therefore an allowance should be made for an increase in temperature and a decrease in humidity of the diffusing air before it strikes the occupants. The clothing worn and the kind of work done will also have a retarding effect. The experimental evidence now available, of the laws govering the cooling of the human body is of great value in predicting just what may be expected of a definite air velocity at a given temperature and moisture content when directed upon the body of lightly clothed individuals. Complete reports with other detailed examples of the use of Laboratory Comfort Data are to be found in the JOURNAL A. S. H. V. E.