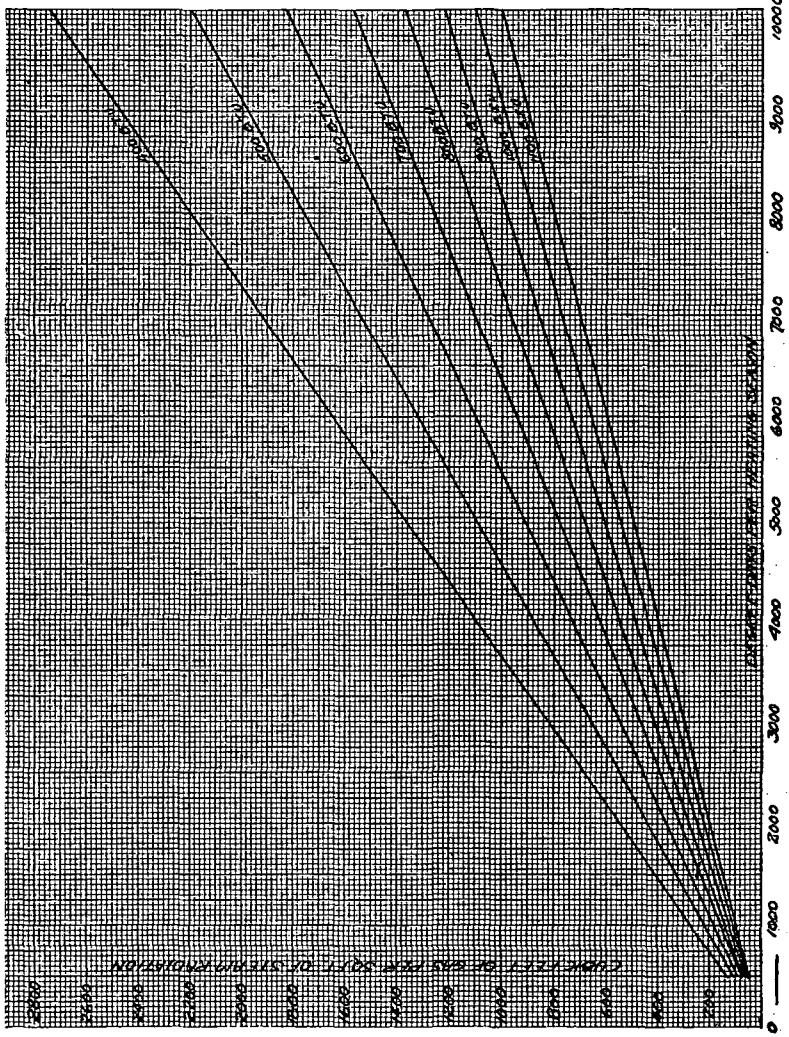

FIG. 1: GAS CONSUMPTION PER SQUARE FOOT OF STEAM RADIATION

In making an estimate of the gas that will be consumed by a gas-fired heating installation during the average heating season, two variables must be taken into account. The first of these is the size of the heating system, usually expressed in terms of square feet of direct cast-iron radiation. The other one is the duration and intensity of the heating season. This is easiest expressed in terms of *degree-days*. A definition of the term *degree-day* may be in order. It has been found that people who use gas under automatic control for heating their homes, seem to require heat on those days when the mean temperature drops below 65 deg. Thus 65 deg. is taken as the datum line from which to measure the number of degree-days in a month or any other given period. The degree-day can be defined as a day on which the mean temperature is one degree below 65 deg., or 64 deg. Therefore, if the mean temperature for each of the 30 days in a month was 64 deg., we would have accumulated 30 deg.-days in that month. By summing up the degree-days for the different days of the heating season, we get the total degree-days for the entire heating season. Studies of weather reports have established the number of degree-days for over 300 cities in the United States and Canada, and it is easy to calculate the heating demands for a particular city. Gas consumption for a given type and size of installation will always be proportional to the number of degree-days in the heating season for the locality in question. A very complete chart, giving the characteristics of the heating season for all parts of the entire Continental United States, was published by the *Heating and Ventilating Magazine* in 1925. Table 3 gives values of degree-days for several representative cities.

By averaging the records of a large number of gas-boiler installations, operating under thermostatic control, with a reduced temperature at night, the following equations have been derived:

$$\text{For Steam } G = \frac{110 \times R \times D}{H} \qquad \text{For Water } G = \frac{64 \times R \times D}{H}$$

where G = cubic feet of gas per season
R = square feet of direct cast-iron radiation (as calculated)
D = degree-days per season
H = B.t.u. (gross) per cubic foot of gas

Example.—To estimate the gas consumption for the average heating season for a 200 sq. ft. steam heating system in Chicago.

From Table 3 it is found that the average heating season in Chicago has 6007 degree-days. The gross heat value of the gas supplied to that city is 535 B.t.u. per cubic foot. Substituting in the equation:

$$G = \frac{110 \times 200 \times 6007}{535} = 247{,}017 \text{ cu. ft.}$$

Observe in the equation that the calculated theoretical amount of radiation is to be used. By this is meant the actual amount of radiation that is required, as determined by accepted methods of heat loss calculations. Over-radiation will not materially affect the gas consumption while under-radiation will merely reflect itself in inability to heat in extremely cold weather. The amount of gas consumed for heating a residence during any given heating season may vary decidedly from an estimate according to the method outlined but the variation will be in almost direct proportion to the difference between the actual degree-