

as it starts. In the same way, when the boilers are shut down, the demand is taken off in steps, eliminating fluctuations in the service pressure.

The steam pressure controls on each one of a battery of several boilers may be set to cut off at different steam pressures. By this means, one boiler can be allowed to carry the base load and the other boilers can be allowed to come on at different pressure intervals and thus carry the peak-loads.

It has been found by analysis of a number of installations that the values given in Table 4 represent the gas requirements of large commercial building heating installations under thermostatic control, expressed in B.t.u.'s per square foot of steam radiation per degree-day.

These values can be converted into annual gas consumptions by the method outlined on a preceding page.

Figs. 2 and 3 graphically represent the number of cubic feet of gas per square foot of radiation for the heating season in any climate, the climate being expressed in degree-days. These figures are applicable to any heating condition in the United States. These charts give very close estimates when the radiation is proportioned to maintain a maximum inside temperature of 70 deg. and when that temperature is maintained.

The rate structures of many gas companies are so devised that additional uses of gas, such as hot-water supply, restaurant use and incineration are charged for at preferential rates, if the main load is for building heating.

#### INSULATION AND WEATHERSTRIPPING

If fuel had no value, there would be no object in reducing the heat losses of a building, at least from the standpoint of fuel economy.

On the other hand, the more costly a fuel, the greater the thickness of insulation required to economically heat a building. It is therefore important that the walls and roof of a building to be heated with gas, especially manufactured gas, be well insulated. The windows should also be equipped with weatherstripping and storm sash.

If the heat losses of a building to be heated by a more expensive fuel are reduced sufficiently, the building can be heated at no greater annual fuel cost than the same building could be heated with a cheaper fuel, if it were not insulated. In many cases the proper insulation of gas-heated buildings is an economic necessity, for without wall and roof insulation, weatherstripping and storm sash, the cost of heating would be exorbitant.

#### Conversions

During the period when gas heating was limited to those localities where a cheap supply of natural gas was available, practically all installations were conversions; that is, appliances designed for coal, with gas burners inserted in them. This practice has not been generally followed by manufactured gas companies, for definite economic reasons.

The usual coal-burning appliance is designed to present a large amount of heating surface to the radiant heat emitted by the flame and fuel bed. Flue passages for the absorption of heat by convection are large because the draft loss, already large on account of the fuel bed resistance, must be kept within reasonable bounds. Heating surfaces in the flue passages of

coal-burning boilers must not be so great as to cool the stack gases to a very low temperature, since a high stack temperature is required to produce sufficient draft for high rates of combustion.

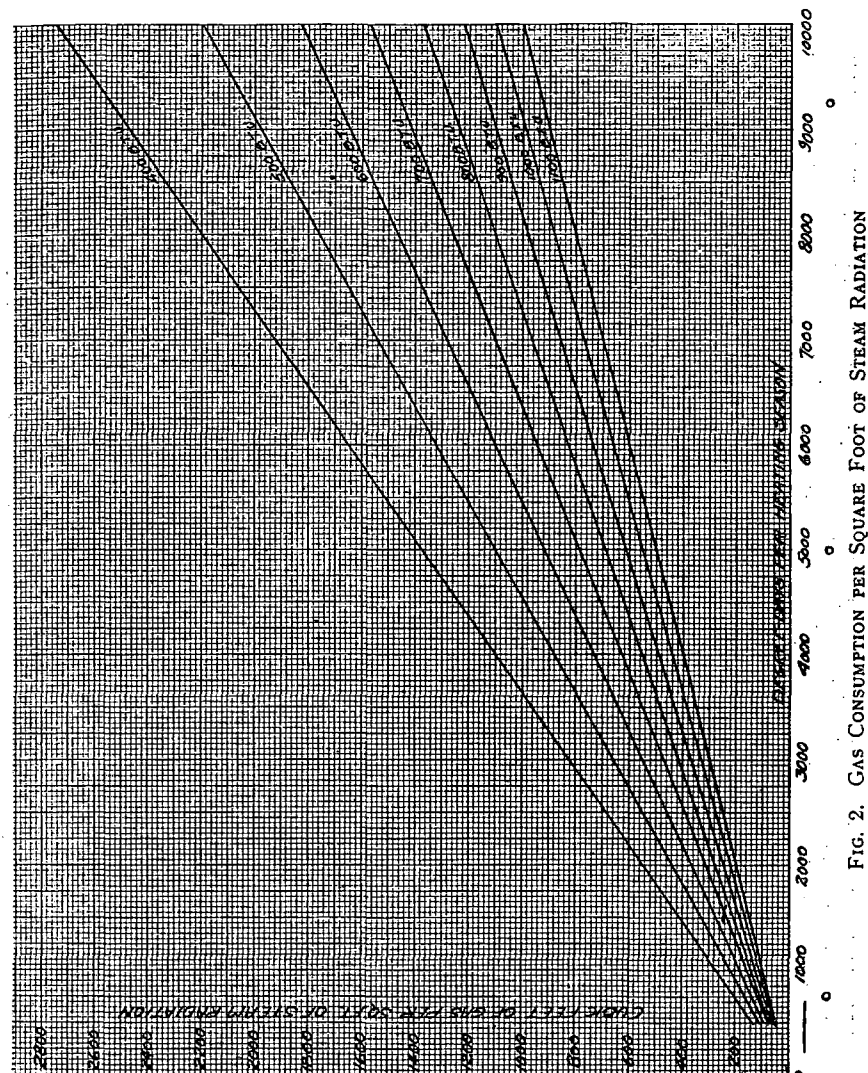


FIG. 2. GAS CONSUMPTION PER SQUARE FOOT OF STEAM RADIATION

When gas is burned in heating appliances, it may be burned either with a Bunsen (non-luminous) flame or with a luminous (radiating) flame. If a Bunsen flame is used and no attempt is made to cause this flame to produce radiant heat, such as by the use of refractories, the heating