

changes in gas pressure. The radiants should not glow more than two thirds of their height if operation is to be safe from carbon monoxide gas and in no case should flame issue from tops of the radiants. These heaters operate best if the gas pressure at the orifice is left constant, regulation being secured by an adjustment at the orifice and not by a cock in the gas line.

Gas Logs have a very poor efficiency if they are placed in a vented fire place, as the radiating power of a blue flame is low and most of the heat goes up the flue.

Tubular and Cylindrical Radiators give off their heat by radiation from black sheet iron covers, similar to old style coal stoves. They are also made in the shape of a steam radiator, either cast iron or pressed steel being used.

Floor Furnaces heat by convection, being placed directly beneath floors and heating the room above by the currents of air set up through the heater. They discharge products of combustion into the heated room.

Gas-Fired Steam Radiators permit local heating with close automatic control, without the extremely intense heat that is present when the gas gives up its heat directly to the radiating surface.

VENTING

It is always safest to vent individual room heaters to an unobstructed chimney. Then no danger can arise from the flame flashing back into the mixer due to low pressure, or from a sudden increase of pressure above that for which the appliance is adjusted. If the gas pressure is certain and constant and if the burner adjustment is correct such appliances are often vented into ventilated rooms and are considered reasonably safe. In no case, however, should unvented heaters be used in sleeping rooms.

CENTRAL HEATING PLANTS

Individual room heaters are suitable only for taking the chill off in mild weather; or, in the case of a house heated with a coal boiler or furnace, for warming up a room quickly, while the more sluggish coal burning appliance is getting under way. Central heating with gas offers the opportunity to secure uniform temperature throughout the house and instant response to the wishes of the owner, without a multiplicity of controls and vents.

Gas can be burned efficiently in hot air furnaces designed for the purpose. The principal requirements in the design of such furnaces are: a path for the hot gas that can be traversed with very little draft loss, thus permitting maintenance of sufficient draft with a low flue gas temperature; and sufficient surface to insure the transmission of most of the heat by direct contact with the hot gases, as a gas flame gives off very little radiant heat.

The heating surface can be placed very close to the burner as combustion is complete within a short distance from the burner. The use of gas in a coal furnace is unsatisfactory at best.

INSULATION AND CONTROLS IMPORTANT

Gas-fired boilers, designed for gas, give very high efficiencies, 80 per cent (based on gross heat value) being readily obtainable. A properly designed boiler should operate noiselessly at full rating and with a flue gas temperature not over 50 deg. higher than steam. Gas boilers can be applied to any type of steam or hot water heating system and will give satisfactory service when properly proportioned to the load. To obtain fully the benefits to be realized from the inherent efficiency of the gas boiler, certain precautions should be observed. Chief among these precautions are insulation and controls.

A boiler should be thoroughly insulated by a non-conducting fireproof material. A gas pressure regulator should be provided and adjusted to hold at the burners the expected minimum service pressure and the burners adjusted to operate at this pressure. A gas valve, operated either by steam pressure or by a thermostat placed in the house, or by both, should be installed. Another requisite for steam jobs is a low water cut-off that will cut-off the gas supply in case the water in the boiler becomes dangerously low. Flues should be provided with some sort of a draft check. This serves the double purpose of keeping the chimney draft low so that the heat lost to the stack will not be excessive and of preventing the pilot flame from being blown out due to back drafts. The pilot flame should be certain in operation and so placed that it will not be blown out by the slight "pop" that often occurs when the main burners go out.

On account of their small heat storage capacity, gas boilers are particularly adaptable to those steam heating systems operating at extremely low pressures; the so-called "vapor" type. The small heat storage capacity and ability for quick steaming insure instant response to the sensitive steam pressure regulators.

RATINGS

Gas appliance manufacturers have followed the custom established by coal appliance manufacturers in rating their product in terms of cubic feet of warm air and square feet of steam or water radiation. The capacity of a gas furnace or boiler is subject to smaller fluctuations than a boiler employing solid fuel and the element of length of firing period does not enter into consideration. Gas appliance manufacturers rate their boilers in terms comparable with the usual 8-hour rating of coal boilers. In other words, where a 2400 sq. ft. coal boiler would be chosen, a 2400 sq. ft. gas boiler would generally be appropriate.

It is common practice for gas boiler manufacturers also to rate their boilers in terms of *Available B.t.u. per hour*. To use this rating the calculated heat loss from the building is increased by the usual percentage allowed for piping losses and the appropriate boiler chosen.

A gas furnace or boiler will show essentially the same capacity of efficiency with any gas fuel, provided steps are taken to furnish burner