

properties of the covering. The gas is assumed to be burned with 35 per cent excess air and has the following composition:

CO	8.6 per cent	
H ₂	52.5 " "	
CH ₄	31.6 " "	
C ₂ H ₄	1.1 " "	
C ₂ H ₆	1.1 " "	
O ₂	0.1 " "	
CO ₂	1.5 " "	
N ₂	3.5 " "	
	100.0	

Heat value per cubic foot at 60 deg. fahr.
and 30 in. hg., 580 B.t.u.
Specific gravity 0.418 (air = 1)
Air Temperature 60 deg. fahr.
Atmospheric moisture neglected.

TYPES OF GAS HEATERS

Luminous Flame Reflector Heaters diffuse a large part of their heat by virtue of the radiating power of the bright yellow flame. They are usually backed by a polished copper sheet which reflects radiant heat into the room. The flame must never be so long that it strikes any part of the heater.

Radiant Heaters have a blue flame which heats refractory "radiants" or "glowers" to incandescence. Radiant heaters are quite sensitive to changes in gas pressure. The radiants should not glow more than two thirds of their height if the products of combustion are to be free 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 warm 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.

Gas-fired boilers, designed for gas, give very high efficiencies, 80 per cent (based on gross heat value) being readily obtainable. A properly designed and installed steam boiler should operate at full rating without priming and with a stack temperature not over 50 degrees higher than steam temperature. Gas boilers can be applied to any type of steam or hot water heating system. To obtain fully the benefits to be realized from the inherent efficiency of the gas boiler, certain precautions should be observed in installation.

Adequate provision should be made for venting air from the system. A gas burning boiler has very little heat storage capacity. As soon as the fuel is turned off by the controlling devices, cooling starts and inleakage of air begins in greater or less degree. When heat is again demanded this air must be purged from the system by the steam before heating can begin. Unless the system rids itself of air easily, there will be a "saw-tooth" effect on the temperature; caused by the house cooling below the temperature for which the thermostat is set, before steam can expel the air and reach the heating surfaces.

A gas-burning boiler lends itself readily to automatic control and such control should be used; since it is a decided aid to economy. Room temperature control on steam boilers and dual control of both room and water temperatures on water boilers should be installed. Steam boilers should be equipped with a steam pressure regulator and with a low-water fuel cut-off; and all boilers should be provided with gas pressure regulators. All of these devices are standard equipment on most gas boilers.

Like a boiler using any other fuel, a gas boiler requires adequate provision for venting. The products of combustion are colorless and odorless; but they are none the less tangible, and the chimney must provide sufficient draft to carry them away. Since a gas boiler operates satisfactorily with very little draft tension, it is advisable to install some kind of draft check between the boiler and the chimney. This serves the double purpose of keeping the chimney draft low so that the heat lost to