

adapted to flat flames, or to conical flames that can be spread over the floor of the combustion chamber. The proper bricking of a large or even medium sized boiler for oil firing is important, and frequently it is advisable to consult an authority on this subject. The essential in combustion chamber design is to provide against flame impingement upon either metallic or firebrick surfaces. Manufacturers of oil burners usually have available detailed plans for adapting their burners to various types of boilers, and such information should be utilized.

Controls for oil burner operation, including devices for the safety and protection of a boiler or furnace, are fully described in Chapter 38.

GAS-FIRED HEATING EQUIPMENT

A gas burner is defined by the *American Gas Association* as "a device for the final conveyance of the gas, or a mixture of gas and air, to the combustion zone." Burners used for domestic heating are of the atmospheric injection, luminous flame, or power burner types.

Because of the ease with which gas fuel may be controlled, automatic gas-fired heating equipment has become very widely used, and is available in a number of types of domestic gas heating appliances and systems. These may be classified in types designed for central heating plants and those for unit application. Gas designed units and conversion burners are available for the several kinds of central systems in which gravity and forced warm air furnaces, steam and hot water boilers are used, and for other applications where warm air floor furnaces and room heaters are installed in the space being heated.

Central Heating Systems

Boilers and furnaces specially designed for gas-firing incorporate design features for obtaining maximum efficiency and performance. Small flue passes to secure good heat transfer, the use of materials resistant to the corrosive effects of products of combustion, and draft hoods are notable features. Control equipment includes gas pressure regulators, automatic pilots, and limit controls designed to protect the appliance and to insure safety of operation. A boiler designed for gas-burning is illustrated in Fig. 19.

Conversion burners are usually complete burner and control units designed for installation in existing boilers and furnaces. Burner heads are of circular or rectangular shape in order to fit in the space available. Single port burners, discharging the flame against a ceramic, stainless steel, or cast-iron target, have become popular in the past few years. The control equipment is generally the same as for gas boilers and furnaces. Various baffles made of clay radiants or metal are used for the purpose of guiding the products of combustion along the heating surface in the firebox or flues. Automatic air dampers are supplied on many models to prevent flow of air into the firebox when the burners is not operating. A typical gas conversion burner is shown in Fig. 20.

Burners of this type are available in sizes ranging from 50,000 to 400,000 Btu per hour capacity. Burners of larger capacity, for use with natural gas in large boilers, are usually engineered by the local utility or contractor. They are available in an infinite number of sizes because the burner may be an assembly of multiple burner heads filling the entire firebox.

Domestic sizes of conversion burners should conform to American Stand-

ard Listing Requirements for Conversion Burners, A.S.A. Z21.17-1948, and installation should be made in accordance with American Standard Requirements for Installation of Domestic Gas Conversion Burners, A.S.A. Z21.8-1948.⁵

Draft hoods, conforming to American Standard Requirements, should be installed in place of the dampers used with a solid fuel.

One form of central heating system is the warm air floor furnace.⁶ The use of these furnaces is adaptable to mild climates, or for auxiliary heating or heating of single rooms in colder climates. They are used for heating first floors, or where heat is required in only one or two rooms. A number may be used to provide heat for the entire building where all rooms are on the ground floor, thus giving the heating system flexibility.

In floor-furnace applications, the heating element, gas piping, and flue

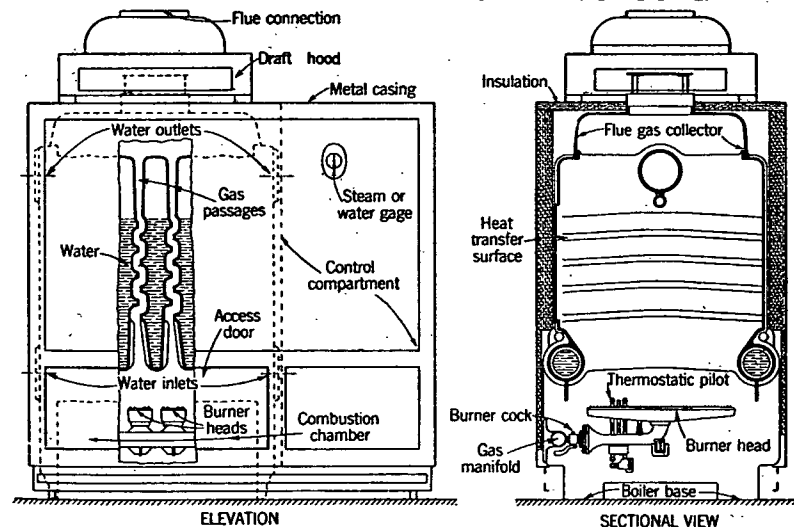


FIG. 19. Gas-Fired Boiler

vent piping are suspended below the floor, and the only part in the room being heated is the circulating air register which may be of the single-type installed in the floor, or of the dual-type installed in a partition, and heating two rooms.

A recent type of central heating, used in mild climates, is the recessed heater which is either a gravity or forced-air furnace designed for installation in the interior partition of a building, and having stub ducts conducting air to two or more rooms. This type of heater is usually installed in new homes, and is plastered into the wall, becoming a permanent part of the building.

Space Heaters

Space heaters are defined as heating units that take the air for combustion from the space being heated. They may be broadly classified as room heaters and unit heaters.

Room heaters are used for heating single rooms or connecting rooms with good circulation between them and, except for wall-type heaters, they