

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.

*Gas designed boilers* for hot water or steam heating are available in cast-iron, steel, and non-ferrous metals. The burners are located beneath the sections, and the flue gases pass upwards between the sections to the flue collector. Some boilers are designed to provide domestic hot water through the use of tankless or instantaneous heaters.

*Warm air furnaces* are of two types, gravity and forced air. The former

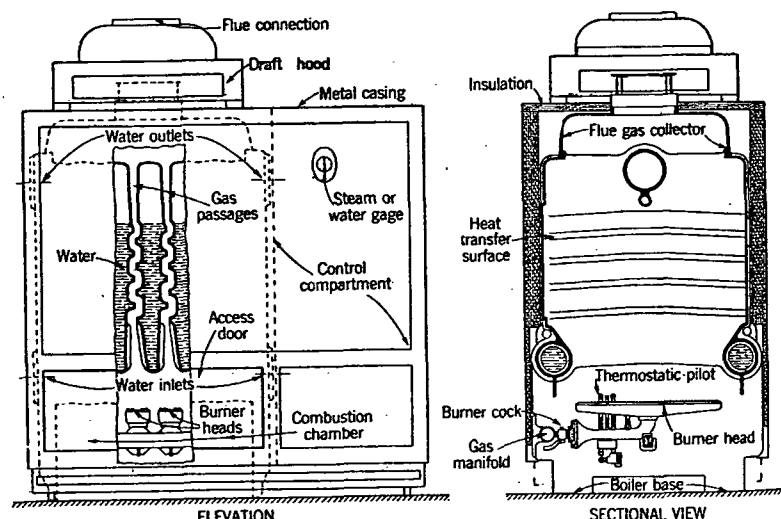


FIG. 19. Gas-Fired Boiler

depends upon a thermal head to provide circulation of air over the heat exchanger and thence directly to the space to be heated, usually through ducts. Most gravity furnaces can be equipped with humidifiers. Forced warm air furnaces utilize a motor-driven blower to circulate air over the heat exchanger and through the ducts. A common type is quite similar to Fig. 18 except that gas burners, pilots, controls, and gas pressure regulator are substituted for the oil burner, and a draft hood is attached to the outlet of the furnace. Due to the pressure developed by the blower, ductwork becomes smaller and the location of the furnace less critical than in gravity systems. Designs of forced air furnaces vary from the conventional types that deliver heated air to overhead ductwork to the downblow types wherein the heated air is delivered at the bottom of the furnace, this latter type being designed for perimeter or radiant panel heating. Several types of low height horizontal furnaces are available for installation in attics or under floors of unexcavated houses. These furnaces are designed for compactness. The A.G.A. listed output at the boiler nozzle or at the

bonnet for forced air and gravity furnaces is 80 and 75 percent, respectively, of the approved input to the burners.

### Conversion Burners

Conversion burners are usually complete burner and control units designed for installation in existing boilers and furnaces. A typical gas conversion burner is shown in Fig. 20. Atmospheric conversion burners may have drilled port, slotted port, or single port burner heads. Single port types have become increasingly popular in the last few years due to their simplicity of construction and ease of installation. In rectangular or round, drilled and slotted port burners, baffles of clay or metal are usually used to direct the products of combustion toward the side walls of the combustion chamber. In single port burners the flame usually impinges against a horizontal cast-iron, stainless steel, or ceramic distributor plate which directs the products of combustion toward the side walls. For certain applications, particularly wet base boilers, a horizontal single port burner

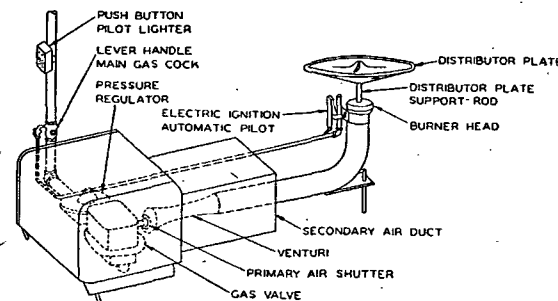


FIG. 20. TYPICAL SINGLE PORT GAS CONVERSION BURNER

is utilized. This design produces a horizontal flame which strikes a curved baffle that spreads the flame in a fan shape.

Several power burners in domestic sizes are available. These are of gun burner design and feature small mechanical blowers for supplying all the air required for combustion. These are particularly desirable for handling restricted flue boilers or furnaces where an atmospheric burner cannot obtain the desired output.

Conversion burners for domestic application are available in sizes ranging from 50,000 to 400,000 Btu per hr capacity. It should be noted that the American Standard Approval Requirements are limited at present to conversion burners of capacities up to 400,000 Btu per input hr. Burners of larger capacity, for use in large steel boilers, are usually engineered by a contractor specializing in this type of work, or by the local utility company. They are available in a large number of sizes and types. In some cases the burner may be an assembly of multiple burner heads filling the entire firebox. For conversion burner installation in boilers requiring more than 400,000 Btu per hr input, reference should be made to the American Standard Requirements for Installation of Gas Burning Equipment in Boilers, ASA Z21.33-1950.

Domestic sizes of conversion burners should conform to American Standard Listing Requirements of Conversion Burners, ASA Z21.17-1948. As