

heaviest grades of oil. Nearly all of the smaller installations, in schools, churches, apartment houses and the like, are full automatic.

Because of the viscosity of the heavier oils, it is customary to heat them before transferring by truck tank. It also has been common practice to preheat the oil between the storage tank and the burner, as an aid to movement of the oil as well as to atomization. This heating is accomplished by heat-transfer coils, using water or steam from the heating boiler, and heating the oil to within 30 deg of its flash point.

Oil Pumps

Unlike the domestic burner, units for large commercial applications frequently consist of atomizing nozzles or cups mounted on the boiler front with the necessary air regulators, the pumps for handling the oil and the blowers for air supply being mounted in sets adjacent to the boilers. In such cases, one pump set can serve several burner units, and common prudence dictates the installation of spare or reserve pump sets. Pre-heaters and other essential auxiliary equipment also should be installed in duplicate.

Boiler Settings

As the volume of space available for combustion is the determining factor in oil consumption, it is general practice to remove grates and extend the combustion chamber downward to include or even exceed the ash-pit volume; in new installations the boiler should be raised to make added volume available. Approximately 1 cu ft of combustion volume should be provided for every developed boiler horsepower, and in this volume, from 1.5 to 2 lb of oil can properly be combusted. This corresponds to a maximum liberation of about 38,000 Btu per cubic foot per hour. There are indications that at times much higher fuel rates may be satisfactory. This in turn suggests that the value of 38,000 Btu per cubic foot per hour should be used with reasonable judgment. For best results, care should be taken to keep the gas velocity below 40 ft per second. Where checkerwork of brick is used to provide secondary air, good practice calls for about 1 sq in. of opening for each pound of oil fired per hour. Such checkerwork is best 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 fire-brick surfaces. Manufacturers of oil burners usually have available detailed plans for adapting their burner to various types of boilers, and such information should be utilized.

Chapter 19

GAS HEATING APPLIANCES

Gas-Designed Heating Systems; Steam, Hot-Water and Vapor Boilers; Warm Air Furnaces; Warm Air Floor Furnaces; Unit Heaters; Space Heaters; Garage Heaters; Conversion Heating Systems; Selection of Gas Boilers; Ratings; Control Features.

THE increased use of gas for house heating purposes has resulted in the production of such a large number of different types of gas-heating systems and appliances, that today there is probably a greater variety of them than there is for any other kind of fuel.

Gas-fired heating systems may be classified as follows:

- I. Gas-Designed Heating Systems.
 - A. Central Heating Plants.
 1. Steam, hot water, and vapor boilers.
 2. Warm Air Furnaces.
 - B. Unit Heating Systems.
 1. Warm air floor furnaces.
 2. Industrial unit heaters.
 3. Space heaters.
 - a. Parlor furnaces or circulators.
 - b. Steam, hot water, and warm air radiators.
 - c. Radiant heaters, wall heaters, etc.
 4. Garage heaters.
- II. Conversion Heating Systems.
 - A. Central Heating Plants.
 1. Steam, hot water and vapor boilers.
 2. Warm air basement furnaces.

The majority of these systems are supplied with either automatic or manual control. Central heating plants, for example, whether gas designed or conversion systems, may be equipped with room temperature control, push button control, or manual control.

Although no exact rules can be prescribed as to the field best covered by each of the foregoing systems, each installation will have problems pointing more or less directly to some particular type of heating equipment.

GAS-DESIGNED HEATING SYSTEMS

Steam, Hot Water, and Vapor Boilers

Gas boilers have assumed a well-defined individuality. The usual boiler is sectional in construction with a number of independent burners placed