

and if necessary to replace them with more effective ones that will prevent the return of air into the heating system, and also to check the tightness of the piping.

Frequently when a coal boiler is already installed in a home, it is expedient to leave the coal boiler in place, and to cross-connect the gas boiler with it. Where gas heating is new to the community, it produces a more secure feeling in the customer's mind when putting in gas-fired house-heating equipment, if he knows that he can burn coal at any time he may desire. For steam or vapor installations, it is desirable to have the water line in both boilers at the same level.

PROBLEMS IN PRACTICE

1 • What functions must an automatic stoker perform in burning coal?

An automatic stoker must distribute the coal evenly over the fuel bed, and fire it uniformly. It must introduce air in proper quantities to all parts of the fuel bed, and dispose of the ash without interfering with the combustion process. Indirectly, the stoker is responsible for the proper burning of the volatile fuel gases in the combustion space above the fuel bed.

2 • Classify stokers as to construction and operation.

- Overfeed flat grate.
- Overfeed inclined grate.
- Underfeed side cleaning type.
- Underfeed rear cleaning type.

3 • What classification may be made of stokers as to their use?

Class 1. For residences (Capacity less than 100 lb of coal per hour).

Class 2. For apartment houses and small commercial heating jobs (Capacity 100 to 200 lb of coal per hour).

Class 3. For general commercial heating and small high pressure steam plants (Capacity 200 to 300 lb of coal per hour).

Class 4. For large commercial and high pressure steam plants (Capacity over 300 lb of coal per hour).

4 • What main parts are found in an underfeed residential stoker?

A *hopper* is supplied to hold coal which is fed by a *screw* or *plunger* into a *revert* provided with air openings called *tuyeres*. A *blower* supplies air under pressure for combustion, and a *gear case* provides for changes in coal feeding rates.

5 • What is a dead-plate?

A dead-plate is a flat surface without air supply openings upon which the fuel rests while combustion of the fixed carbon is completed. Generally the ash is removed from the dead-plate.

6 • What rate of coal burning is usually recommended for small underfeed stokers?

For continuous operation, 25 lb per square foot of grate surface is recommended; for short duration peaks, 30 lb.

7 • What methods of oil atomization are used?

- Throwing the oil from a rotating cup or disc.
- Forcing the oil under high pressure through a whirl chamber in a nozzle.
- Propelling the oil with a high velocity jet of air or steam.
- Forcing an oil and air mixture through a nozzle.

8 • What is the purpose of atomization?

Atomization is used to increase the surface area of the oil in order to facilitate putting it into a vaporous state so it may burn.

9 • Is the furnace of much importance in oil burning?

In most cases it is very important. It is the function of the oil burner to supply the air and fuel in correct proportions; the furnace must provide heated space for proper mixing and combustion.

10 • Which flame is considered better, the luminous or the non-luminous?

Laboratory tests show that they are equally efficient in the usual installation.

11 • What main precaution is necessary in choosing a boiler for an oil burner?

Since the burner output is usually varied through a wide range under control of the thermostat, a boiler should be provided with enough indirect heating surface to absorb the heat as it is released. The combustion space must be large enough, and have correct proportions for mixing fuel and air at high temperatures. If oil is used inefficiently high heating costs will result.

12 • How should oil burner adjustments be made?

Adjustments should be made by an experienced man who uses a gas analysis apparatus to determine the CO_2 content.

13 • What CO_2 content should be attained in oil burning?

Ten per cent CO_2 is considered good practice, for it indicates the supplying of 50 per cent excess air.

14 • What maximum heat release is considered good practice in oil burning?

A heat release of 38,000 Btu per cubic foot per hour is considered to be the maximum for average large installations. This figure has been greatly exceeded in some cases. The design of the combustion chamber, as to impingement of flame and as to proper mixing at high temperatures, has much to do with the attainable heat release.

15 • Name five types of gas-fired space heaters.

- Parlor furnaces or circulators.
- Radiant heaters.
- Gas-fired steam or hot water radiators.
- Warm air radiators.
- Garage heaters.

16 • How are gas heating units rated?

Gas-fired units are rated on the basis of output in Btu per hour.

17 • What safety consideration is noted in establishing the ratings of gas-fired units?

The rating is limited by the amount of gas that can be burned without the liberation of harmful amounts of carbon monoxide.