atomization. The high-pressure atomizing type, illustrated in Fig. 12, is characterized by an air tube, usually horizontal, with oil supply pipe centrally located in the tube and arranged so that a spray of atomized oil is introduced at about 100 psi, and mixed in the combustion chamber with the air stream emerging from the air tube. A variety of patented shapes is employed at the end of the air tube to influence the direction and speed of the air, and thus the effectiveness of the mixing process.

A fan is used to supply the air for combustion. Ignition is established by a high-voltage electric spark that may be operative continuously while the burner is running, or just at the beginning of the running period. The burner operates on the intermittent *on-off* principle, and with a luminous flame.

The combustion process is completed in a chamber constructed of refractory material, or stainless steel, this being a part of the installation.

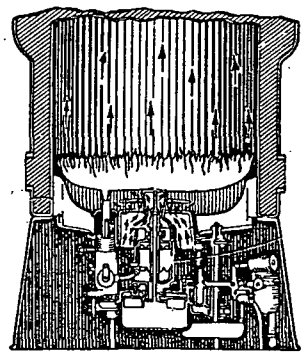


FIG. 13. CENTER FLAME VERTICAL ROTARY BURNER

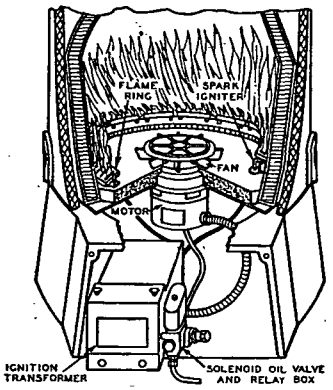


FIG. 14. WALL FLAME VERTICAL ROTARY BURNER

The *low pressure atomizing* type differs from the high pressure type mainly by having means for supplying a mixture of oil and primary air to the burner nozzle. The air pressure before mixing and the pressure of the oil-air mixture at the nozzle vary with different makes of burners, but are in a low range of 1 to 15 psig for the air and 2 to 7 psig for the mixture, respectively. The various parts of the burner, except for oil and air mixing parts, are the same as shown in Fig. 12.

Rotary Type Burner

This class of burners may be divided into two groups: vertical and horizontal. Most of the smaller rotary burners are of the vertical type, and use a fuel oil of No. 1 or 2 grade.

The most distinguishing feature of vertical rotary burners is the principle of flame application. These burners are of two general types: the center flame and wall flame. In the former type (Fig. 13), the oil is atomized by being thrown from the rim of a revolving disc or cup, and the flame burns in suspension with a characteristic yellow color. Combustion is supported by means of a bowl-shaped chamber or hearth. The wall flame burner (Fig. 14) differs in that combustion takes place in a ring of stainless steel

or refractory material which is placed around the hearth. Dependent upon combustion adjustment, these burners may operate with either a semi-luminous or non-luminous flame.

Both types of vertical rotary burners are further characterized by their installation within the ash pit of the boiler or furnace. Various types of ignition are utilized, gas and electric, either spark or hot wire. The air for combustion is supplied partially by natural draft, and partially by fan effect of the central spinner element.

Vaporizing Burner

In the vaporizing burner, fuel oil is ignited (manually or electrically) and vaporized in a vessel or pot which is open at the top or one side. Heat for vaporization is supplied by the combustion process. Openings in the side walls of the burner admit primary air which forms a rich mixture of air and oil vapors in the burner. Adjacent to the outlet opening, sufficient additional or secondary air is admitted to complete combustion. The openings

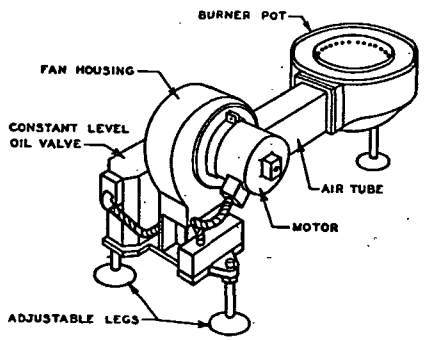


FIG. 15. VAPORIZING FORCED-DRAFT POT-TYPE BURNER

for admitting air are arranged to obtain gradual and intimate mixing of air and oil vapor for combustion, with a minimum amount of excess air and resulting high combustion efficiency.

Fuel is fed by gravity from a constant level control valve, and the flow is either *on* (at rated capacity) or *off* (at pilot flow), according to the demand of the thermostat. However, the high fire can be reduced and the pilot fire can be increased to give almost any desired control characteristic within the range of the burner. The majority of vaporizing burners are manufactured in sizes up to one gallon per hour input. Most vaporizing burners are limited to use with No. 1 fuel oil having a maximum end point of 625 F and a minimum A.P.I. gravity of 35 deg.

A barometric draft regulator is required to maintain the recommended draft. A draft of not more than 0.06 in. of water column is recommended for most natural draft burners. When burners are equipped with mechanical forced draft, a slightly lower chimney draft can be used. A burner of this type is illustrated in Fig. 15. A gravity type is shown in Fig. 16.

Vaporizing burners are adaptable to water heaters, space heaters, and furnaces. Some types have also been applied successfully to conversion