CHAPTER 13

Vaporizers

By definition, a vaporizer is *a type of so called oil burner whose primary duty is to cause a change of state of a liquid fuel to gas for combustion.*

There are two general types classed according as the heat necessary to vaporize the fuel is applied: 1, below, or 2, above a plate or container holding a small quantity of liquid fuel.

They may be further classed as 1, *non-mixing*, and 2, *mixing;* that is, the vaporized fuel or gas may be delivered as such, or mixed with air in proper proportion for combustion.

The basic principle of the non-mixing type is shown in fig. 1 and two forms of the mixing type in figs. 2 and 3.

Ques. How does a vaporizer work of the type in which the vaporizing heat is applied underneath.

Ans. The fuel passes from the source to the retort or *vaporizer* which is a closed vessel heated by the burner underneath, causing the fuel to boil and supply gas to the burner.

In the non-mixing type, fig. 1, mixing takes place when the gas leaves the nozzle of the burner.

In the mixing type, the gas from the vaporizer passes into the mixer into which the gas is injected bringing with it the air, the resulting mixture passes out through small holes where ignition takes place.

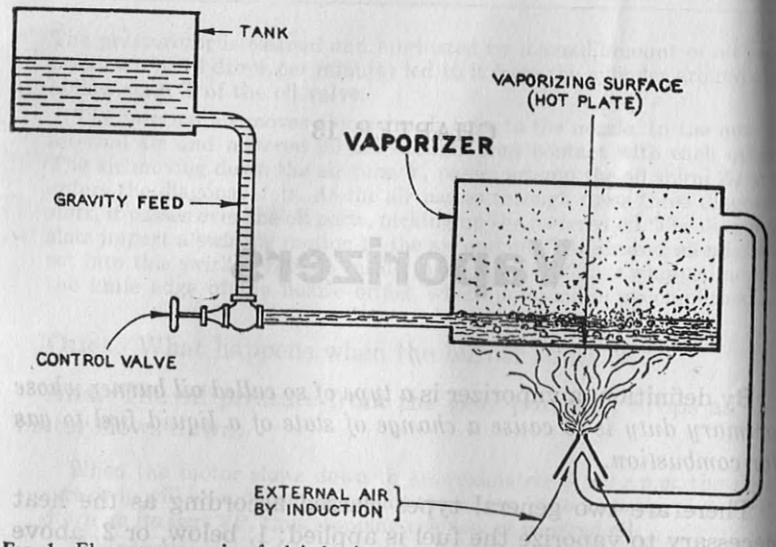


FIG. 1—Elementary gravity feed induction ***non-mixing*** under flame vaporizing burner. The heat from the flame vaporizes the liquid fuel in the retort. The vapor issuing from the nozzle mixes with the air externally by induction.

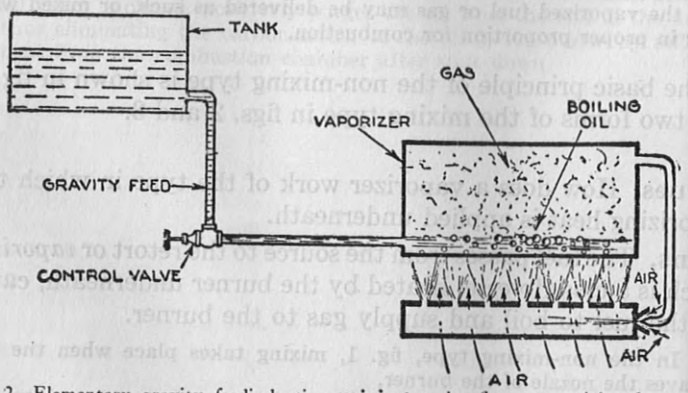


FIG. 2—Elementary gravity feedinduction ***mixing*** under flame vaporizing burner. In this type the vapor issuing from the nozzle draws in air into a mixing chamber where the vapor and air mix, the combustible mixture thus formed passes out through numerous small openings and ignites at the top.

Ques. What do you understand by the term vaporize?

Ans. A fuel is vaporized when a *change of state* takes place, that is, a transformation of the fuel from the liquid state to the gaseous state.

Careful distinction should be made between vaporizing and alleged "*atomizing*" burners later explained.

Ques. Name two typical vaporizers of the type in which the vaporizing heat is applied from above.

Ans. The pot type and the blue flame type.

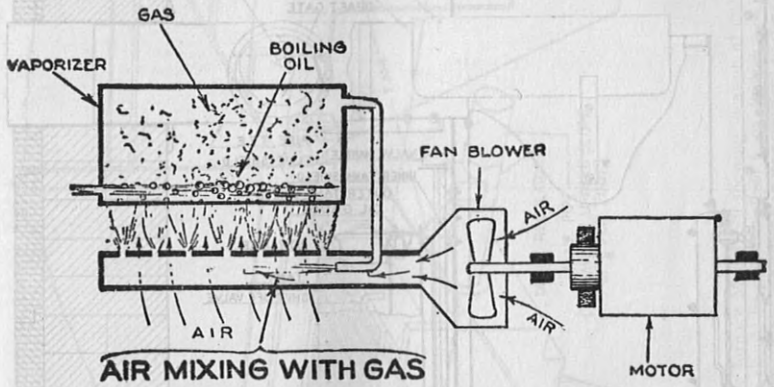


FIG. 3—Elementary gravity feed forced draught ***mixing*** under flame vaporizing burner.

Ques. Describe the pot type.

Ans. As shown in fig. 4, it consists of a pot-like mixing chamber perforated with holes for the admission of air. The bottom of the pot is slightly concave and at the side is an inlet for admission of oil. The pot is provided with a top ring and a pilot ring. The oil supply line connects the control valve with the oil inlet of the burner.

Ques. How does the pot burner work?

Ans. There is a cool pool of oil in the bottom of the burner which vaporizes from the top or surface of the pool because the heat of the burning flame is above the oil pool. Evidently vaporization is due to *radiant* heat from the burning flame. The operation is shown in detail in figs. 6 to 9.

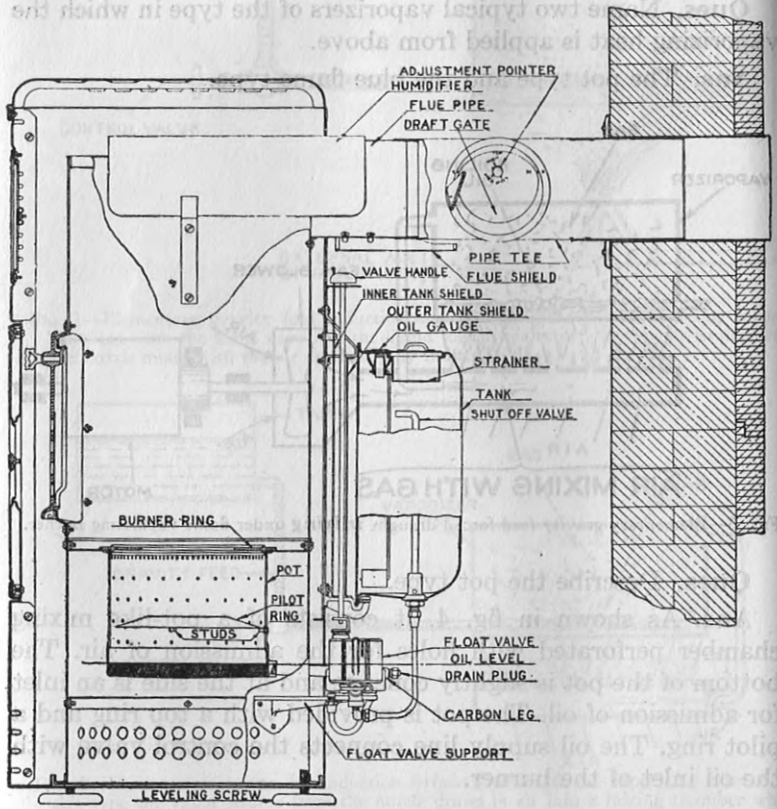


FIG. 4—Typical pot burner installation illustrating also low chimney connection and gravity oil feed with float valve. Note no manual damper is used.

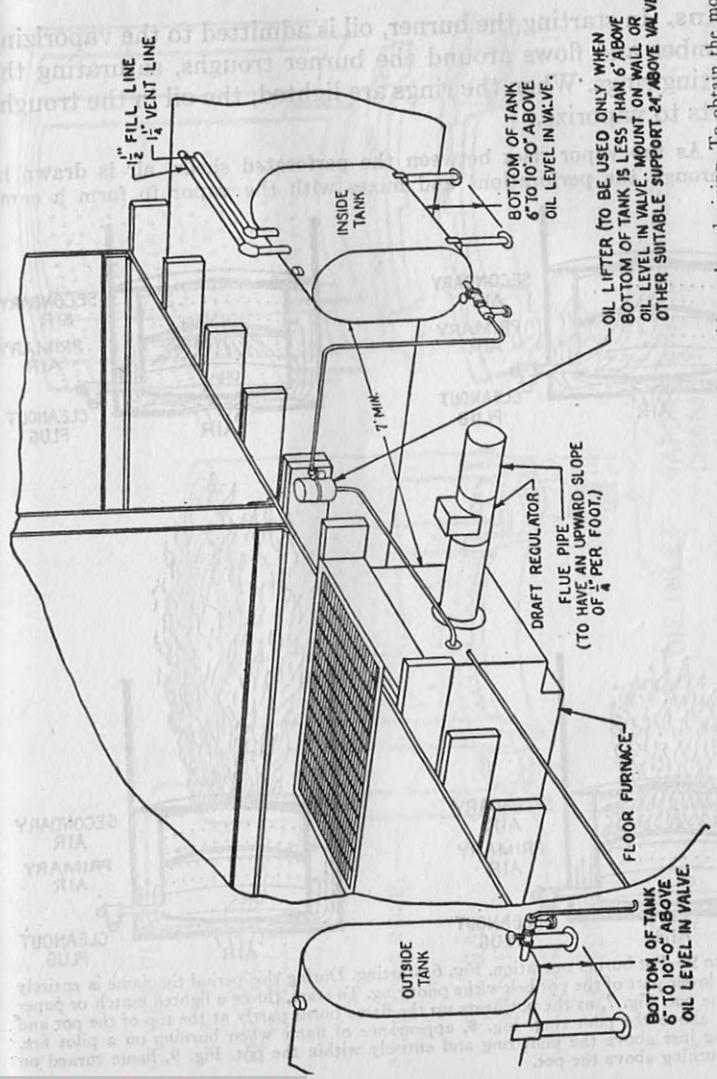
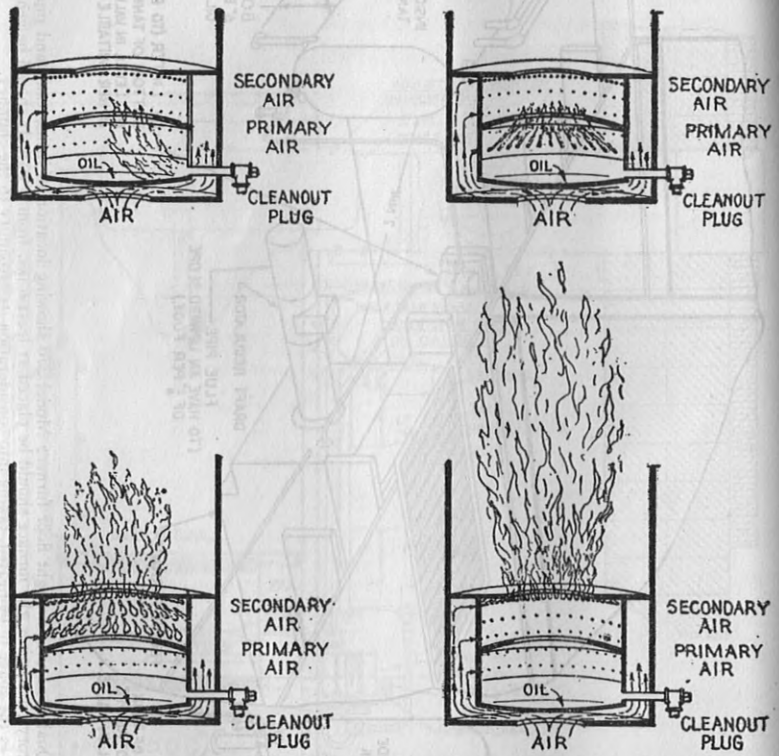


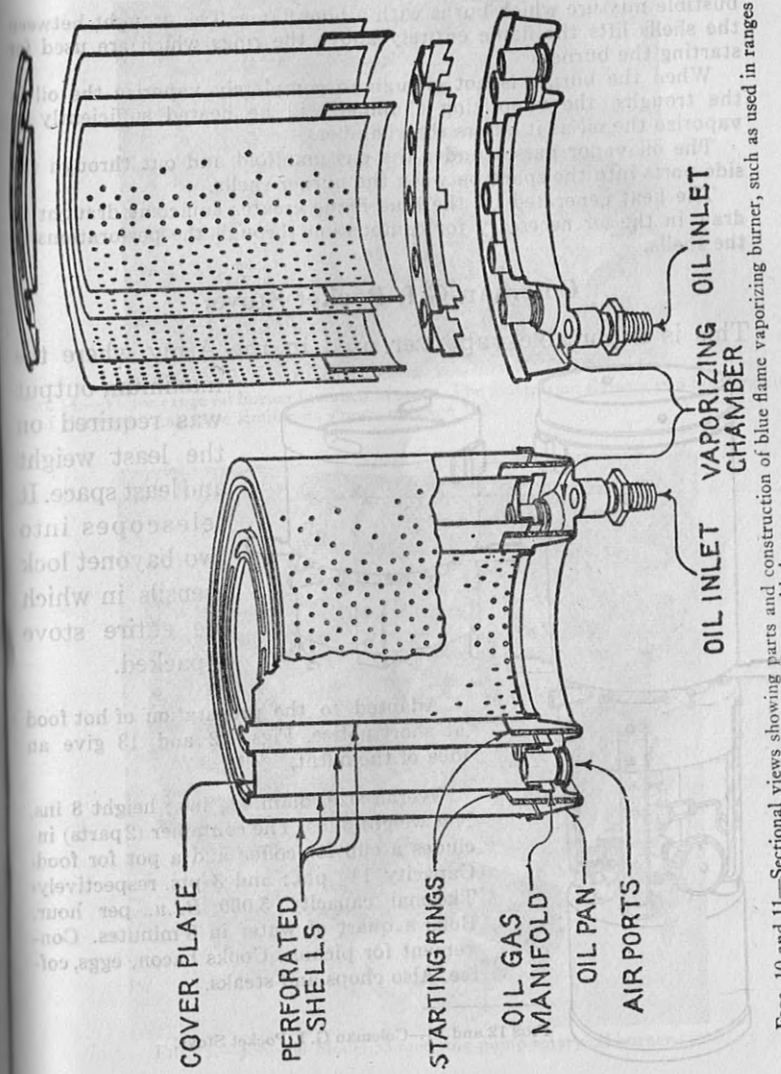
FIG. 5.—Quaker natural draught floor furnace Model 270 showing location of inside tank and piping. To obtain the most satisfactory circulation, the furnace should be placed at least 6 ins. from a wall. It should be centrally located, as near as possible in the space to be heated, taking into consideration its proximity to the chimney.

Ans. In starting the burner, oil is admitted to the vaporizing chamber and flows around the burner troughs, saturating the starting rings. When the rings are lighted, the oil in the troughs starts to vaporize.

As the vapor rises between the perforated shells, air is drawn in through the perforations and mixes with the vapor to form a com-



FIGS. 6 to 9—Pot burner operation. Fig. 6, starting. During this period the flame is entirely in the lower part of the pot below the pilot ring. To start, throw a lighted match or paper into the pot. Fig. 7, as the pot heats up the flame burns partly at the top of the pot and partly above the pilot ring. Fig. 8, appearance of flame when burning on a pilot fire, burning just above the pilot ring and entirely within the pot. Fig. 9, flame turned on high burning above the pot.



FIGS. 10 and 11—Sectional views showing parts and construction of blue flame vaporizing burner, such as used in ranges and stoves. Fig. 10, assembled; Fig. 11, disassembled.

bustible mixture which burns with a blue flame. The draught between the shells lifts the flame entirely above the rings which are used for starting the burner.

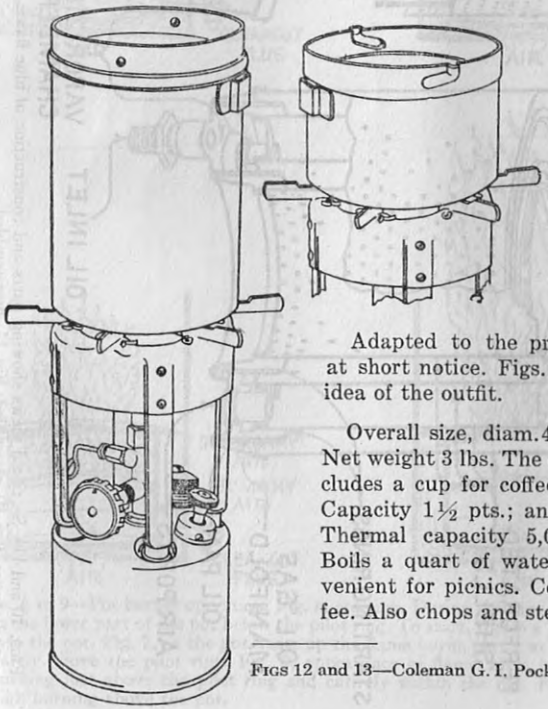
When the burner is hot enough to completely vaporize the oil in the troughs, the vaporizing chamber will be heated sufficiently to vaporize the oil as it enters the chamber.

The oil vapor passes under the gas manifold and out through the side ports into the space between the burner shells.

The heat generated by the blue flame creates sufficient draught to draw in the air necessary for combustion through the perforations in the shells.

Coleman G.I. Pocket Stove.

This is a portable vaporizer used in the Army where the maximum output was required on the least weight and least space. It telescopes into two bayonet lock utensils in which the entire stove is packed.



Adapted to the preparation of hot food at short notice. Figs. 12 and 13 give an idea of the outfit.

Overall size, diam. 4¼ ins.; height 8 ins. Net weight 3 lbs. The container (2 parts) includes a cup for coffee and a pot for food. Capacity 1½ pts.; and 3 pts. respectively. Thermal capacity 5,000 *B.t.u.* per hour. Boils a quart of water in 8 minutes. Convenient for picnics. Cooks bacon, eggs, coffee. Also chops and steaks.

FIGS 12 and 13—Coleman G. I. Pocket Stove.

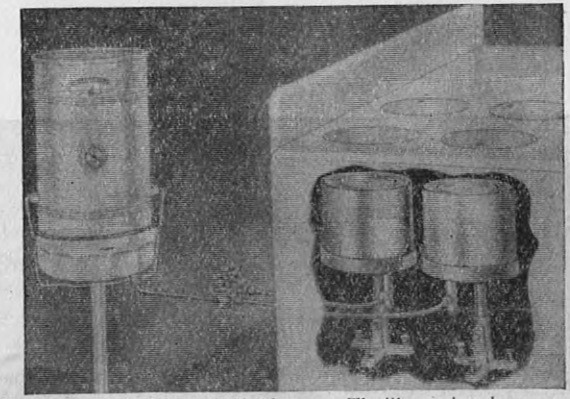


FIG. 14.—Victor range oil burner installed in stove. The illustration shows a two burner unit of the vaporizing type similar as shown on page 103.

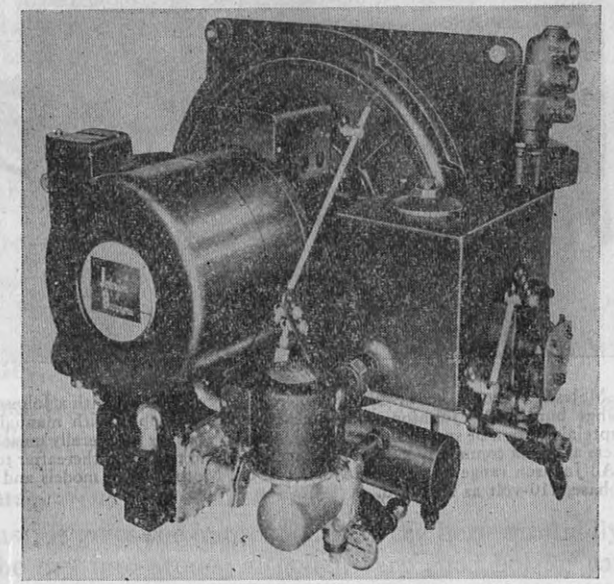


FIG. 15.—Johnson Model 53 metering pump rotary oil burner.

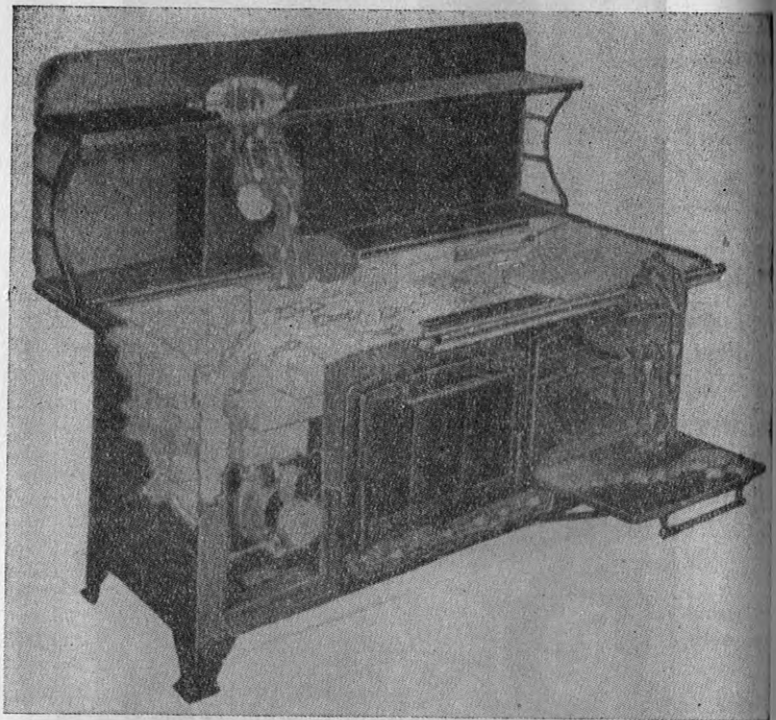


FIG. 16.—Majestic two oven heavy duty commercial range equipped with a Johnson Model B-00 range burner. All Johnson range burners come equipped with manual ignition unless special ignition be specified in ordering. *Manual ignition* is generally most desirable as burners are most commonly lighted but once a day and regulated thereafter to varying needs. All Johnson range burners use No. 3 fuel oil. Motors on all models and sizes are single phase, 110 volt as standard.