CHAPTER 10

Fuel Oil Tanks and Piping

In installing the auxiliary equipment such as the fuel oil storage tank and piping, good material together with skilled workmanship is important.

Most cities have certain rules and regulations governing the installation of such equipment and each dealer should familiarize himself with the existing local regulations.

Placement of Tanks.—There are two kinds of installations of storage tanks wherein the oil supply is stored.

1. Inside storage tanks.
2. Outside underground storage tanks.

Inside Storage Tanks.—This is the more usual method of installation because of the lower costs of installation where local regulations permit.

Ques. What is the usual arrangement?

Ans. Usually two 275 gallon storage tanks giving a total storage of 550 gallons are installed.

Ques. What fitting must be used with this arrangement?

Ans. To comply with the regulations of the Underwriter's Laboratories, a three way valve must be provided at the junction of the two oil lines.

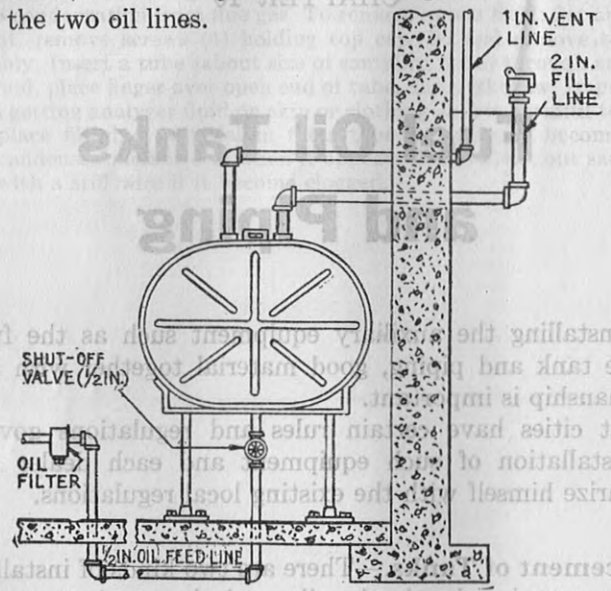


FIG. 1—Piping diagram for single inside fuel oil storage tank.

Ques. How is this three way valve constructed?

Ans. It is so constructed that the oil feed line, by manipulating this valve manually, can be connected to the oil supply in either tank, but not to both at the same time as shown in fig. 2.

Ques. What should be noted from the illustration?

Ans. A common fill line extending to the outside of the building connects to both tanks and both tanks are connected to the vent line, which terminates outside the building.

Ques. Describe the vent line.

Ans. It should be one inch in diameter (pipe size) and be provided with a weatherproof hood, screened to prevent any obstruction and the height above the ground should be in accordance with the existing regulations.

Ques. What should be the pitch of a vent pipe and how far should it extend?

Ans. It should be inclined so as to drain toward the tank, and should not extend more than one inch down through the top of the tank.

Ques. What is the preferred shape of tank and why?

Ans. The oblong tank is preferable to the cylindrical tank, because this construction reduces the door clearance necessary to allow passage of the tank.

All storage tanks should bear the Underwriter's label.

Ques. How are inside tanks mounted?

Ans. On some non-combustible material usually iron pipe, the fittings on the tank determine the size of pipe to be used. The tank must be anchored securely either to the wall or to the floor.

Ques. What kind of gauge should be used for indicating the amount of oil in the tank?

Ans. A suitable approved gauge screwed in the top of the tank, but in no case should a glass level gauge be used.

Ques. How should the oil feed line be connected?

Ans. It should be connected to the top of the tank as shown in fig. 1.

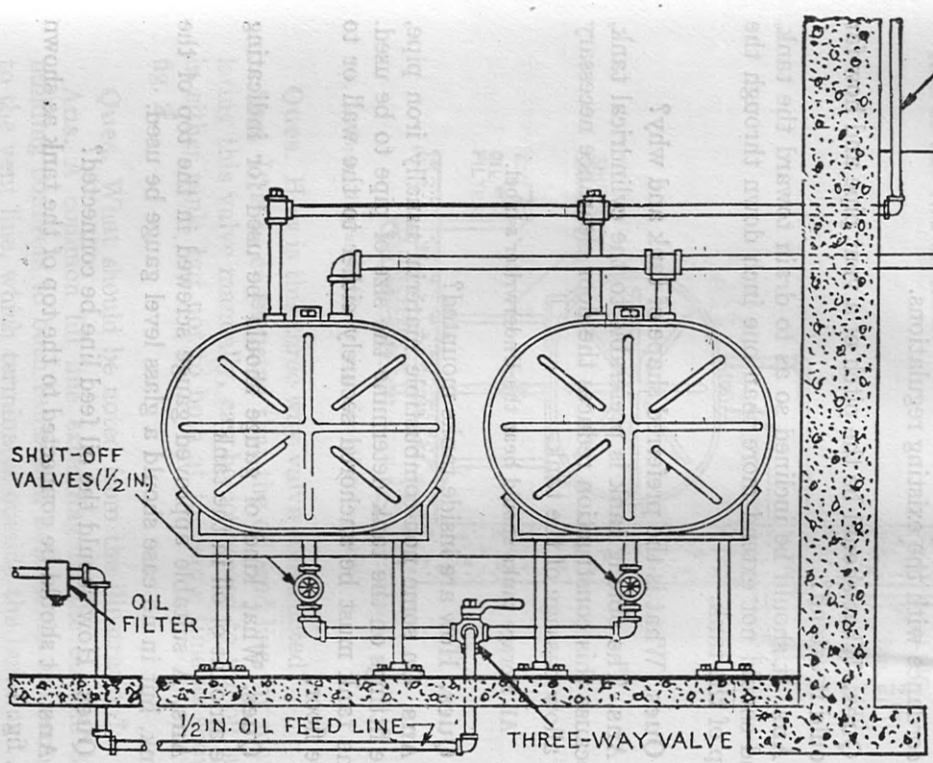


FIG. 2—Piping diagram for two inside fuel oil storage tanks.

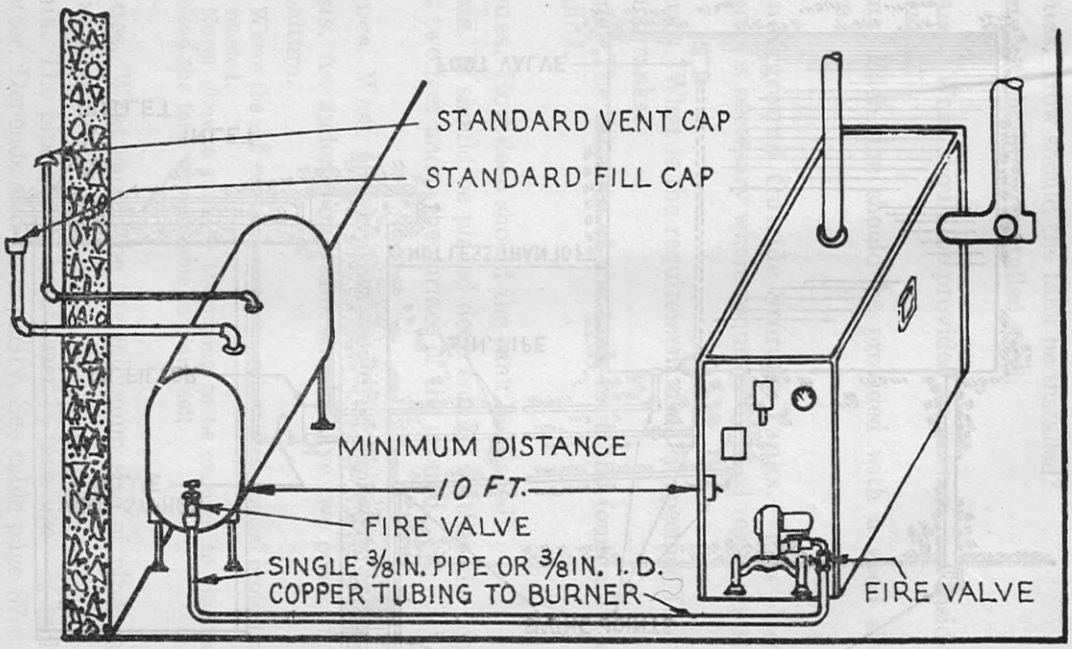


FIG. 3—Pictorial view of inside tank installation.

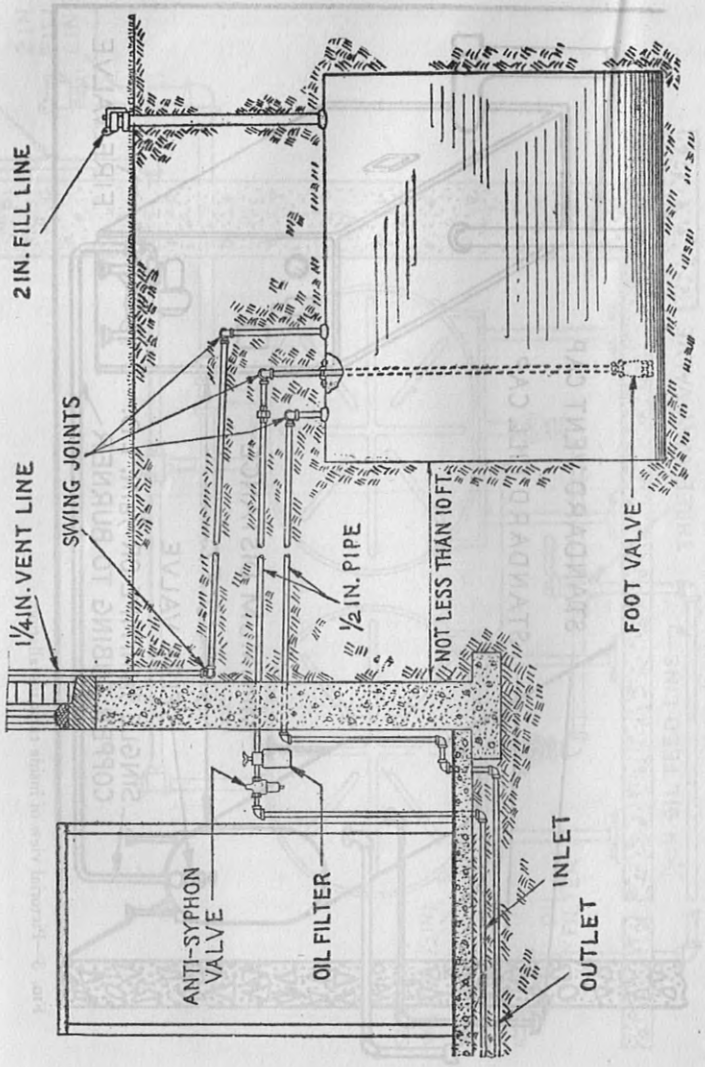


FIG. 4—Piping diagram for outside underground fuel oil storage tank.

Ques. How should the tank be installed?

Ans. It should be installed level.

Ques. What should be provided on gravity feed inside storage tanks?

Ans. Each line should be provided with a good shut off valve.

Underground Outside Storage Tanks.—This placement of tanks is necessary where required by local regulations.

Ques. What is the requirement usually specified for underground tanks?

Ans. The distance of the tank from the foundation of the building.

Ques. How deep should the tank be placed?

Ans. It should be placed deep enough so that the top is at least two feet under the surface of the ground.

Ques. What preservative should be applied to the tank?

Ans. An underground tank should have two coats of tar or asphaltum.

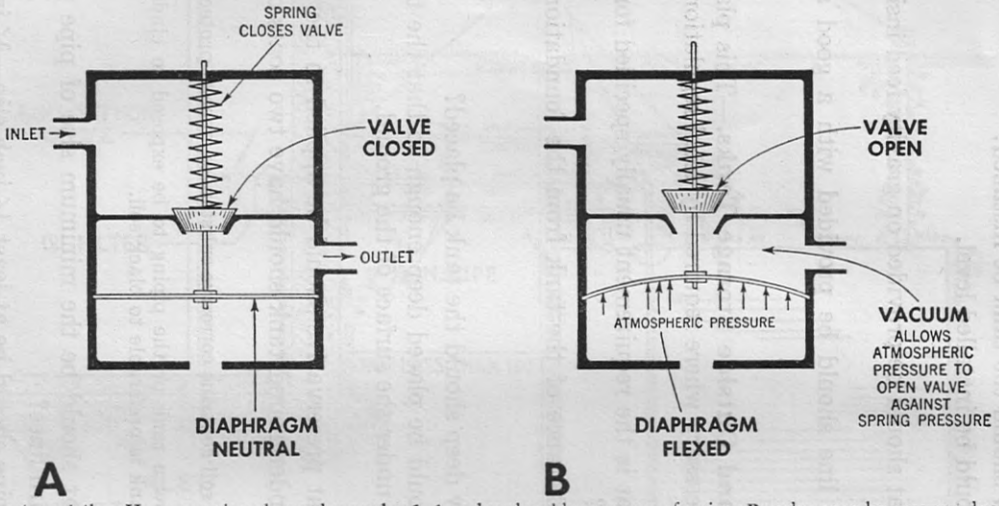
Where the soil contains corrosive substances, special protection may be needed.

Never allow a tank or the piping to be exposed to cinders. Clay around the tank is preferable to black soil.

Ques. What should be the minimum size of pipe used on intake or return lines?

Ans. The pipe should be at least ½ inch size—¾ inch pipe is better. Depends also on capacity. See table page 87.

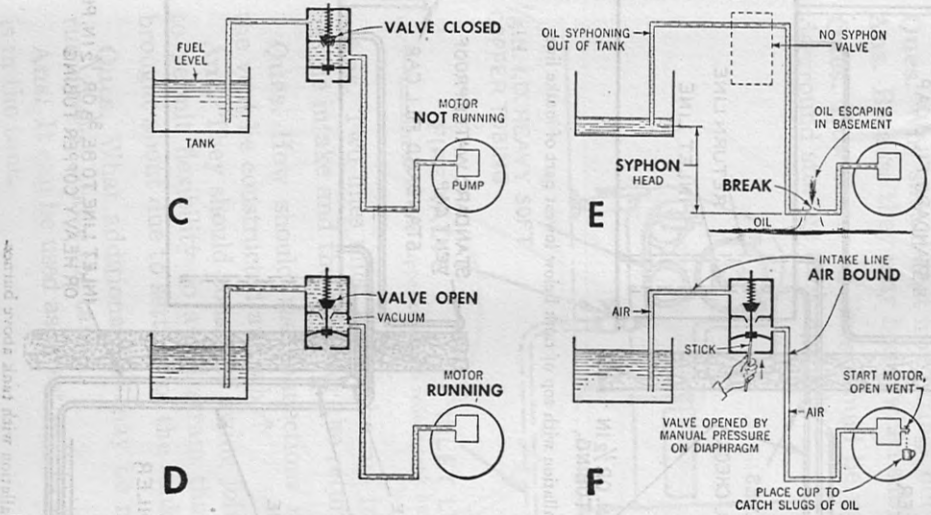
HOW AN ANTI-SYPHON VALVE WORKS–1



FIGS. 4a and 4b.—How an anti-syphon valve works: **1. A**, valve closed by pressure of spring; **B**, valve open by pressure due to vacuum making available increased pressure of the atmosphere to overcome pressure of spring.

Physics of the Anti-Syphon Valve.—The operation of an anti-syphon valve depends upon the opposing forces created by two elements viz.: 1, a spring which tends to close the valve and 2, a vacuum allowing the pressure of the atmosphere to act upon a diaphragm which tends to open the valve as shown in figs. 4a and 4b. The

HOW AN ANTI-SYPHON VALVE WORKS–2



FIGS. 4c to 4f.—How an anti-syphon valve works: **2. C**, motor not running valve closed preventing any flow of fuel; **D**, motor running valve open due to pressure by vacuum acting upon diaphragm causing it to flex upward; **E**, break in fuel line. With no syphon valve the syphon head will syphon all the fuel out of the tank into the basement; **F**, effect of air bound fuel line. ***Remedy:*** open fuel vent, start motor then push open the valve with a stick as shown.

spring is strong enough to keep the valve closed against the syphon head in the fuel line, but not strong enough to keep it closed when the vacuum created by the pump, allows the pressure of the atmosphere to press the diaphragm upward which opens the valve and that's all there is to it.

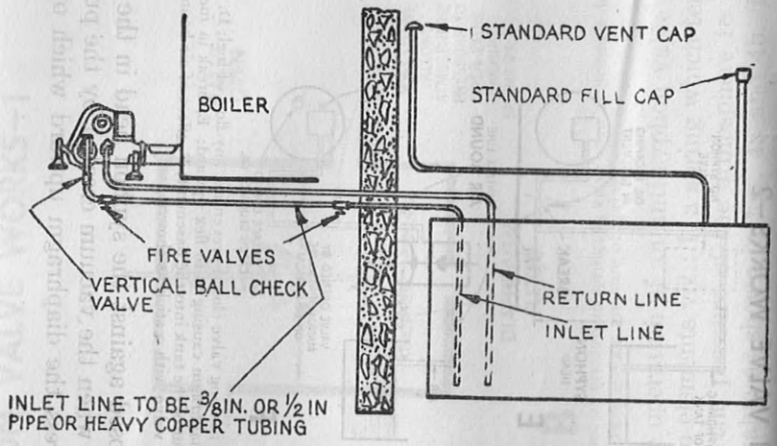


FIG. 5—Outside tank installation with top of tank below lowest part of intake line.

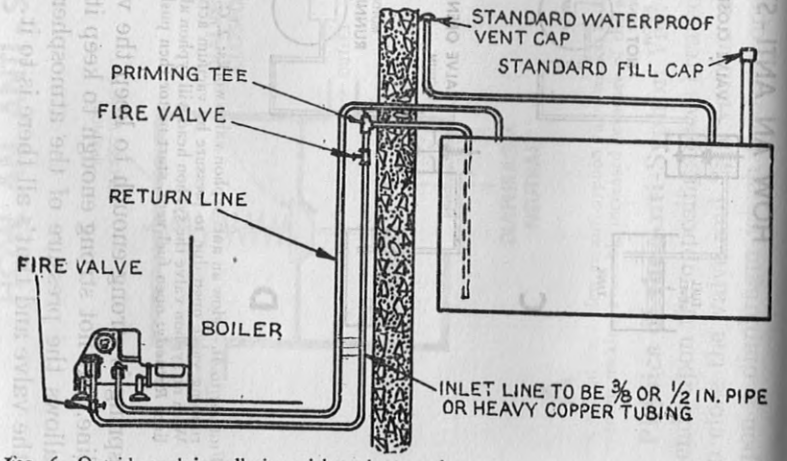


FIG. 6—Outside tank installation with tank above burner.

Ques. What kind of pipe and fittings should be used?

Ans. Full weight wrought iron steel or brass pipe with substantial fittings, or copper tubing of at least 1/16 in. wall thickness, with approved fittings.

Ques. Why should cast iron fittings not be used?

Ans. Because they may break when subjected to strain.

Ques. How many oil lines should be used with an outside underground storage tank and why?

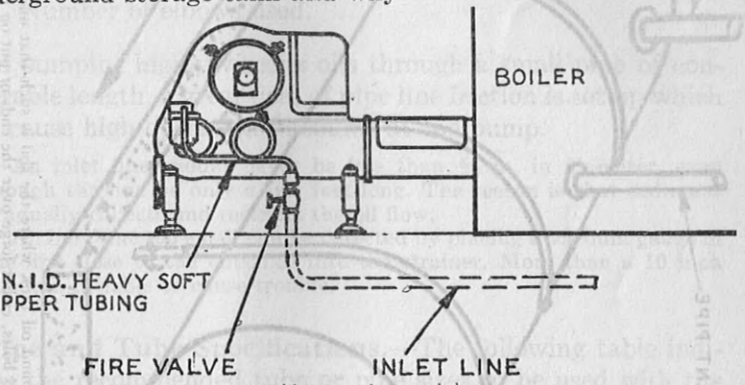


FIG. 7—Installation of soft cupper tubing to reduce tank hum.

Ans. Two lines must always be run into the building—one for the intake and the other for the return.

Ques. How should the connections in these lines and in the vent be constructed and why?

Ans. They should consist of swing joints, as shown in fig. 4 to permit flexibility to avoid strain that might otherwise be brought about due to settling of the tank or piping.

Ques. What additional use may be made of the fill line if run directly above the tank?

Ans. It can be used as a test well to ascertain how much oil is in the tank.

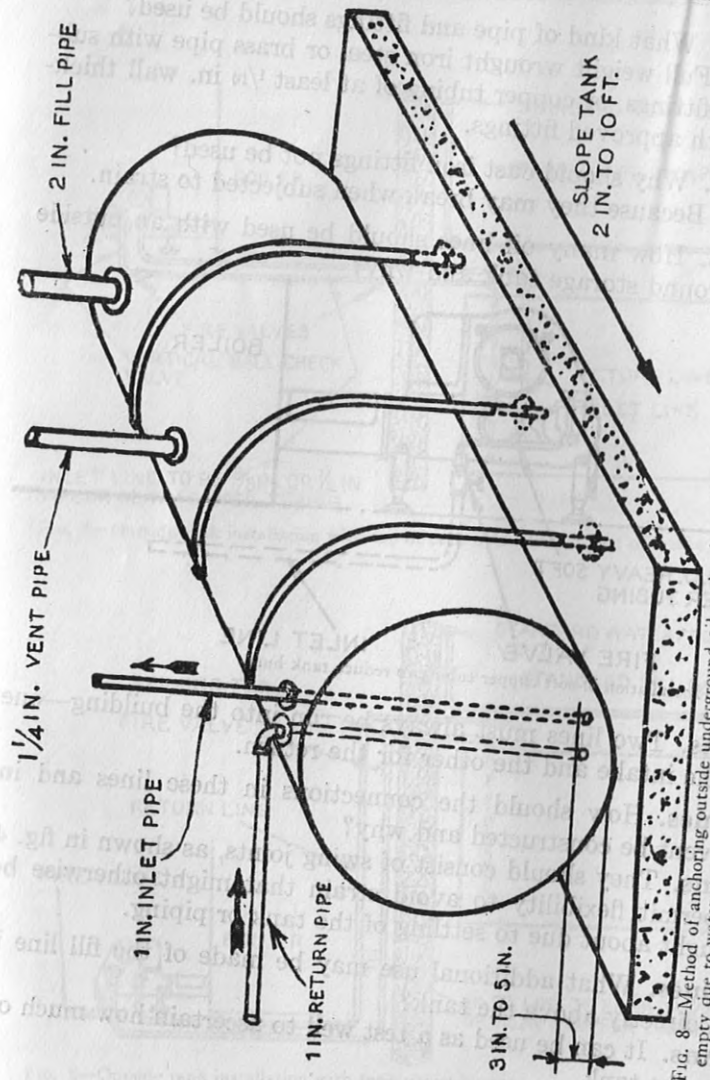


Fig. 8—Method of anchoring outside underground oil tank where the soil is such that underground tanks may rise when empty due to water pressure. Make several U bolts, either forge over the ends or put on nuts and large washers as stays. Place the U bolts around the tank as shown. Pour a concrete base as thick as may be deemed advisable and allow the stays on the ends of the bolts to be well covered with concrete.

Points on Piping.—There are some points covering the installation of a burner which may seriously affect the proper performance of the pump and of course influence the performance of the burner. The selection of the size of pipe for the inlet line is important. Selection involves four points:

1. Maximum volume to be handled.
2. Viscosity of oil.
3. Length of inlet line.
4. Number of elbows used.

In pumping highly viscous oils through a small pipe of considerable length, a great deal of pipe line friction is set up which will cause high operation vacuums at the pump.

An inlet line should never be less than ⅜ in. in diameter, even though the line be only a few feet long. The reason is that sediment gradually collects and restricts the oil flow.

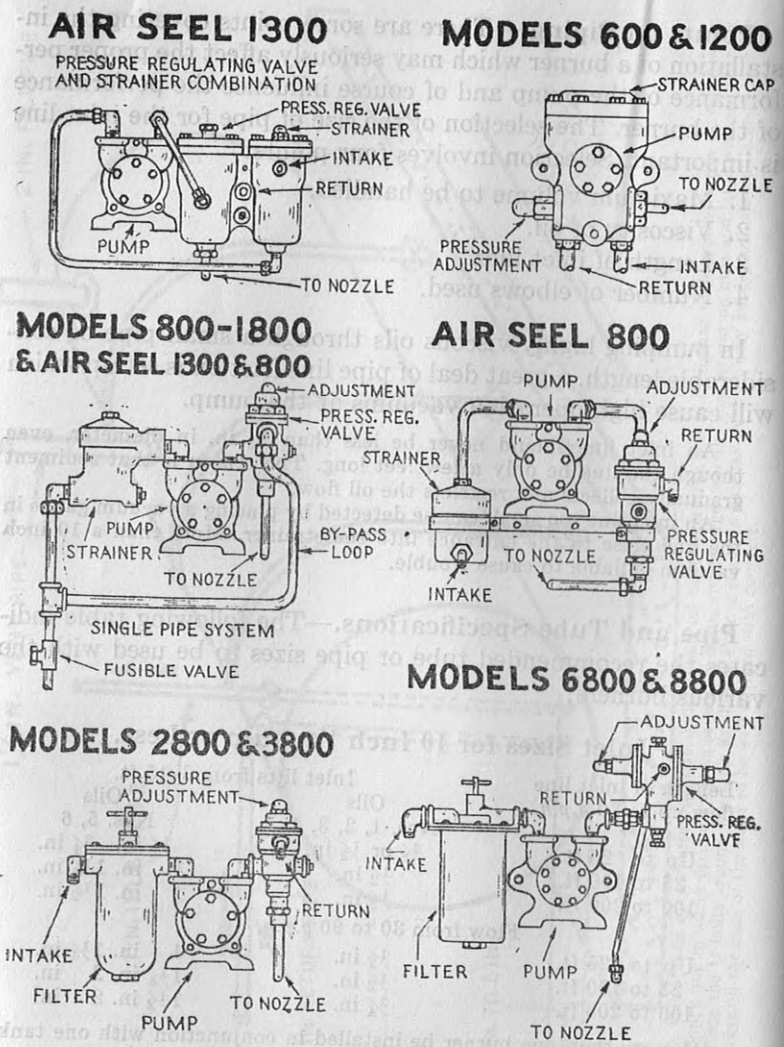
An inlet line too small can be detected by placing a vacuum gauge in the line close to the entrance into the strainer. More than a 10 inch vacuum is liable to cause trouble.

Pipe and Tube Specifications.—The following table indicates the recommended tube or pipe sizes to be used with the various burners:

Inlet Sizes for 10 Inch Vacuum or Less.

Length of inlet line flow up to 30 *g.p.h.*	Inlet lifts from 3–15 ft. Oils Nos. 1, 2, 3, 4	Oils Nos. 5, 6
Up to 25 ft.	⅜ or ½ in.	½ in. ¾ in.
25 to 100 ft.	½ in.	1 in. 1¼ in.
100 to 200 ft.	½ in.	1 in. 1½ in.
Flow from 30 to 90 *g.p.h.*		
Up to 25 ft.	½ in.	1 in. 1¼ in.
25 to 100 ft.	½ in.	1¼ in. 2 in.
100 to 200 ft.	¾ in.	1½ in. 2 in.

If more than one burner be installed in conjunction with one tank, each burner must have a separate inlet line.



FIGS. 9 to 14.—Silent Glow pump piping details for various models.

The Term Oil Burner.—It should be noted that the term "oil burner" is a glaring misnomer, but at this stage nothing can be done about it.

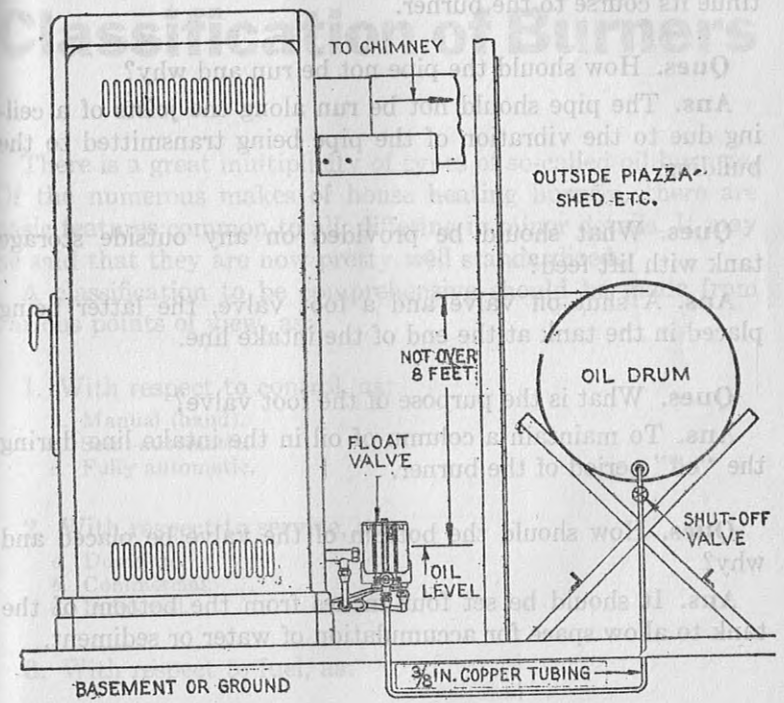


FIG. 15—Feeding heater from large storage drum. Whenever local regulations permit heater may be fed from large storage drum where the bottom of the drum can be placed at least a few inches higher than the float valve on heater to give gravity flow. Brackets can be supplied for attaching floats to most models in place of the usual tank equipment. Where heater is already equipped with six gallon tank and float, it is only necessary to break connections between six gallon tank and float and reconnect as shown to large storage tank. Underwriters also require that on such installations heater must be anchored to floor.

Ques. In an underground installation, if the top of the tank be higher than the oil inlet to the burner, how should the oil intake line be run?

Ans. It should incline slightly to the point where it enters the basement, at which point an anti-siphoning valve should be provided and from this point the intake line can then continue its course to the burner.

Ques. How should the pipe not be run and why?

Ans. The pipe should not be run along the joists of a ceiling due to the vibration of the pipe being transmitted to the building.

Ques. What should be provided on any outside storage tank with lift feed?

Ans. A shut off valve and a foot valve, the latter being placed in the tank at the end of the intake line.

Ques. What is the purpose of the foot valve?

Ans. To maintain a column of oil in the intake line during the "off" period of the burner.

Ques. How should the bottom of the valve be placed and why?

Ans. It should be set four inches from the bottom of the tank to allow space for accumulation of water or sediment.