either high pressure, low pressure, vapor, or vacuum conditions. Either the up-flow or the down-flow arrangement of mains may be employed.

Two-Pipe High Pressure Systems

Two-pipe high pressure systems operate at pressures above 15 psi, usually from 30 to 150 psi. Large industrial type buildings, which are equipped with unit heaters or large built up fan units, usually use high pressure steam systems.

Fig. 8 illustrates a typical high pressure system. Because of the high pressures and the great differential between steam and return mains, it is possible to locate returns above the heating units and lift the condensate to these returns.

The condensate can be flashed into steam in low pressure mains if any are available or passed through an economizer heater before being dis-

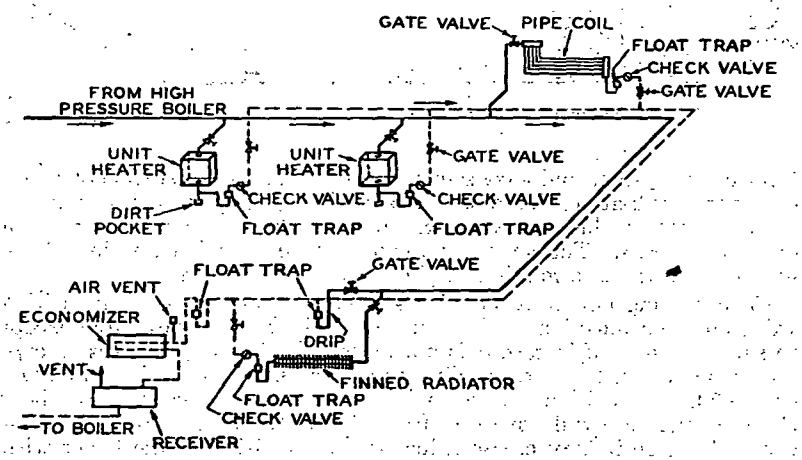

FIG. 8. TYPICAL HIGH PRESSURE HEATING SYSTEM

charged to a vented receiver. It is of course necessary to provide for the elimination of air from high pressure systems, the same as in low pressure systems.

Return traps used on high pressure systems are usually of the bucket, inverted bucket, float or impulse type.

Two-Pipe Low Pressure Systems

Low pressure systems operate at pressures of 0 to 15 psi. The piping arrangement of both up-feed and down-feed low pressure systems is identical with these of two-pipe vapor systems described in the following section. The only difference between the two systems is in the type of air valve used. The air valves used in low pressure systems do not contain the check discs and hence the system cannot operate under vacuum conditions. The low pressure systems are not as popular as the vapor systems, because they have the disadvantage of not holding heat when the rate of steam generation is diminishing. They also have the disadvantage of

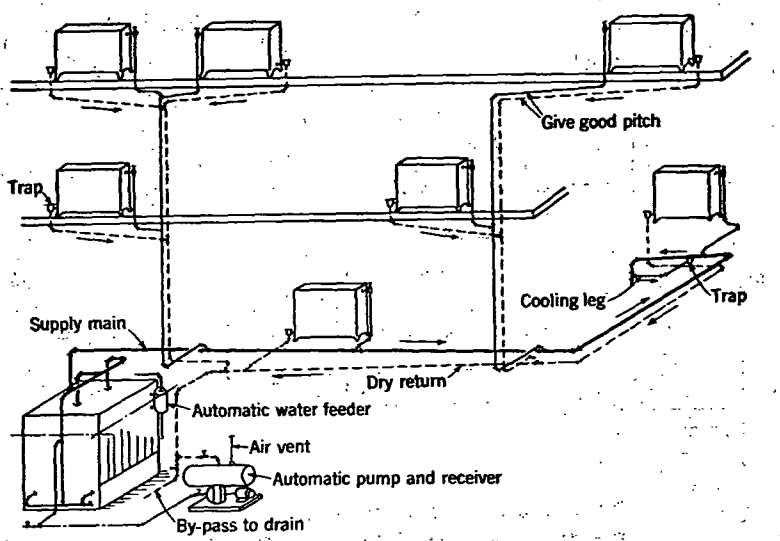

FIG. 9. TYPICAL INSTALLATION USING CONDENSATE PUMP

corroding to a greater extent than vapor systems due to the continued presence of new air in the system.

Low pressure systems have the advantage however of returning condensate to the boiler readily and not retaining it in the piping as may be possible in vapor systems.

Fig. 9 illustrates a typical low pressure system with condensate pump.

Two-Pipe Vapor Systems

Two-pipe vapor systems operate at pressures varying from 30 in. vacuum to 15 psi without the use of a vacuum pump. A typical two-

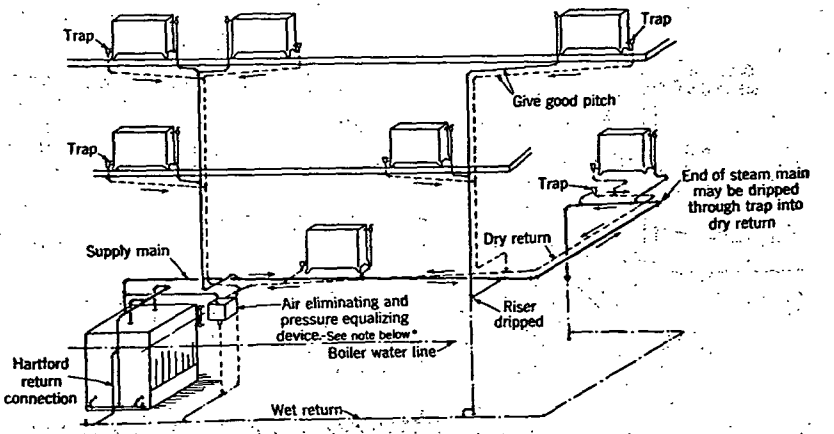

FIG. 10. TYPICAL UP-FEED TWO-PIPE SYSTEM WITH AUTOMATIC RETURN TRAP*

*Proper piping connections are essential with special appliances for pressure equalizing and air elimination.