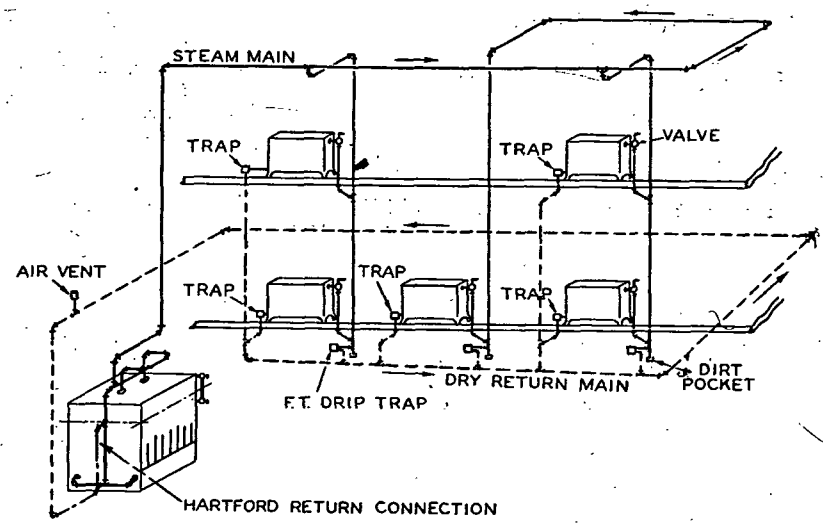

FIG. 11. TYPICAL DOWN-FEED TWO-PIPE SYSTEM

pipe up-feed vapor system is shown in Fig. 10, and a typical two-pipe down-feed system is illustrated in Fig. 11. The method of dripping drop risers in a down-feed system is illustrated in Fig. 12. Radiators discharge their condensate and air through thermostatic traps to the dry return main. Air is eliminated, when the system is under pressure, at the ends of the supply and return mains just before they drop to the wet return. The air valves are of the float and thermostatic type which opens when cool air contracts the thermostatic element and closes when steam expands the element. The float element of the valve closes the valve when, due to pressure differences, water rises to the point of overflow in the main. The air valves are also provided with a small check

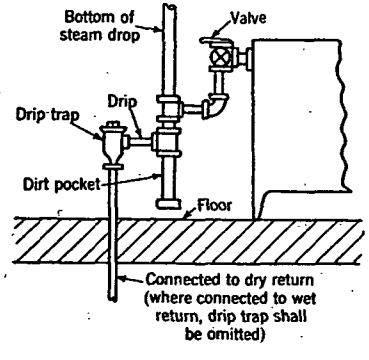

FIG. 12. DETAIL OF DRIP CONNECTIONS AT BOTTOM OF DOWN-FEED STEAM DROP

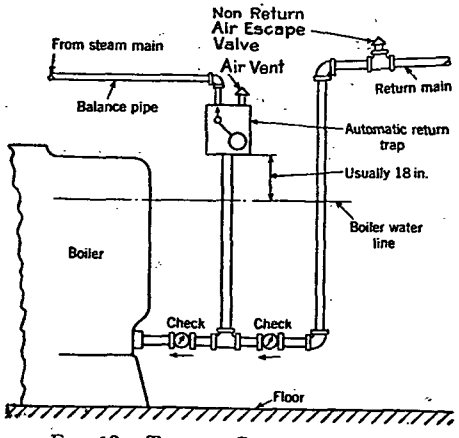

FIG. 13. TYPICAL CONNECTIONS FOR AUTOMATIC RETURN TRAP

disc which closes to prevent the inflow of air to the system when the pressure drops below atmospheric pressure. This enables the system to operate under vacuum conditions at lower steam temperatures for a period of four to eight hours depending on the tightness of the system.

Vapor systems may also be provided with an automatic return trap or alternating receiver which automatically returns condensate to the boiler when the boiler is steaming under pressure conditions which would prevent the return of condensate by gravity. The typical connections for an automatic return trap are illustrated in Fig. 13.

Each heating unit in a vapor system, as in all two-pipe systems, is provided with a graduated or modulating valve which permits the control of heat in the radiator by varying the opening of the valve.

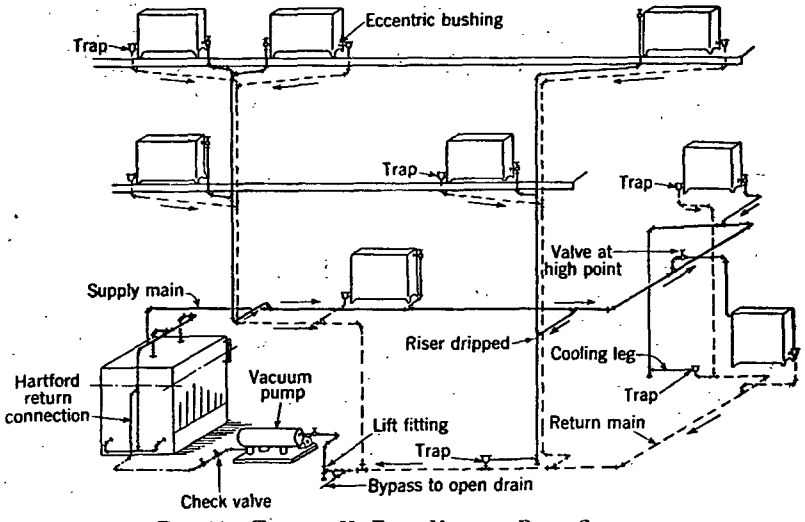

FIG. 14. TYPICAL UP-FEED VACUUM PUMP SYSTEM

Two-Pipe Vacuum Systems

Vacuum systems operate under conditions of both low pressure and vacuum, but employ the use of a vacuum pump to insure maintenance of sub-atmospheric pressures.

A typical two-pipe up-feed vacuum system is illustrated in Fig. 14, and a down-feed arrangement in Fig. 15.

The return risers are connected in the basement into a common return main which slopes downward toward the vacuum pump. The vacuum pump withdraws the air and water from the system, separates the air from the water and expels it to atmosphere and pumps the water back to the boiler, or other receiver, which may be a feed-water heater or hot well. It is essential that no connection be made from the supply side to the return side at any point except through a trap. The desirable practice demands a return flowing to the vacuum pump by an uninterrupted downward slope. In some instances local conditions make it necessary to drop the return below the level of the vacuum pump inlet, before the pump can