

by an air vent passing through a thermostatic trap into the dry return line as shown in Fig. 21. On vacuum systems the ends of the steam mains are dripped and vented into the return through drip traps opening into the return line. The same method may be used in atmospheric systems. A float type trap is preferable to a thermostatic trap for dripping steam mains and large risers. If thermostatic traps are used, a cooling leg (Fig. 22) should always be provided. The cooling leg is for cooling the condensation sufficiently before it reaches the trap so the trap will not be held shut by too high a temperature. On down-feed systems of atmospheric, vapor, and vacuum types, the bottoms of the steam risers are dripped in the manner shown in Fig. 23. On large systems it is desirable to install a gate valve in the cooling leg ahead of the trap.

CHAPTER 16

Hot Water Heating Systems and Piping

One- and Two-Pipe Systems, Selecting Pipe Sizes, Forced Circulation, Gravity Circulation, Expansion Tanks, Installation Details, Examples of Piping Design

HOT water heating systems may be divided into two general classes, the gravity systems in which circulation is caused by the difference in density of the water in the supply and return risers, and the forced circulation systems in which circulation is caused by a pump. Water is supplied at temperatures from 150 to 250 F, and the higher temperatures are generally used with the forced system.

Four principal elements of a hot water system may be recognized, and these are discussed in the various chapters as follows:

1. The boiler or heat exchanger in which the water is heated is similar to the steam boiler, and is discussed in Chapter 12.
2. The radiators, convectors, pipe coils or panels that deliver the heat to the spaces to be heated are covered in Chapters 13 and 45.
3. The design of the piping system through which the water flows from the boiler to the radiators and back to the boiler is considered in this chapter.
4. The control system by which the temperature in the heated spaces is regulated according to varying requirements is covered in Chapter 34.

SYSTEMS OF PIPING

There are two general systems of piping used for either gravity or forced hot water systems:

- (a) Two-pipe system.
- (b) One-pipe system.

With either of these piping systems the distributing mains may be located in the basement with up-feed to the radiators and risers, or the supply main may be located in the attic with the return main located in the basement. For radiators located on the basement floor the mains may be run at the ceiling, as one of the advantages of a forced hot water heating system is that the returns need not be below the radiators as required with a steam system. In some one-pipe systems there is one supply main in the basement with separate flow and return riser connections to the radiators.

In the two-pipe system there are separate supply and return pipes