

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 bottom 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

SYSTEMS for heating with hot water radiators may be divided into two general classes, the first known as gravity systems in which circulation is caused by the difference in density of the water in the flow and return lines, and the second known as forced circulation systems in which circulation is caused by a pump. Flow water temperatures vary from 150 to 220 F and the higher temperatures are generally used with the forced system.

For the sizing and selecting of boilers, radiators and piping, refer to Chapters 12, 13 and 18 respectively.

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 cellar 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 cellar. With the latter system of piping, the one-pipe system would be only one pipe for the risers. For basement radiators located on the 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. With some one-pipe systems there is one main in the cellar but separate flow and return risers and connections to the radiators.

In the two-pipe system there is separate supply and return pipes throughout so that the same water flows only through one radiator, resulting in the same water temperature in all radiators. With the one-pipe system part of the water flows through more than one radiator, so that the water temperature toward the end of the main is not as hot as near the boiler. However, with the one-pipe system, by maintaining a rapid circulation and small difference in temperature between the water leaving and returning to the boiler or other heat generator, the tendency to have variable temperatures in the radiators is much reduced.

The two-pipe system for larger buildings should, if possible, be arranged for reversed return. The direct and reversed return systems are shown