steam flow. Any steam main in any heating system can be elevated if dripped. Fig. 22 shows a connection where the steam main is raised and the drain is to a wet return. If the elevation of the low point is above a dry return, it may be drained through a trap to the dry return in two-pipe vapor, vacuum and sub-atmospheric systems. Horizontal steam pipes may also be run over obstructions without a change in level if a small pipe is carried below the obstruction to care for the condensate (Fig. 23). Horizontal return pipes may be carried past doorways and other ob-

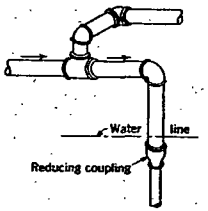


FIG. 22. DRIPPING MAIN WHERE IT RISES TO HIGHER LEVEL

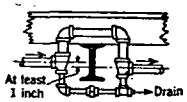


FIG. 23. LOOPING MAIN AROUND BEAM

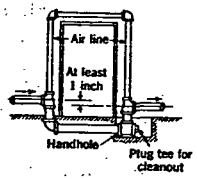


FIG. 24. LOOPING DRY RETURN MAIN AROUND OPENING

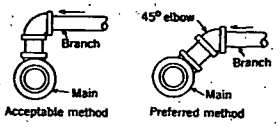
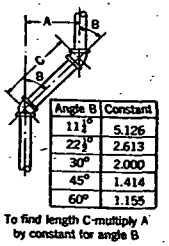


FIG. 25. METHODS OF TAKING BRANCH FROM MAIN



Angle B	Constant
11¼°	5.126
22½°	2.613
30°	2.000
45°	1.414
60°	1.155

FIG. 26. CONSTANTS FOR DETERMINING LENGTH OF OFFSET PIPE

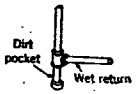


FIG. 27. DIRT POCKET CONNECTION

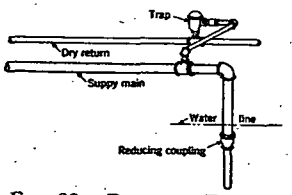


FIG. 28. DRIPPING END OF MAIN INTO WET RETURN

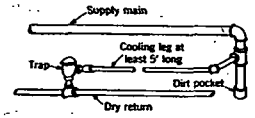


FIG. 29. DRIPPING END OF MAIN INTO DRY RETURN

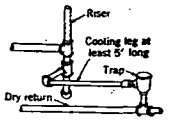


FIG. 30. DRIPPING HEEL OF RISER INTO DRY RETURN

structions by using the scheme illustrated in Fig. 24. It will be noted that the large pipe, in this case, runs below the obstruction and the smaller one over it.

Branches from steam mains in one-pipe gravity steam systems should use the *preferred connection* shown in Fig. 25, but where radiator condensate does not flow back into the main the *acceptable* method shown in the same figure may be used. This acceptable method has the advantage of giving a perfect swing joint when connected to the vertical riser or radiator connection, whereas the preferred connection does not give this swing

without distorting the angle of the pipe. Runouts are usually made about 5 ft long to provide flexibility for movement in the main.

Offsets in steam and return piping should preferably be made with 90-deg ells but occasionally fittings of other angles are used, and in such cases the length of the diagonal offset will be found as shown in Fig. 26.

Dirt pockets, desirable on all systems employing thermostatic traps, should be so located as to protect the traps from scale and muck which will interfere with their operation. Dirt pockets are usually made 8 in. to 12 in. deep and serve as receivers for foreign matter which otherwise would be carried into the trap. They are constructed as shown in Fig. 27.

On vapor systems where the end of the steam main is dripped down into the wet return, the air venting at the end of the main is accomplished

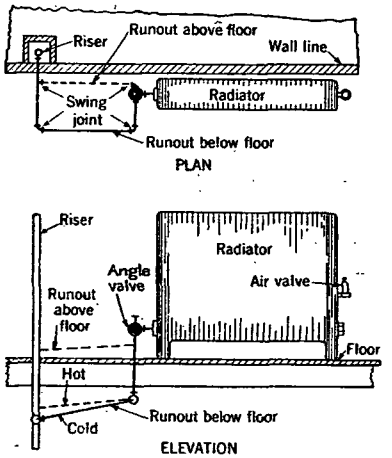


FIG. 31. ONE-PIPE RADIATOR CONNECTIONS

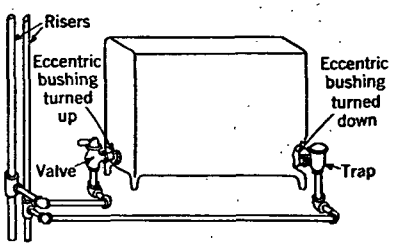


FIG. 32. TYPICAL CONNECTIONS FOR TWO-PIPE SYSTEM

by an air vent passing through a thermostatic trap into the dry return line as shown in Fig. 28. 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. 29) should always be provided. The cooling leg is for cooling the condensate 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. 30. On large systems it is desirable to install a gate valve in the cooling leg ahead of the trap.

CONNECTIONS TO HEATING UNITS

Riser, radiator and convector connections must not only be properly pitched at the time they are installed but must be arranged so that the pitch will be maintained under the strains of expansion and contraction. These connections may be made by swing joints which permit the expansion or contraction to occur under heating and cooling without bending