

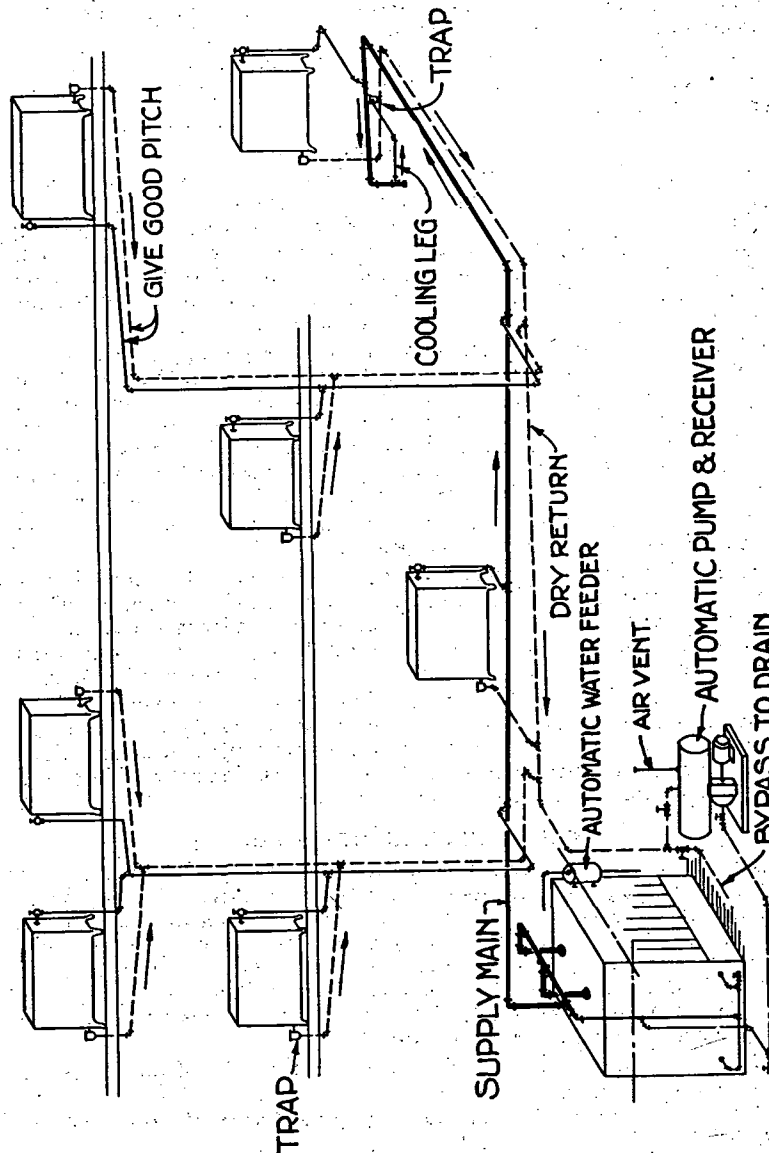


FIG. 4. TYPICAL INSTALLATION USING CONDENSATION PUMP

Length of Run

The length of run must not only include the actual linear feet of straight pipe, but also the proper allowance for fittings, valves friction and other items which cause drop in pressure. (See Table 6.)

Pressure Drop

There are, theoretically, several factors to be considered, including: the initial pressure, the pressure required at the end of the line, fluctuations in the initial pressure, the distance between the low point of steam main and dry return and the water line of the boiler (where the condensation is to be returned by gravity), and any extra load on the system during heating-up periods.

With a high initial pressure it is theoretically possible to allow much greater drops in pressure if there is sufficient distance between the low point of steam main and dry return and the water line of the boiler. In attempting any very great drop in pressure, the following practical difficulties present themselves:

1. If the system is designed to secure the same drop in pressure for each unit of radiation (including those nearest, as well as those farthest from the source of supply) the velocity necessary to equalize these drops in the shorter runs will be so high that serious trouble will be encountered from noise and the entrainment of the condensate.
2. If the system is so designed as not to equalize these pressures, the condensate returning from radiators near the source of supply will be at a correspondingly higher temperature than that from radiators farthest from the source of supply, thus causing re-evaporation and pressures in the return system with consequent backing-up from one radiator to another, the holding-up of the return and the filling of the return lines, with too large a percentage of steam instead of condensate.

It has been found, that while it may be theoretically possible to design a system for relatively large pressure drops, it is generally more satisfactory to design heating systems on the basis of a low initial pressure and reasonably low total drops in pressure. The matter of fluctuations in pressure should be taken into consideration wherever the steam is to be supplied directly from the boiler, to the radiators at boiler pressure and the system should be designed to operate properly with the lowest pressure under which the boiler may operate.

In the matter of initial pressure and return of condensation it is undoubtedly true that with a constant initial pressure (such as is produced by a high pressure supply by means of a pressure reducing valve, or from the boiler direct where the pressure is maintained constant), somewhat higher drops in pressure and correspondingly smaller pipe may be successfully used. It is also undoubtedly true that, with mechanical circulation where a constant vacuum is maintained, fluctuations in initial pressure and the difficulties from high velocities are reduced, so that the pressure drops may be higher and the pipe sizes smaller.

Maximum Velocity

The capacity of pipe of a given size in any part of a steam or vapor heating system depends on water of condensation present in, as well as