DUNHAM

PRODUCT APPLICATION MANUAL

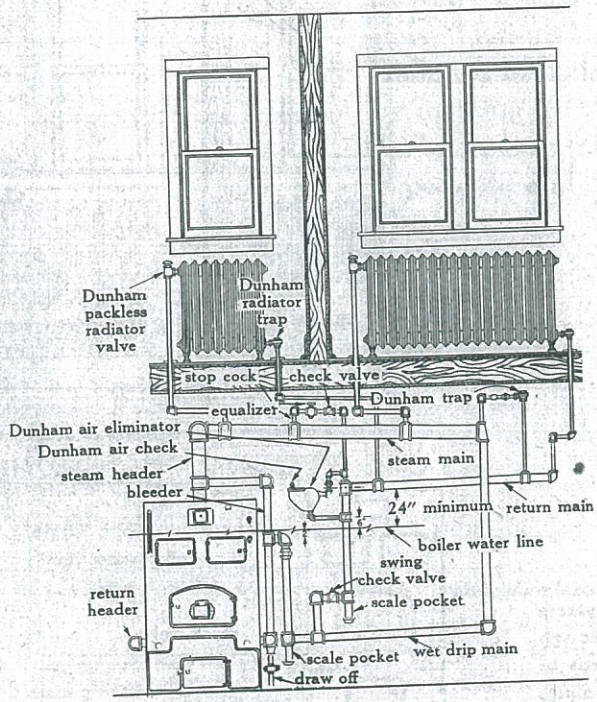
a handbook on heating

C. A. DUNHAM COMPANY
CHICAGO, ILLINOIS

VAPOR SYSTEM

This is one of the early steam systems where thermostatic traps were used at each radiator and at the ends of steam mains. This system can be used in buildings where 24″ or more can be provided between the boiler water line and the end of the return main.

Advantages are: (1) **Even, quiet circulation** of steam without objectionable water hammer or air binding. (2) **Ability to continue supplying heat after the fire under the boiler has declined.** Since the system is closed and air cannot enter, a moderate vacuum is created by the condensing of the steam. When this moderate vacuum exists, steam is generated at lower temperatures. (3) **Room temperatures can be controlled automatically** by a thermostatic control of the fire or burner. (4) **Air valves are not necessary.** (5) **Orifices can be used to balance distribution.**

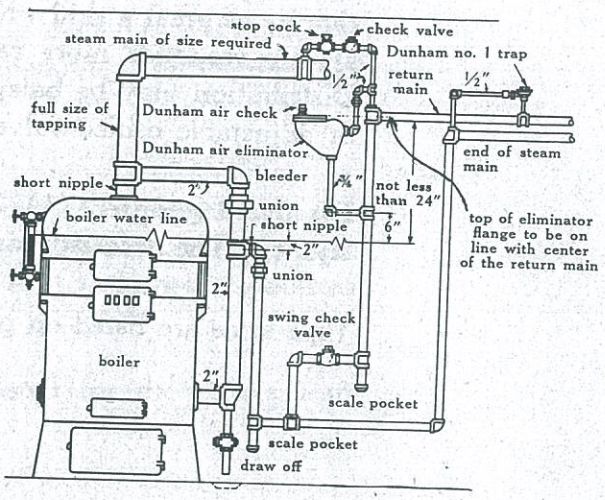


Vapor system piping connections. Thermostatic traps permit passage of water and air into the return piping but prevent the passage of steam. The return pipe carries water and air only, and the air is expelled through an air eliminator, the water returns to the boiler by gravity.

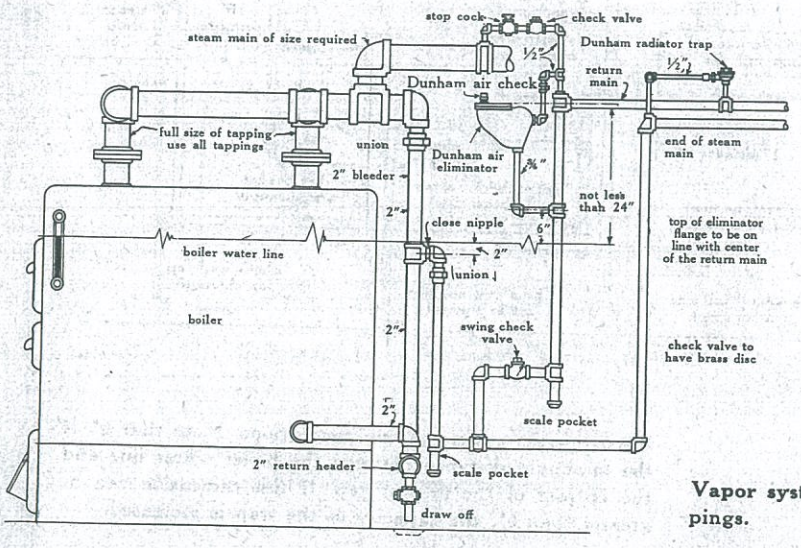
Disadvantages are: (1) **Only low steam pressures are possible.** (2) **Operating steam pressure is limited by the headroom in the basement.** (3) **Condensate must return to the boiler by gravity.** (4) **Relatively large pipe sizes are necessary.**

NOTE: Since water must return to the boiler by its own weight, it will tend to back up in the vertical return pipe when there is steam pressure in the boiler. Therefore, the air eliminator must be installed well above the boiler water line. The minimum dimension is 6″ from the center of the tee at the bottom of the air eliminator to the boiler water line.

Pipe sizes are listed on page 92.



Vapor system piping to a boiler with **one** supply tapping.



Vapor system piping to a boiler with **two or more** supply tappings.

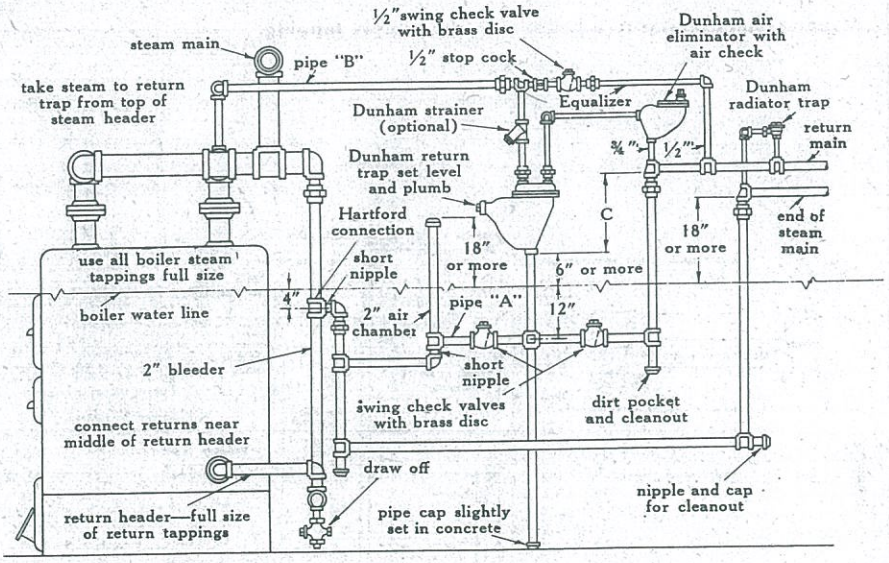
RETURN TRAP SYSTEM

This system is similar to the vapor system except that the return trap provides a more positive return of condensate to the boiler. A return trap system can be used in any size building providing the EDR capacity of the system is not greater than the return trap capacity.

Advantages are: (1) **Ability to operate at higher steam pressure than the vapor system.** (2) **Smaller pipe sizes are possible** (because of higher steam pressures). (3) **The system does not require as great a skill** when the boiler is hand fired. (4) **The system responds more readily** to thermostatic control. (5) **Distribution may be balanced** by the use of regulating plates or adjustable orifice valves.

Disadvantages are: (1) **The physical limitations in trap capacity.** (2) **The necessity for sufficient height for piping.**

Pipe sizes are listed on page 93.



Return trap system piping connections. Note that 6" is the minimum distance between the boiler water line and the bottom of the return trap. If this dimension can be greater than 6", the capacity of the trap is increased.

CONDENSATE RETURN SYSTEM

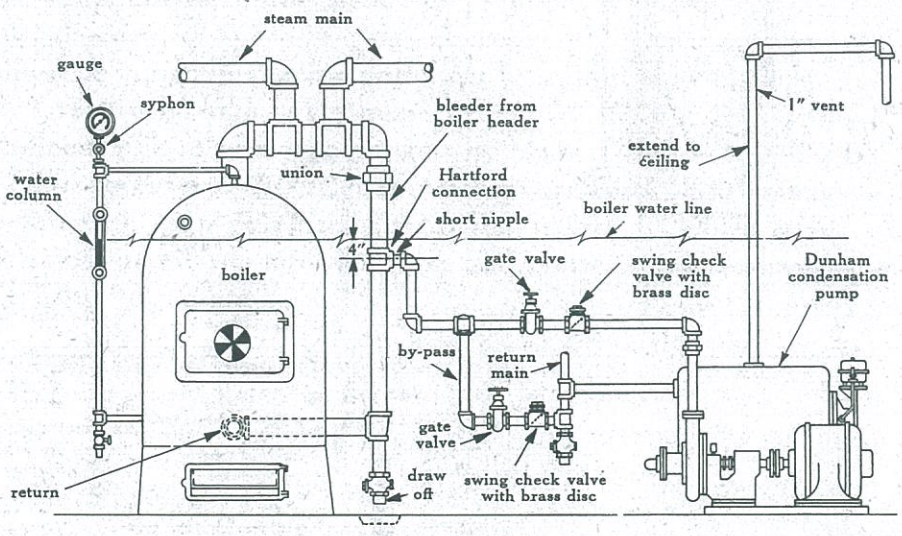
When the system is limited as to capacity or height of the boiler water line or of a size so that a return trap cannot be used, a condensation pump may be employed to return the condensate to the boiler. (See pages 161-178 for complete data on condensation pumps).

The condensation pump must be located so that the system return line is pitched sufficiently for condensate to flow into the receiver by gravity.

Advantages are: (1) **Returns may be located below the water line.** (2) **Higher steam pressures are possible** (limiting pressure is the safety valve setting which is 15 psi on low pressure boilers).

Disadvantages are: (1) **A vacuum cannot be produced** in the return line to speed steam circulation. (2) **The system cannot function on sub-atmospheric pressure.** (3) **Larger pipe sizes are necessary.**

Pipe sizes are the same as those listed for the return trap system. (See page 93).



Condensate return system piping connections.