

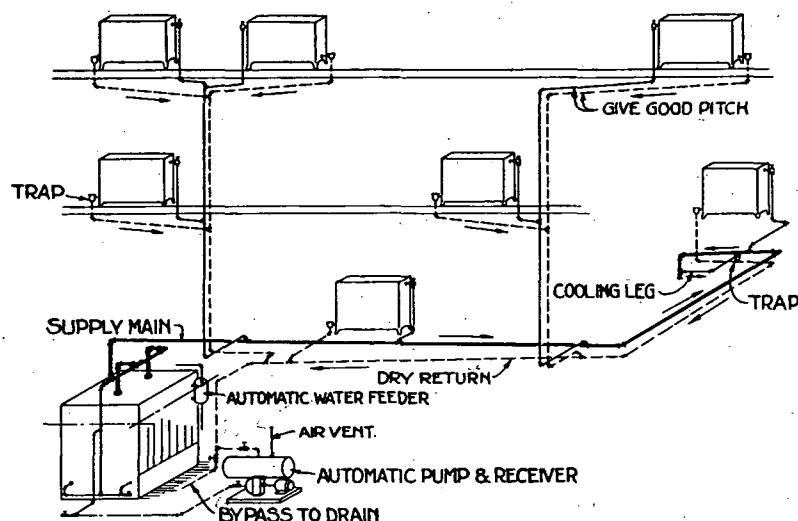


FIG. 5. TYPICAL INSTALLATION USING CONDENSATION PUMP

system by means of thermostatic or other forms of traps on the return ends of all heating units, (2) that the air is eliminated with the condensation through the heating unit returns into the return system and thence to the atmosphere through automatic vent valves or other forms of auto-

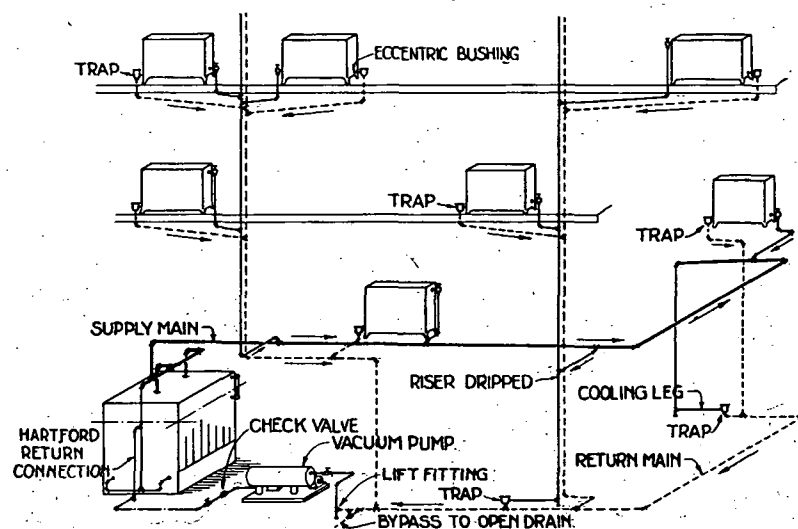


FIG. 6. TYPICAL INSTALLATION USING VACUUM PUMP

matic air venting apparatus, instead of through individual air valves on the radiators in the rooms, (3) that the backing up of water in returns may be prevented by the carrying of exceedingly low supply pressures, (4) that real fractional control is possible.

In vapor systems boiler protection is given by devices supplementing the damper regulator and may be in the form of an alternating receiver, return trap, equalizing or differential device. An approved return connection (Fig. 7) is quite extensively used in place of a check valve for partially preventing water from leaving the boiler.

Vapor systems are often provided with venting valves which prevent air from returning through the vent port or return traps thus permitting the formation of a partial vacuum when generation of steam pressure above atmospheric ceases. Such installations are termed vapor-vacuum systems.

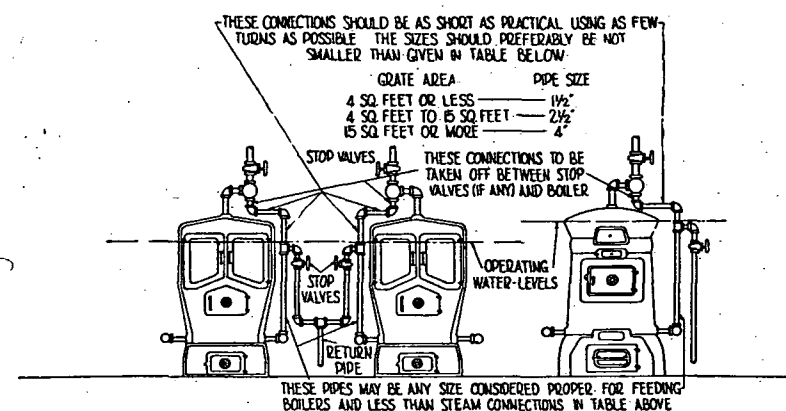


FIG. 7. CONNECTING TWO BOILERS USING THE APPROVED RETURN CONNECTION

Vacuum Pump Systems.—These are similar to vapor systems in every way, except that a pump is used to produce a vacuum on the return system for removing air and water. They permit wider variation in pressure differences between steam and return mains.

They are installed in buildings where it is required to operate at low initial pressures or where, by reason of the layout, radiators must be located below the water line of the boiler. These systems are also well adapted to large groups of widely separated buildings. They are common where exhaust steam is available, as they may be operated on a low back pressure, without appreciably decreasing the capacity or economy of steam engines. A vacuum pump is used to accelerate circulation by discharging both water and air, the water being returned to the boiler and the air vented to atmosphere.

Because of the greater pressure differential of vacuum systems the result of faulty grading of piping connections is less serious than in the other systems mentioned.