separating tank is generally used. The tank must be located high enough so that the pressure produced by the water column in the discharge pipe will be sufficient to overcome that in the low-pressure boiler feed water heater or other point of disposal. Fig. 4 shows the proper arrangement of vacuum pump, air separating tank and feed water heater.

The air escapes through a vent in the top of the tank and the water flows by gravity to the feed water heater through the loop seal attached to the discharge outlet in the tank. If the rate of flow of returns to the tank exceeds the rate of discharge from the tank the excess overflows through an opening on the end near the top.

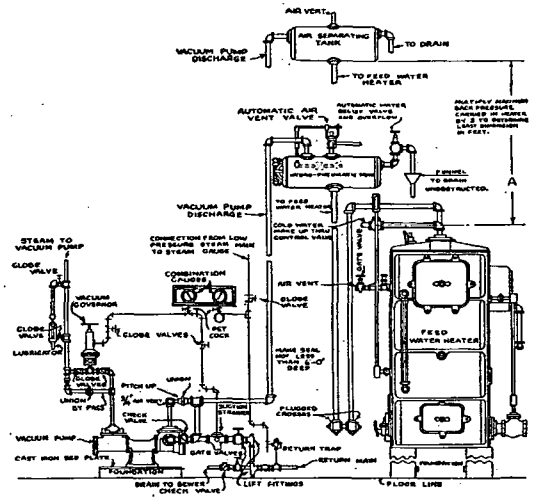

FIG. 4. METHOD OF CONNECTING VACUUM PUMP, FEED WATER HEATER AND SINGLE CONTROL HYDRO-PNEUMATIC TANK OR AIR SEPARATING TANK

Where an open tank cannot be located at a height sufficient to provide gravity head to discharge the tank contents against the maximum pressure in the heater or boiler, the hydro-pneumatic tank is used. A float controlled valve is placed on the air outlet of the separating tank and so arranged that when the water of condensation has not sufficient head to flow by gravity to the point of use, the air will be confined in the upper part of the tank. As the pump continues to deliver water and air to the tank the pressure within the tank increases until sufficient to discharge the water, thus lowering the water-line and eventually permitting escape of the surplus air through the float controlled air valve. The confined air pressure in the tank plus the gravity head in the tank discharge pipe must be sufficient to cause flow to the place of disposition. This confined air pressure plus the column of mixed air and water in the pump discharge to the tank is the total head against which the pump must act. Fig. 4 shows a hydro-pneumatic tank, Figs. 5, 6 and 7 show vacuum pump connections for several different conditions of service.

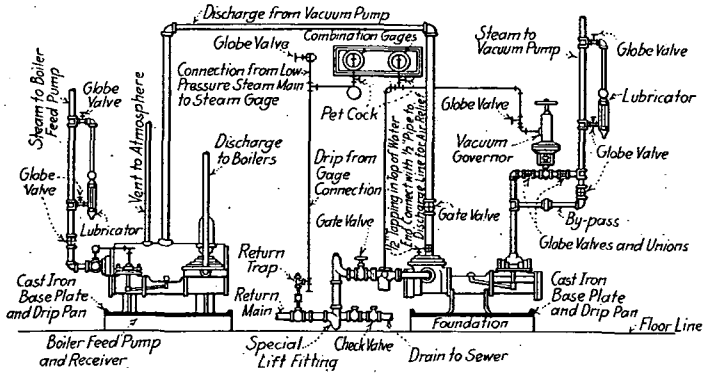

FIG. 5. METHOD OF CONNECTING VACUUM PUMP AND AUTOMATIC BOILER-FEED PUMP AND RECEIVER

Table 10 gives the sizes of plain or hydro-pneumatic tanks for air separating purposes and also those for storage of returns. In the latter case the tanks are based upon storing the quantities of water which will be discharged during five minutes at the basis of hourly rates given in the first column.

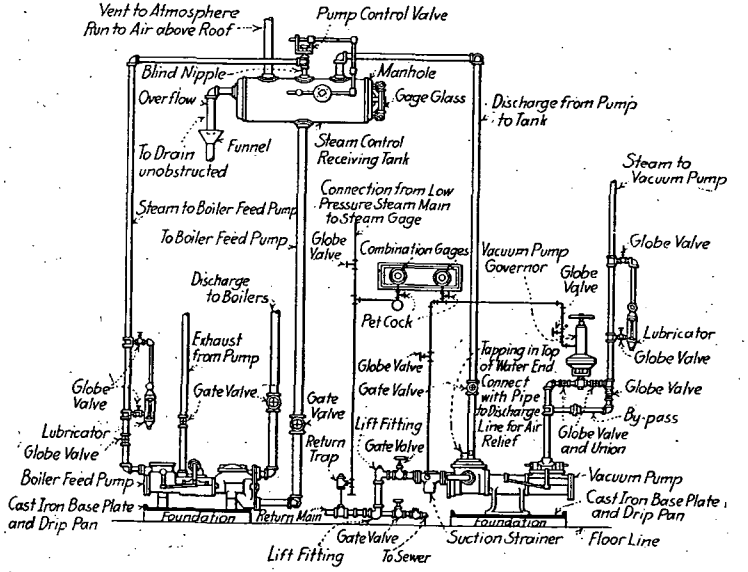

FIG. 6. METHOD OF CONNECTING VACUUM PUMP, BOILER-FEED PUMP AND STEAM-CONTROL RECEIVING TANK