

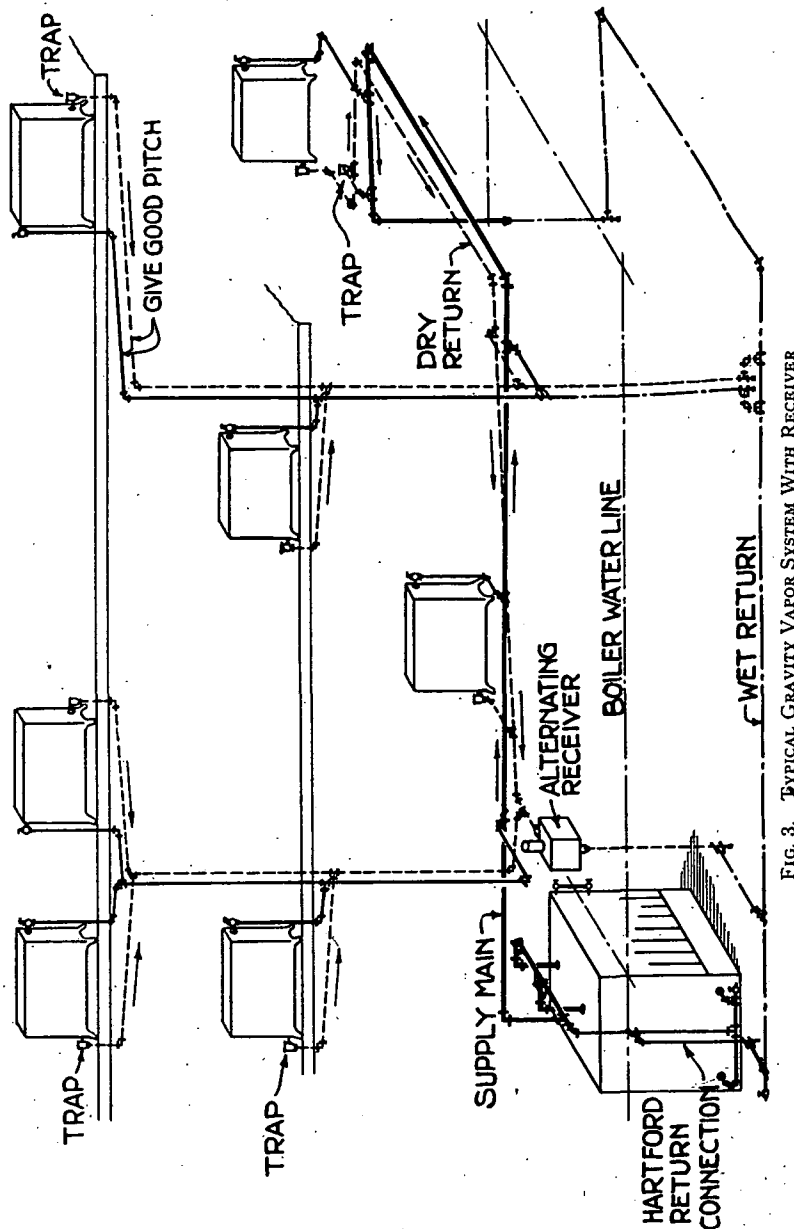


FIG. 3. TYPICAL GRAVITY VAPOR SYSTEM WITH RECEIVER

CHAPTER III—STEAM HEATING SYSTEMS AND PIPING

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.

STEAM DISTRIBUTION

The broad divisions that may be very definitely made in a discussion of pipe sizes for the heating of buildings with steam systems are (1) the distribution of the steam and (2) the use of the steam. The following capacity tables of steam mains and branches, radiator connections, etc., under average conditions can be applied for sizing pipes by the person who not only wants the data for immediate use but who may also want the basic data from which the calculations were made.

The conveyance of steam for any considerable distance is a problem by itself, needing separate analysis and altogether different handling from any of the problems concerning the use of the steam after it has arrived at the building. Steam flow tables should be used for this distribution, and tables giving the capacities of steam mains and branches, radiator connections, etc., (See Tables 1 to 20), under standard and average conditions of use should be applied for sizing the pipes within the buildings.

For this reason, data on the subject may be distinguished as:—
(1) *transmission mains*; (2) *service piping*.

Transmission mains are those that have to do with the conveying of steam for a distance of considerable extent, through or between buildings and for collecting and returning the water of condensation from the several sections or buildings. Service piping is that part of the apparatus by which the radiating units are connected to the transmission mains.

The velocities of flow used in the distribution of steam are only limited by the available or allowable drop in pressure, while the velocities within the buildings where the steam is used are limited to such values as will allow of sufficient separation of the condensation so that defective circulation or water hammer will not occur.

STEAM HEATING PIPE SIZES

Generally, in using tables for steam heating pipe sizes, it is difficult to determine the length of run upon which they are based. Usually some allowance is made for one or more such items as: condensation in the pipe, equivalent length of pipe, for fittings, valves, etc., but it is generally difficult to determine what factors have been allowed for, and what percentage of allowance has been made. In compiling the Tables 1-20 and other data for THE GUIDE, 1928, every attempt has been made to eliminate such indefinite and conflicting factors.

The principal factors upon which the determination of pipe sizes for steam heating depends, are:

1. The equivalent length of the run from the boiler, or source of steam supply, to the farthest radiator.
2. The total pressure drop, which may be allowed, between the source of supply and the end of the return system.
3. The maximum velocity of steam allowable for quiet and dependable operation of the system.
4. Unusual conditions in the building to be heated.