

level. The pressure system is where there is some device which forces the water on its own course over the pipe system. This is usually a mercury generator or some form of pump. Both of these machines have their advocates, and many have success with either. The gravity system has its limitations, however, and the first one is that the water cannot be carried over 150 ft. of coil away from the boiler with good success. Some plants are working to-day at 200 ft. away from the boiler, but the best results are not being obtained because of overloading the boiler. Some growers claim that the highest point of the heating system should be at the boiler, thus giving the water a drop all the way into the boiler again. The pipes should have a drop of ten inches per 100 ft., for successful running of the gravity system. With the mercury generator or some form of circulator the water can be forced over 400 ft., this being over twice the distance of the gravity system. The pipes do not need so much grading in this form of heating. In this system the water is forced through at a greater rate than by gravity, and it comes back to the boiler containing more degrees of heat than that which has passed over the system working according to the laws of gravity. This point means more than is often thought, and should be investigated thoroughly before any system is selected. The longer the water takes to travel around a heating system the less number of degrees of heat it contains when it again comes to the boiler. All this water has to be heated over again, and thus it is quite apparent the more degrees the water has to be raised in temperature the more units of heat required and this falls back again and increases the consumption of coal.

The gravity system is to be recommended for small houses such as 30 or 40 by 100 or 150 but may be used up to 30,000 square feet of glass. For larger houses, and where there are several in a range and hot water is wanted, some form of circulator is recommended. There are some good pumps on the market, and as a rule they are run by steam. A small steam boiler is necessary for the pump alone. One of these is giving good service at the Goldwood greenhouse near Cleveland, Ohio. Another method used in the vicinity of Rochester is that of a centrifugal pump operated by a  $\frac{1}{2}$  h.p. electric motor. This system has given entire satisfaction, and the cost for power is very small. This method is not a common one and should be inquired into thoroughly before being attempted. Hot water heating is never recommended for plants having much over 100,000 sq. ft. of glass but this will no doubt be overcome in the future.

**STEAM HEATING.**—For long houses and for large houses or large ranges the use of steam is advised. In these cases where the heat has a long way to travel it can be carried to a better advantage and with a less cost of fuel by the steam system. There are several systems of steam heating which may be installed, but there are only two of these that have been satisfactorily applied to greenhouse heating. These are the high pressure and the low pressure systems.

The low pressure system is used to a great extent and this is one that operates at a pressure of 1-10 lbs., usually 5-6. This works by gravity and the condensation is carried back to the boiler without any circulator of any kind. This system necessitates that the boiler must be several feet below the lowest return in the house. This is the limiting factor for this system as it is not always convenient to have the boilers in a pit as this entails. This pit may be overcome and the boilers placed on a level with the houses by the addition of a steam trap which lifts the water into the boiler from the returns. This arrangement is found