FROST-PREVENTION FOR ORCHARDS.

(Continued.)

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II.—FROST AND ITS OCCURRENCE.

THE fruitgrower who successfully controls disease in his orchard is one who knows something of its nature and methods of attack. In the same way, any one making an endeavour to prevent damage to his orchard or garden by frosts should at least have an elementary knowledge of the physical principles involved in the production of frost before he can hope to make a success of orchard heating.

When the temperature of the air falls below 32° F. there is said to be a frost. A frost may be a "white frost," when it is made patent by the appearance of crystals of ice or hoarfrost on exposed objects, or a "black frost" which can only occur when the atmosphere is very dry. In a black frost the dew-point is below the air temperature at the time of the frost. As is more fully explained below, a frost in temperate latitudes is usually confined to the layers of air near the surface. If the whole mass of the air, including that in the higher layers, is below freezing-point the condition is described in America as a "freeze." A freeze may accompany either a black or a white frost.

Temperature Inversion.

Should the day be warm and sunny the ground-surface is heated very considerably by radiation from the sun until its temperature becomes higher than that of the air in contact with it When this occurs the latter is warmed by conduction of heat from the ground. This heated air rises, and is continually being replaced by cold air from above. The former continues to rise until it reaches air of the same temperature as itself. Any layer of cold air near the surface is thus gradually warmed up, so that by the middle of the morning the temperature of the air is highest near the ground. This state of affairs continues until about 3 p.m., when the amount of heat radiated from the ground begins to exceed that received from the sun and the ground temperature begins to fall. Soon the ground begins to cool the air in contact with it, thereby reversing the order of things and making the air near the ground colder than that higher up.

Fortunately for the grower intending to heat his orchard, atmospheric cooling does not usually extend to great heights, the temperature rising from the ground upwards until a height is reached when there is very little variation. This phenomenon is known as "temperature inversion," and is what makes orchard heating possible. The feasibility of heating depends on the existence at a moderate elevation above ground of a layer of air which is above freezing-point. With the same ground temperature, heating will be easier the more marked the inversion. The warmed air from the heaters rises, at the same time imparting heat to the surrounding air, until it reaches a height where its temperature is the same as that of the air with which it comes in