arc is more difficult to control (when the charge consists of cold metal), and the carbon of the electrodes is apt to affect the chemical composition of the charge. On the other hand, the heat is transmitted more directly, thus obtaining a greater economy, and only one movable electrode is needed for each arc.

Resistance Furnaces.

In these, the heat is produced by the passage of the electrical current through some solid or liquid resistor. They may be divided into two main classes, in one of which a special resistor is provided, and in the other the charge itself constitutes the resistor. The second class may be subdivided into two classes; in one of these the current is used merely to heat the charge, while in the other it also produces electrolysis of the fused contents of the furnace. These will be treated, for convenience, as three independent classes.

I.—Furnaces With Special Resistor.

The resistor is a solid, and is imbedded in the walls of the furnace, or in the charge itself.

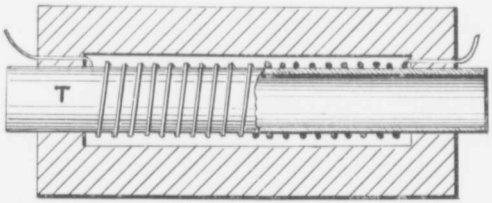

Fig. 12.—Electrical Tube Furnace.

(1) **Furnaces with the resistor imbedded in the walls.** The furnace shown in Fig. 12 may be taken as an example, it consists of a tube T, often of porcelain, a spiral of platinum wire, and a heat retaining envelope or covering. An electric current passes through the wire and heats it to any desired temperature below its melting point, 1775°C., or 3227°F., and ultimately the tube and its contents may be heated nearly to the same temperature. The substance to be heated is placed in the tube T. This arrangement is convenient for heating a material in any particular gas, and for observing the operation; as this can be done through glass,