cell is fully charged the positive plates have a coating of peroxide of lead, the negative being porous or spongy lead, as described before, and the electrolyte is of its full strength or specific gravity. During discharge, that is, when the positive and negative poles of a cell are connected through an external circuit, an E. M. F. is set up in the cell, a current flowing into the circuit from the positive plate.

The chemical action which takes place during discharge is as follows: The sulphur radical in the electrolyte enters into combination with the active material on both plates forming sulphate of lead, the specific gravity of the electrolyte being correspondingly reduced. When all the active material has been acted upon in this manner the cell is discharged, for an equilibrium has been created between the two plates and the electromotive force has fallen to zero.

When a cell is being charged, the chemical action is reversed. The current enters the cell at the positive plate, passing through the electrolyte to the negative. The passage of the current through the electrolyte decomposes it, oxygen and hydrogen gas being given off. The oxygen is given off at the positive plate and converts the sulphate of lead into peroxide of lead again, the sulphur going back into the electrolyte; the hydrogen which is given off at the negative plate enters into combination with the sulphate of lead, reducing it to pure lead, the sulphur returning to the electrolyte and increasing its specific gravity. This action restores both plates and electrolyte to the original condition of full charge. If the charging current is continued after the cell is fully charged, that is when all the active material has been converted to peroxide of lead and spongy lead respectively, no further effect will be produced except to decompose the water, the resulting gases pass off through the water, giving it a milky appearance. This indicates that the cell is fully charged. Continuing the charging current beyond this point, that is, overcharging the cells at the proper rate, does no harm to the plates, but the energy represented by the current is wasted.

When the cell has been properly charged, the positive plate is of a brown or deep red color, while the negative is a slaty gray. Naturally the chemical action can take place only at a certain rate, depending on the amount of active material and the construction of the plates. If it is attempted to give or to take from a cell too much current, the efficiency and durability are affected.

Generally speaking, there are two distinct methods of preparing the active material of storage battery plates. One of these consists in applying mechanically some material to the surface or