nia escapes into the air. The great advantage of this battery is that the attacking liquid is formed only when the circuit is completed, and the battery only burns itself up during the time it is actually in use. At the same time its electromotive force is high, namely, one and a half volts. The Smée cell gives ½ a volt; the bichromate 2 volts; the Bunsen nearly 2 volts.

Now just as we measure steam or water power in pounds per square inch, and heat by thermometric degrees, electromotive force is measured by volts. A volt is the pressure yielded by a galvanic cell, the Daniel cell being taken as the standard unit. The size of the cell has nothing to do with its electromotive force; a cell the size of a percussion cap will give an electromotive force as high as a cell a yard in diameter.

Electromotive force depends on difference of potential.

The difference of potential exists in all dissimilar electrified bodies, whether they are large or small makes no matter; just as the fact that pressure of water due to its flow from a reservoir to a plain beneath is not influenced at all by the area of the receiver, but by the height of the water level above the plain.

As I have shown, water pressure is the same per vertical foot of height, whether the column at its base is a square foot or a square mile in area. The two bodies in the cell are at different potential, therefore the current flows from one to the other from the attacked to the unattacked, through the liquid which surrounds them, and then back to the attacked body through the wire.

The galvanic cell converts chemical action into electricity by burning the zinc, just as the steam boiler converts coal into energy by the chemical action of combustion. If in the galvanic cell we burn twice as much zinc in a given time, we shall have a current twice as strong, but not twice as intense; we can do this by making the surface of the zinc twice as large.

Thus you see that while the size of the bodies in the cell has no bearing on the pressure of the current, it has a material bearing on the strength of it.

So that when we want high pressure electricity, we put into the cell bodies which are, or will be when attacked, of highly different potential. When we want great strength of current we look to their dimensions. All Leclanche cells have the same pressure, whether big or small. If we take two Leclanche cells, different sizes, the tensions or pressures of the two currents are precisely the same; but if we harness these two currents to some work, mechanical or chemical, such as the decomposition of water, the result will vary according to the volume of the cell. In practice, however, we do not make large cells chiefly because they are cumbersome and difficult to handle. We can increase either the electromotive force or the strength of the current by using several cells of the same size and connecting them together differently. If we connect them in a series of tension, that is the attacked element of one to the unattacked element of the other, and so on, we shall add together the electromotive force of each, while the strength of the current will remain the same as that of one cell, if however we connect all the attacked elements of the four cells, say, to one wire, and all the unattacked ones to the other, we shall have quadrupled the size of the element, and we shall have a current four times as strong, while its pressure will remain at one volt.

RESISTANCE.

When the current in a cell travels from the attacked to the non-attacked element, through the liquid in the cell, it meets with resistance; and so also when the current travels around from the non attacked element to the attacked element, by the wire outside of the cell, it meets with resistance still further. There are then two places where the current meets obstacles,—one inside the cell and one outside of it. The resistance offered by the liquid inside the cell is known as the internal resistance, while the other is known as the external resistance. The internal resistance is so much lost energy, so that we should endeavor to make it as small as possible, by bringing the solid elements in the cell as near together as possible.

For this reason the conglomerate battery is an improvement over the one with porous pot.

The external resistance we can control, it may be due to many miles of telegraph wire, the coils of an electromotor, or the filament of an electric lamp, the human body, or to any other path we provide for the current, in traversing which it does the work we desire.

The unit of resistance is called an ohm, in honor of George Simon Ohm, who was born at Erlangen in 1781.