of the switch where the current is broken. Although the incoming current may be of only 100 volts, that of the spiral at the moment the current is broken may reach many thousands of volts in the case of a large coil as used for X-ray purposes. All these effects are due to what is called self-induction, and it is such an important factor that it is worth while taking some trouble to understand.

Solenoid. — A hollow spiral of wire is called a solenoid, and when traversed by a current of electricity has all the properties of a magnet. When a rod of iron is inserted into it, all its properties are intensified. It becomes, in fact, an electro-magnet.

In view of what has been said above it will not be difficult to see that a solenoid with a considerable number of turns, enclosing an iron core, will, when supplied with a current which rapidly alternates in direction, set up such strong self-induction currents as to oppose the incoming currents to an extent out of all proportion to the resistance of the wire composing it. Again, if we take an iron core made in the form of a closed square or a parallelogram or even a circle and wind a coil on one side of this and apply an alternating current to it, the result of course is the same.

Transformer.—Now let us wind another coil on the opposite side of the core which we will call the secondary coil—the other is, of course, the primary. If we connect the primary again with the alternating current we will find that another alternating current is formed in the secondary coil. This is, in fact, an experimental transformer and differs in no essential particular from those used for the distribution of electrical energy wherever alternating currents are used. The primary coil impresses a magnetism on the core which is constantly varying. As the core is continuous and passes through both coils, the secondary coil is thus exposed to a constantly varying magnetic field. We have already seen