

12 TEXT-BOOK OF RADIOLOGY.

is in the form of a closed ring or parallelogram. This is due to the very high permeability of iron to lines of magnetic force.

Electro-magnetic induction forms the basis of nearly every practical application of electricity. The dynamo is a machine in which coils of wire are subjected to the influence of a constantly varying magnetic field; the induction coil and the transformer are instances of two coils wound on a common iron core, one usually having many more turns of wire than the other, and the passage of intermittent or alternating currents in one induces corresponding alternations in the other, and may be used either to convert a low tension to a high one or *vice versa*.

We may now consider another phase of this subject, and one that has considerable importance to the radiologist who wishes to have a proper understanding of the appliances he has to use. Keeping in view the effect of electric currents on conductors near by, what is the effect of passing a current through a closely wound spiral? Is it the same as if the wire were straightened out? A moment's consideration will show that it is not the same. As the current rushes round the first turn of the spiral it will induce an opposite current in the second turn, and as it traverses the second turn it will induce opposing currents in the third and also in the first turns, and so on to the end of the spiral. Thus the incoming current is opposed at every turn by these *self-induced* currents, and it is not until these have died out that it can flow freely. Here, again, this effect is intensified if the spiral has been wound on a core of iron, and the greater the number of turns in the spiral or the greater the mass of iron, the greater will be the opposition to the incoming current. It takes a longer time to rise to its full value. When the current is cut off the sudden decrease in the strength of the magnetic field induces a current in the spiral which is now in the same direction as the incoming current, and reinforces the latter to such an extent that a brilliant spark is produced at the points