(wires), in each of which a switch is placed. When the generator is rotated it is the seat of an electromotive force which will force electricity from B to A. The potential of A will, therefore rise, while that of B will fall. At the end of a certain time the difference of potential between A and B will be sufficiently great to balance the electromotive force set up by the generator, and there will be a condition of equilibrium. If the speed of the generator is increased, its electromotive force is increased, and there will be a further transference of electricity

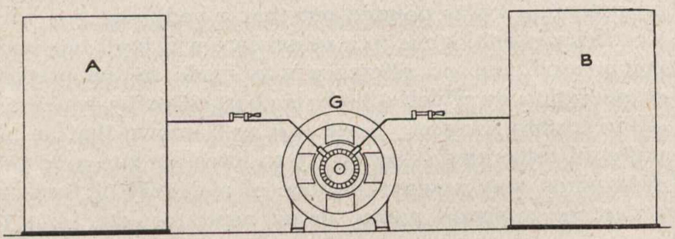

FIG. 4

from B to A until equilibrium is again established. If the generator is now stopped, the electricity which has been transferred from B to A will flow back again through the generator and connecting wires. If, however, the switches are opened before the generator is stopped, the potential of A and that of B will remain unchanged, while the electromotive force becomes zero as soon as the generator is stopped. From this it is clear that electromotive force is the direct cause of difference of potential, and that the latter is a measure of the former. The unit of electromotive force is, therefore, the same as the unit of potential. In other words, it requires an electromotive force of one volt to create a difference of potential of one volt. The term electromotive force is usually represented by the abbreviation e.m.f.

An e.m.f. may be obtained from any one of several sources When the magnitude of the e.m.f. required is large and a large quantity of electricity is involved, the electric generator or pump is usually employed. In the case of minor or auxiliary work the electric battery is used. There are several other sources of e.m.f., but from the engineer's point of view these are of minor importance and will not be considered here. A description of the latter may be found in any good text book on Physics. The battery and generator will be discussed more fully in a subsequent section.

Condensers.—If the quantity of electricity which must be pumped from one body to another to create a difference of potential of one volt be measured, it will be found that the quantity depends on the size and shape of the bodies, and also on their position relative to each other. The closer they are together the greater this quantity. If, for example, the two bodies are made into the form of thin plates, and are placed as close together as possible, this quantity will be largely increased. When two bodies are brought together with the object of securing this condition, the arrangement is known as a "condenser." The effectiveness of the arrangement is increased by dividing each body into a series of plates and placing them alternately as shown in Fig. 5. The body A now consists of a series of plates separated from one another by a small distance, and all connected together so that electricity can flow from one plate to the other. A second series of plates, representing the body B, are placed in the spaces between the plates of the first series, the two sets of plates being insulated from each other so that no electricity can pass directly from one to the other.

The mutual effect of one body on another with respect to their electric charges is somewhat analogous to the effect which may be obtained when air is pumped into a vessel with flat, elastic walls. Suppose, for example, that the vessel is of the form shown in Fig. 6a, and that the flat walls are elastic. When air is forced into this vessel the walls will extend, and it will require more air to bring the pressure up to a specified amount than if the vessel were of a cylindrical shape. A reduction of the external pressure will allow the walls to extend further, and this will still further increase the amount of air required. If, now, the two tanks shown in Fig. 3 assume the form of a series of such flat vessels, arranged alternately, as shown in Fig. 6b, and air is pumped from B to A, it is obvious that on account of the reduced pressure in the B series the walls of the A series will extend more when arranged in this way than if each series were separate. More air will thus be required to bring the pressure up to a specified amount; in other words, the capacity is increased.

Since the amount of energy required to pump over sufficient air to create a specified difference of pressure depends on the quantity of air to be pumped and the difference of pressure, it follows that more energy is stored with the arrangement shown in Fig. 6b than could be stored if the vessels were separate. This is also true of the electric condenser.

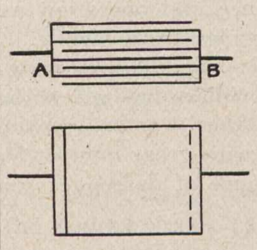

FIG. 5

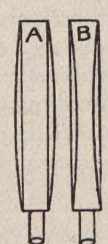

FIG. 6a

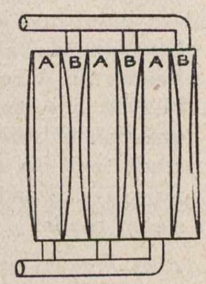

FIG. 6b

The "capacity" of a condenser thus depends upon the arrangement of the two elements of which it is composed. The capacity of any particular arrangement is defined as the quantity of electricity which must be transferred from one element to the other to bring the difference of potential up to one volt. The unit of capacity is the "farad," and is defined as the capacity of a condenser which requires a transference of one coulomb to bring the difference of potential to one volt. In practical work it is found that this unit is too large, and the "microfarad" is, therefore, used. The microfarad is one-millionth of a farad.

(To be Continued.)

CREMATION OF TOWN REFUSE.

This is the most satisfactory method of destroying town refuse.

Combustible substances are destroyed, and the hard residuum (clinker) can be used for road making or sewage filter beds, or mixed for cement. Steam can be generated by the combustion, and this can be used for sewage pumping, heating sewage works in winter, etc.

With modern destructors, 1,043 lbs. of water can be evaporated per lb. of refuse burnt.

Destructors are of various types. The principal are, as follows:—

(Continued on Page 326.)