current appears as its substitute. The thermo-pile is, therefore, a machine for the transformation of heat into electric current. If heat be a kind of molecular motion, then an electric current must be some other kind of motion!

When the armature of a dynamo is turned and an electrical current is developed, the latter is the representative of the mechanical movement of the armature. It takes more power to make it move at a given speed when it is producing a current than when it is not. The current represents the difference. It is mechanical motion that goes into the dynamo, and an electrical current comes out of it; and hence a dynamo is a machine for the transformation of mechanical into electrical motion. One is visible, the other molecular, as is the case when friction develops heat. An ordinary static electrical machine possesses a similar function.

On the other hand, a galvanic battery transforms chemical into electrical motions; and, in every case where electricity is developed, there is some sort of apparatus which receives one kind of motion for transformation. That one kind of machine will transform mechanical motion, a second heat, a third chemical, all into the same kind of product, helps one to see that the antecedents, which at first seem to be so unlike, are really but varieties of the same condition, namely, motion, which, when transformed by suitable machines, might be expected to appear as a similar product of each.

An electrical current always heats the conductor through which it passes. It is, therefore, an antecedent for the production of heat in the same sense as mechanical motion is an antecedent in condensation, percussion and friction, and the conductor is the agency for the transformation into the vibratory molecular form.

So far as the production of light by electricity is concerned, whether by the incandescent or the arc system, the function of the current is to raise the temperature of the conductor to the proper degree for luminousness. The light comes from the hot molecules, not from the electricity; but here, as in the simpler case of heating the conductor, the conductor itself, whether it be a filament of carbon or the tips of the carbon rods, acts as a transformer of electrical into heat motions, and thence to ether waves.

Ether waves may be transformed in two different ways. First, by falling on molecules of matter; the latter absorb them, and are heated in consequence, which is the converse of the production of ether waves by heated molecules. Second, by their own interferences, plane, elliptical, and spiral waves may be produced, which resultant waves are capable of affecting matter in different ways. One of these consequences is of so much theoretic importance it will be well to allude to it.

Given a flexible section of a spiral ether wave, no matter what its origin. If its ends were to come together, there is good reason for thinking they would close and weld together, forming a ring which would then be practically a vortex ring. The ends of vortex rings formed in