other body, develops in the latter an electrical condition, that is to say, it electrifies it; and the process we call "electric induction," to distinguish it from the transferrence of the electrification by contact, which is called "conduction." In the process called induction there are two transformations: in conduction there is simply a transferrence, and no transformation. The experimental fact is this: an electrified body sets up in the ether a stress of such a nature, that, by its re-action upon another body, the latter is brought into a condition similar to that of the first; that is, it electrifies it.

II. The Magnetic Field. — A magnet in like manner sets up in the ether a stress that is propagated outwards with the velocity of light. The physical character of this stress is such that iron and some other substances upon which it can re-act are thereby rendered magnetic. Their molecules are re-arranged. On the supposition that a piece of iron were suddenly magnetized in any way remote from any magnetizable substance, the magnetic field would spread radially, having a spherical surface. As soon, however, as a piece of magnetizable substance was reached, the re-action of the ether upon it would begin; and the so-called magnetic lines of force will now be curves, and the equipotential surfaces will no longer be spherical. The distortion will depend upon the size, shape, and quality of the second body, as well as upon the strength of the field.

This process is called "magnetic induction." The magnetic field differs from the electric field in this important particular: the latter has no selective property, but re-acts upon all substances, while the magnetic field re-acts upon iron and a few other substances, and but slightly, if at all, upon most bodies. They are alike, however, in this: their equipotential surfaces are determined by the presence or absence of other bodies.

A magnet then sets up such a physical condition in the ether, that its re-action upon another body brings the latter into a condition similar to that of the first; that is, it magnetizes it.

III. — The Thermal Field. — An isolated hot body becomes cool by a process called radiation. It is explained by saying that the atomic and molecular vibratory motions that constitute the heat of the body, set up undulatory motions in the ether. These undulations are propagated with the velocity of light, certain wave-lengths being light. The path of a ray is straight, and is continued indefinitely outwards, to the boundary of the universe if there be a boundary; if not, then to an infinite distance. A hot body has a field, as well as an electrified or a magnetized body.

Experimentally we know that when these undulatory motions called rays fall upon other matter, it becomes heated in consequence; and we also know that the energy acquired by the second body from the radiations depends rigorously upon the area exposed to them. It is customary to say that the intensity of light varies inversely as the square of the distance from the source, when intensity means energy. This is true, however, only for equal intervals of time; for if a body at unit distance was exposed to radiations from a constant source for one second, and another similar body at double the distance was exposed for four seconds, each unit of surface would have received the same amount of light or radiant energy.

The presence or absence of another body in the thermal field makes no difference in the strength of the field in other directions: in other words, the absorption of radiant energy of this sort makes no manner of difference in the direction of other rays that have not been stopped. I am not aware of the existence of any evidence that a ray of radiant energy of any wave-length is ever deflected from its rectilinear course except by a change in the density of the medium through which it passes, and not then if the incidence be normal. In this respect the thermal field is entirely unlike the other two fields. In addition to this, let it be remembered that a hot body continues to impart its energy to the ether until its income equals its expenditure, according to Prevost's law of exchanges: so, if there were but a single hot body in the universe, it would impart its energy to the ether, and approach infinitely near absolute zero; while an electrified body or a magnet would be perfectly insulated, and, so far as is known, would lose none of