

The Mystery of the Ether

Connection with Radio Activity



THE wave theory of light built up by Young, Fresnel and Hukghens, disputed by Newton, and re-established on a firmer foundation by Clerk Maxwell, postulates the existence of a tenuous medium, sometimes stated to possess specific mechanical properties such as density and elasticity. Actually it appears to be impossible to define its qualities in any strictly mechanical terms. Its nature is too fundamental to be compared consistently with any other known kind of matter. It is assumed to occupy all space, even inter-penetrating molecules of the most compact material substance.

"Action at a Distance."

THE phenomena of attraction, repulsion and induction demands existence of an all-pervading medium to justify the otherwise inexplicable "action at a distance."

Clerk Maxwell's Theory.

IT would obviously be too highly complicated and artificial to imagine that two such universal media should exist simultaneously and independently of each other. Nor is it necessary to do so, for Clerk Maxwell has shown on mathematical grounds that the properties necessary to explain the transmission, reflection and diffraction of light rays are just those necessary to produce the known effects of magnetism and electricity. In short, he showed that the electro-magnetic medium must be identical with the luminiferous ether.

It is known that light vibrations originate from the oscillations of charged particles (electrons) of incandescent matter, and so give rise to alternations of electric and magnetic fields. Similarly the rapid movement of the electrons constituting the oscillating current in a transmitting aerial set up wireless waves in the ether.

Matter and Ether.

THE ultimate constitution of matter has been resolved into terms of protons and electrons, which are simply positive and negative charges of electricity. Since electricity and magnetism are both held to be different aspects of the same fundamental happening, namely, a definite stress or strain set up in the ether, the very existence of matter itself is thus made dependent upon this omnipotent medium.

From another point of view the development of wireless science in general and broadcasting in particular, has brought the existence of the ether into common or everyday practical experience. In short, whichever way one turns, the question of etheric energy seems to be a focus of modern scientific interest and enquiry.

There are, of course, schools of thought which set up various alternatives to the ether. For instance, the quantum theory as developed by Planck, together with other recent discoveries connected with the study of radio-activity and molecular physics, appear to offer fresh evidence in favour of a corpuscular theory of radiation similar to that advocated long ago by

Newton, and afterwards discarded in favour of the luminiferous ether.

According to another theory put forward by Thomson, the electro-static and electro-magnetic "lines of force" imagined by Faraday are actual realities, and consist of "strings" which are attached to the electric charges emitting radiation, and along which

driven to doubt first one maxim and then another until they finally cast it all aside and decided to rely entirely upon their own practical investigations.

In exactly the same way, practical electricians, particularly those who are interested in the development of wireless science, are realising more and

Is there such a medium as the ether which continues to occupy a most prominent part in modern scientific discussion and speculation? The latest arguments for and against this intangible "something" are laid out in this fascinating article by J. C. Jevons in "Modern Wireless."

vibrations such as wireless waves are transmitted.

Modern Speculations.

FINALLY, Einstein proposes to replace the conventional "ether" by a four-dimensional space-time continuum in which space and time are inextricably mixed.

Here the known properties of the electro-magnetic and luminiferous ether are replaced by "fields" or "warpings" of space.

A "field" which gives rise to purely magnetic action when viewed from one set of co-ordinates appears as a purely electric field when viewed from another set of co-ordinates in relative motion to the first.

In other words, electricity and magnetism are identical in substance, but have different appearance according to the standpoint of the observer.

For instance, a unit charge of electricity, insulated and at rest in space relatively to an observer, possesses all the properties associated with static electricity. If, however, the same unit charge is moving relatively to the observer at the speed of light, it acquires all the known magnetic properties of an ordinary electric current.

"Etheric Energies."

PROFESSOR EINSTEIN has quite recently developed his "field" theory to cover the known laws of gravitation, thus fusing the mechanism of electro-magnetism with that of gravity in one comprehensive generalisation.

Sir Bampfylde Fuller now enters the arena to provide us with further provocative speculations. In his book on "Etheric Energies" he investigates the significance and reactions of the medium, which he conceives to be the vehicle not only of radiant energy such as light and heat, magnetism and electricity, but also of gravity, movement and sound.

The author draws an early distinction between text-book axioms or standard theory and the results so often secured by practical experiment. In this connection he points out that the brothers Wright—the pioneers of aviation—having set out with absolute faith in existing scientific data, were

more that precise dogmatic definitions and explanations are often irreconcilable with increasing knowledge. In short, when exploring the unknown one must learn to rely more upon experiment and less upon mere doctrine.

Space and Time.

REGARDING the doctrine of Relativity, he says: If the movement of a thing is simply a change of place in relation to another thing, its measurement is not prejudiced by the movement of the latter. We are simply concerned with relative positions, and the two movements can be compounded.

On the other hand, if movement affects spacial dimensions, time must enter as a factor of space, combining with it to make a "space-time continuum." This the author states is in direct conflict with all experience. He cannot conceive of the mingling of space with time, and regards the uncomprehending acceptance of the doctrine of Relativity as one of the most disconcerting facts in the mental history of our time.

It is clear, he holds, that all substance is pervaded by ether—ether is present everywhere in the material world—for heat and light are transmitted terrestrially as well as celestially. Light and heat from a fire cross a room as those from the sun traverse inter-stella space. The method of transmission must be the same.

Etheric vibrations must be assumed to be devoid of thickness. They radiate spherically, but, as they spread, their intensity diminishes only in accordance with an inverse square law, and not inversely as the cube of the distance. The sphere of distribution must therefore be composed of radiating lines which possess superficial area but not thickness. For if they did possess thickness, the diminution of the intensity would be greater than that given by the inverse square law. The conception is also in accord with the fact that etheric movements can cross one another without interference.

All ether energy is in the nature of a vortex. When a material object, such as a wheel, is in rotation, it produces a centrifugal force from its centre outwards, because its circumference moves more rapidly than its centre. A

liquid in rotation may act in a contrary fashion, developing a centripetal or inward force. A whirlpool, for example, draws things strongly inwards towards its centre. This tendency increases as consistency of substance diminishes.

In a whirlwind the resultant force is violently inwards. It is justifiable, therefore, to assume that an etheric vortex would develop a very powerful indrawing force.

Ether Vortices.

IMAGINE that the rings of electrons and the central nuclei which form the ultimate basis of matter are ether vortices, one within the other, each extending its influence spirally across the surrounding ether so as to produce an indraught. The extended overlapping influence of such ether vortices would then attract adjacent atomic systems, and so give matter its coherence.

The radiation of heat is due to an unbalancing of these vertical forces, created by friction, or electrical action, or other external agency, and a consequent streaming away of heat energy. Light radiation is treated on similar grounds, light being stated to differ from heat only in that its effects do not endure after the withdrawal of the etheric energy that causes them.

Miniature Solar System.

COMING to electricity, the author points out that matter is conceived by modern science as a miniature solar system in which variously grouped circles of electrons revolve around central nuclei, as planets revolve around the sun. The nuclei differ in nature from the electrons; their essential element is a proton which possesses peculiar properties of its own.

He conceives both electrons and protons to be vortices, rotating in different directions, and the orbit around which the electrons move to constitute a third vortex. Positive electricity is then identified with the proton vortex, and negative electricity with the ring or orbit vortex of the electrons.

An electric current is the result of a disturbance in a balanced system of such vortices, leading to a rapid interchange of adjacent vortices and the final detachment of a core vortex at the end of the conductor.

When an electric discharge takes place across a spark gap, a series of very rapid oscillations occurs, the effect of which is to throw off a stream of broken spiral vortices alternately revolving in contrary directions, according to the direction of the momentary current which generated them. These fly off into space in all directions, and so form what we are accustomed to think of as electric waves.

Polarisation.

These spirals may travel outwards in loops progressing in a sidelong fashion, or after a time may change their mode of progress and advance face forwards like a screw. This corresponds to known alterations in the polarisation of transmitted wireless waves.

It is not possible to follow the author further in his conception of (Concluded on page 4.)