SESSION 1912-1913

President: SUMMERS HUNTER, Esq.

DISCUSSION ON

"Wave Motion and Modern Developments in High Frequency Electricity."

BY MR. A. E. BATTLE (MEMBER),

Monday, December 2, 1912.

Mr. BATTLE: I propose this evening, first of all, to summarize the paper given at the Non-Ferrous Metals Exhibition, by giving a series of demonstrations which will emphasize the various points I brought forward. There was little time at that meeting to give these demonstrations satisfactorily, and I have brought here some additional instruments, by means of which I hope to make matters clearer.

There are one or two models which I had with me last time, and I have them here to-night again. This first one represents wave motion and shows in a rough manner how, although the particles only move in a vertical direction, the appearance of wave motion is given, the wave travelling along and transmitting energy from point to point. A wave of this kind is similar to a wave in water. At the meeting in the Agricultural Hall I exhibited lantern slides showing photographs of wave interferences and other effects with water waves. These tubes containing water represent the action of canal waves. You will observe that one is half full and the other quarter full, and by moving them slightly it will be seen that the waves are reflected from side to side. The most interesting point about this, however, is that it shows how the

depth of the water has a great influence on the speed of the waves, the deeper one being very much faster than the other.

From the consideration of water waves, we will pass on to a subject I did not touch upon at the last meeting, that is, waves in air. I have an apparatus here for detecting air waves, and this detector works upon the principle of responding to very short air waves, but not to waves of any considerable length. The action is that the short waves set in motion the gas that passes at the top of this flame, and consequently cause the flame to roar. A series of very interesting experiments can be done with this apparatus by means of CO_2 lenses. It will be noticed that the flame does not respond to the voice waves, which are rather long, and yet the short waves produced by the rattling of these keys have an immediate effect. These experiments follow on right through wave motion. When we come to the consideration of, say, X-rays, we find that they occupy the same position relatively as these small waves to the big wave lengths. In X-rays the waves are very, very small indeed, whereas in wireless telegraphy some of the waves are of enormous length. So there are waves in water and air of varying magnitudes and all following the same laws. At the last meeting I demonstrated that there is a close association between mathematics and wireless telegraphy. Waves are set up by an electrical wave in wire, and these surge backwards and forwards and practically form harmonic motion. Certain conditions have to be produced to make them more effective, the principal thing being to tune them up to each other or to bring them into harmony. For instance, if there were two pendulums side by side and one had an impulse given to it, it would impart its motion to the other, until they were both swaying with equal force. We have to get the same effect here, but instead of dealing with matter, we have to get the capacity induction practically the same. In this experiment there are two closed circuits. A set of wires is wound round this frame in the ordinary way, terminating in a glow lamp. The other wire is connected to this induction coil. I propose to oscillate the currents and convert what may be called the semi-alternating current obtained from an induction coil into a true alternating current, and you will then notice the effect of induction inasmuch as sufficient current will be obtained in the circuit not connected to the induction coil to light up the glow lamp. By introducnig a couple

of Leyden jars to bring up the capacity of the current, you will see the remarkable difference obtained by tuning. The inductance is the same, but the capacities are brought nearer to one another, with the result that the light is obtained much more readily, and there is also a much stronger light. It is practically upon the perfecting of the tuning aparatus that the recent discoveries in wireless telegraphy are based. If these could be tuned up sufficiently, it would be possible for the lamp to be lit up from a considerable distance. The force exercised by impulses being given at regular periods can be illustrated in many ways. It has been found, for instance, when soldiers have kept in step when crossing a bridge, the step synchronizing with the time period of the bridge, a serious effect upon the structure of the bridge has resulted. Before going on to demonstrate wave effects of electricity in wires, I will show how Hertz first discovered waves in ether. (The demonstration was then given as described on page 184.)

The demonstration as described on page 187 was afterwards given, proving the existence of stationary electrical waves in wires by means of the apparatus there described. A demonstration of wireless telegraphy was also given, and other demonstrations included the dissipation of smoke by electrical means, Röntgen rays, the effects of discharging high frequency electricity into a vacuum, etc., etc.

Mr. Battle replied to various questions addressed to him by members in the audience.

A hearty vote of thanks was accorded to Mr. Battle on the proposal of Mr. John McLaren, seconded by Mr. J. H. Redman.

"Titanic" Engineering Staff Memorial.

This Fund now amounts to £2,566. Since the publication of the list in the November issue, amounts of £5 and over have been received from the following :—

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