WIRELESS TELEPHONES AND HOW THEY WORK

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JAMES ERSKINE-MURRAY

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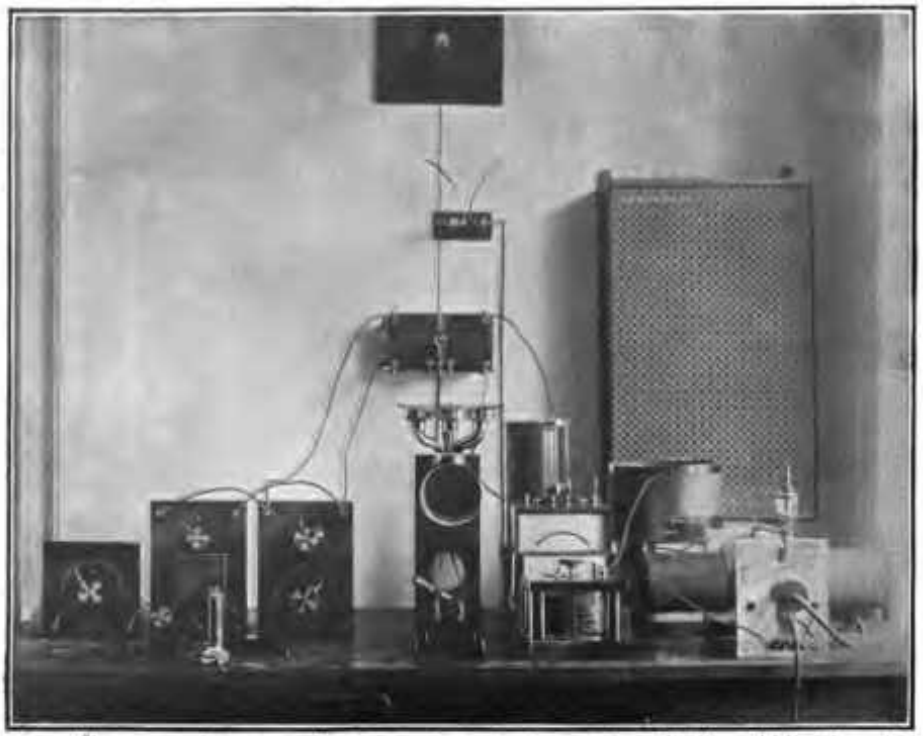

POULSEN WIRELESS TELEPHONE STATION. On the right is the transmitter; in the middle the microphones with aerial wire above; on the left the receiver. [From the *Electrician*, by kind permission of the publishers].

WIRELESS TELEPHONES

And How They Work

BY

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PREFACE.

In the nine short chapters which follow I have attempted to give a well balanced sketch of a subject so complex that it has only been possible to show the leading principles in their proper values by excluding a mass of details of lesser importance.

Much time and thought have been expended in the attempt, but both will have been well spent if some of those to whom wireless telephony is as yet but a name are enabled to realise in some degree the dauntless perseverance of the inventors, the wonderful adjustment of means to ends, and the almost poetic beauty of the interlinking laws of Nature which together have gone to the establishment of this new means of intercourse.

I shall also be glad if what I have said in Chapter IX. rouses some of my countrymen to a realisation of the enormous value of cheap and rapid communications within the Empire.

Telegraphs and Telephones, of every sort, are the nerves of the body politic; they carry swift messages from the extremities to the brain centres, and transmit instantaneous orders for action from brain to hand. Their failure is paralysis. This Empire is peculiarly liable to such failure owing to the thousands of miles of sea which separate its parts. We must therefore welcome and encourage every new invention, such as wireless telephony, which tends to avert the most serious disease to which our national life is subject.

J. ERSKINE-MURRAY.

34, Norfolk Street,
London W.C.
December, 1909.

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WIRELESS TELEPHONES.

CHAPTER I.

HOW WE HEAR.

THERE are few more wonderful organs in Nature than the ear. From mere changes of air pressure on its drum it gives us a series of sensations, pleasant or unpleasant, musical or unmusical, and, most remarkable of all, it enables us to distinguish between many simultaneous sounds although these; when they arrive at it, are absolutely fused together as a mere motion of the particles of the air.

From whatever source a sound is produced, whether from the vibration of the vocal chords of a speaker, from the trembling parchment of a drum or the string of a violin, its mode of transmission to the ear is the same.

What passes out from the source is merely a rhythmical series of changes of pressure which spreads in ever widening spheres throughout the atmosphere. These compressions follow one another in an order which is different for every sound.

Thus it has been found that the sound "oo," as in boot, is the sensation produced by a uniform succession of equal changes of pressure following one another at

equal intervals of time, and the sound "ah," by groups of pressure changes, each group containing a large pressure and several smaller ones. In more complex sounds the grouping of the pressures is more complex

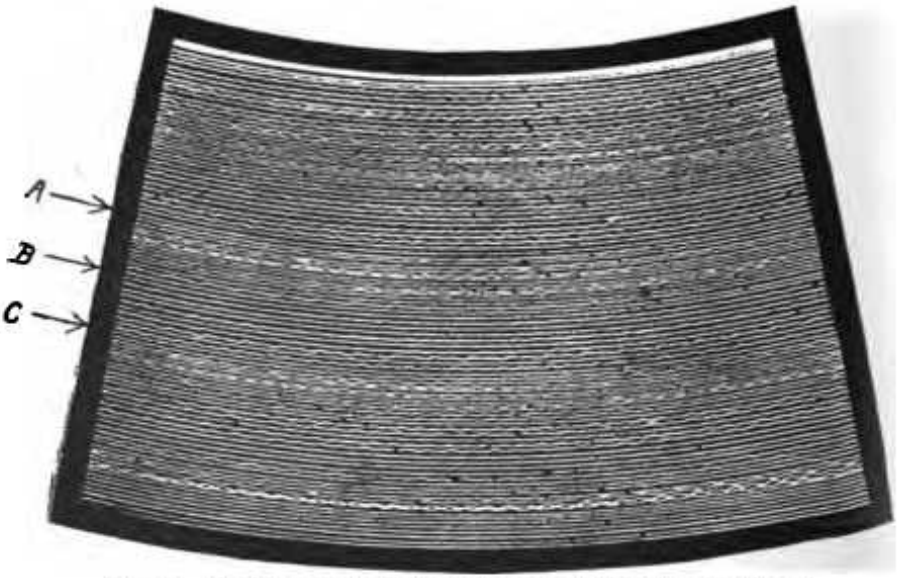

FIG. 1.—Portions of the Record of a powerful bass voice (Oreste Luppi, of Milan) singing *La Calumnia* from *Il Barbiere di Siviglia*. Examine with magnifying glass. Note the different types of wave corresponding to different sounds:—*e.g.*, at A, waves in groups of two; at B, waves which rise steeply and fall slowly; at C, a nearly uniform series of equal waves.

[From an article by Professor J. G. McKendrick, LL.D., F.R.S., in *Nature*, of 15th April, 1909.]

also, the changes sometimes following one another in an order so apparently confused that there is no way of analysing it but by the ear.

For instance, the sound of a band, as it reaches the