

of the tube. The length of the electric waves can be varied, by changing the distance between the small spheres, and by varying the size of the larger spheres. The length of the strips must be varied according to the length of the waves, and so the sender and receiver can, in a certain sense, be attuned, and any other receiver that is not in harmony with the sender, will not be influenced by the waves. With such an arrangement, however, messages cannot be sent to a great distance. So, the problem of rendering communications exclusive is not yet satisfactorily solved.

The coils  $k'$   $k'$  are what Mr. Marconi calls "choking coils" or "impedance coils." Their function is to hinder the oscillating current of the vertical wire, from passing through the circuit of the relay current, and into the earth, by the earth connection. They thus oblige it to pass through the coherer, and to produce the desired effect on the filings.

There is another difficulty that Mr. Marconi has had to overcome. It was found that the frequent makes and breaks in the currents of the relay, recorder, and rapper, produced extra currents that had a disturbing effect on the coherer, hindering it from regaining its state of non-conductivity. The strong direct extra current of self-induction especially, produced small sparks that influenced the coherer. To avoid this inconvenience, the instruments mentioned are shunted. The shunts  $s$ ,  $q$ ,  $p_1$ , and  $p_2$  are not simple wires. but apparatus resembling somewhat that which Edlund used to destroy the action of the principal current, in order to be able to measure the extra current. Here, it is the action of the extra current that is destroyed.

But the most interesting part of the apparatus is the "coherer," as it is generally called. The stopples  $j_1$   $j_2$ , inserted in the glass tube  $j$   $j$ , are of silver. The space between them is but the fiftieth of an inch, and is partly filled with filings of silver and nickel; ninety-six per cent silver and four per cent nickel, with a little mercury. The pressure of the air on the filings is reduced to four millimetres. The resistance of the filings has been measured, before and after being affected by the Hertzian waves. In their natural state, the resistance of the filings is practically infinite, that is, they are non-conductors; but after the