mersed in an electrolyte and an e.m.f. is applied to them, they become polarized. It is also well known that this polarization can be destroyed by coating the bright surfaces with platinum black, platinum black being a powder-like form of platinum. When the ohmic resistance of an electrolyte is measured between two platinum electrodes, these electrodes always have to be coated with platinum black to get rid of apparent resistance introduced by polarization. Since coating by platinum black is a well-known cure for polarization it occurred to me that if the action of the detector depended upon the polarization of the fine platinum wire forming the anode, coating this fine wire with platinum black should render it inoperative. At the same time, the thin coat of platinum black could not interfere with the heat action, if such existed, if it were made so thin as not to appreciably increase the diameter of the fine wire. I accordingly platinized the fine wire by the usual method, making it one of the electrodes, of an electrolytic cell containing a solution of platinum chloride. Examination under the microscope showed that a smooth coat of platinum black had been deposited upon the wire, the thickness of which was not greater than one-tenth of the diameter of the fine wire itself. Since the fine wire, in this case, had a diameter of 38/1,000,000 of an inch, the thickness of the coating of platinum black was not more than 4/1,000,000 of an inch. Such a thin coating as this could not sensibly change the heating effect in the electrolyte if such heating actually occurred. The diameter of the fine wire when platinized could not have been more than 56/1,000,000 of an inch, and I have found that a wire 90/1,000,000 of an inch in diameter is practically as sensitive as the 38/1,000,000 wire. Even a one-mil wire will respond if only the end of it is immersed in the electrolyte. It was found that the coat of platinum black entirely destroyed the sensitiveness of the detector. In fact when the fine wire was completely coated it would not respond at all. The experiment was performed by noting the response before platinizing and after platinizing, under exactly the same conditions with respect to the electrolyte and the depth of immersion in the electrolyte. In order to do this the electrolytic cell was placed under a microscope, so that the fine platinum wire could be carefully observed at every stage of the experiment. In this experiment the fine wire was usually immersed to a depth of about 4/1,000 of an inch, or to about 100 times its diameter. When carefully platinized, no response could be obtained even if the amount of immersion was made the very smallest possible.

From the preceding experiments I think it is evident that this detector of Hertzian waves is electrolytic in its action, depending upon the polarization of the fine platinum wire forming the anode of the cell.

Although its use as a Hertzian wave detector does not apparently depend upon the rectification of the Hertzian currents in the aerial wire, it is capable of being used as a rectifier. Mr. Pickard has actually observed these rectified Hertzian currents. As a rectifier it is essentially similar in structure to Pupin's electrolytic rectifier (see Bulletin American Physical Society, Vol. I, p. 21, 1900; U.S. Patent Specification No. 713,045). In this device the anode consists of a one-mil platinum wire sealed into a capillary glass tube, ground off squarely at the end, and the cathode consists of a small platinum plate. The use of this device as a rectifier and also as a Hertzian wave detector depends upon the existence of a polarization layer upon the small surface of the anode.

I find that to get good results with this detector the surface of the cathode should be much greater than that of the anode. If the surface of the cathode is made very small the sensitiveness of the device is very much decreased, and the response in the telephone is very faint. This is probably due to the fact that the effective electric valve action takes place only at the anode, and consequently the only result of reducing the surface of the cathode is to decrease the local current through the detector, and consequently to decrease its sensitiveness. It is interesting to note that the effective valve action is at that electrode at which oxygen is liberated. It is well known that oxygen is *absorbed* by platinum; that is, is condensed upon its surface. Such an action would undoubtedly give rise to a polarization film. It is a question as to whether such a layer of oxygen is in a gaseous state or in a liquid state, or is perhaps in a condition of unstable chemical union with the platinum.

Most of the experiments described were carried out in such a manner that the fine wire could be seen under a microscope. In this way its depth of immersion and its behavior in the electrolyte could be accurately observed. It was noticed that when a signal was received by the aerial wire one or more bubbles of gas were usually formed at, and set free from, the fine wire. The stronger the signal, the more bubbles were formed. For a weak signal only one bubble might be formed. This bubble was usually formed at the same place on the wire each time, but not necessarily at its end. Weak signals could be received and heard in the telephone without the apparent formation of any bubbles.

There is an interesting resemblance between this detector and the Wehnelt interrupter, the two devices differing principally in the magnitude of the quantities involved. In both the anode is very small compared with the cathode, and the action is due to the formation of gas at the surface of the anode.

I would suggest that this electrolytic detector might be called a *polariter*, since its action depends upon the polarization and consequent polarity of an electrolytic cell. The *coherer* depends upon the tendency of two clean and dry metallic surfaces to cohere under the influence of Hertzian impulses; the *barretter*, upon the heat generated by Hertzian currents in a conductor of small cross-section; and the *polariter* upon the breaking down of a polarization film in an electrolytic cell.

TECHNICAL EDUCATION AND BUSINESS.*

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One of the greatest difficulties in getting on arises from the idea, which is carefully fostered among English science teachers, that there is something degrading in applying science, and that business ability is an inferior quality which is to be despised. No science teacher is so foolish as to tell his pupils in so many words that the object of science is not to be useful; but the whole attitude of science teachers in this country is that of contempt for practice and admiration for unapplied science. All teaching is hopelessly unpractical, and the teaching even of science is very unpractical. This is not due to a curious perversity among schoolmasters in general or science teachers in particular; it is a perfectly natural and, I believe, quite unavoidable result.

If you imagine a school or college which somehow came into existence and gave a good education, teaching the things that are useful in a useful way, and imagine that after a time new masters have to be chosen out of the old pupils, who will get the appointments? The old pupils will consist of clever men who absorbed the education in a practical way, and equally clever men who absorbed the information but gave it a less practical turn. It will also consist of less able men of each kind. The ablest practical men will have gone out into the world, doing its work, and so will many of the less able practically minded men. The able men with a slightly unpractical bent will thus become candidates for the new posts. The next generation of teachers is thus less practical, and the education becomes more and more unpractical as time goes on. There is thus an unavoidable tendency for education to become more and more unpractical.

It is but human to glorify one's own office. The result is that the attitude of the science teacher in this country is that of a real though unavowed antagonism to the scientific development of the industry of the nation. Science, for which no use has been found, or which is not applied, is called "Pure Science," whereas it is really the raw material and should be called "raw" or "crude science." There is

*Extracts from an address before the students of the Institution of Electrical Engineers.