The omission is probably due to the fact that the process in question (Riecken's) has not been worked on a large scale except during the last three or four months, though the patent is three years old. Its efficacy depends essentially on securing a clean mercury kathode in the form of a thin stream of mercury flowing over a nearly vertical copper plate.

The liquid containing the pulverised ore is a continually agitated solution of cyanide and the anode is of iron, as the electro-motive force, one and a half volts, liberates nothing more corrosive than cyanogen. The particles of gold are doubtless cleansed of the obstructing sulphide and tellurous films by the convection currents of ionised cyanogen and also, in a more direct way, by the current as it passes through each particle, making in effect one side of it a kathode and the other an anode, just as is seen if we suspend a piece of metal in an electrolyte between the electrodes and unconnected with either.

This simple invention may revolutionise the treatment of refractory ores, yet apparently the inventor could get no hearing for three years till, at his own cost, he erected apparatus on a working scale in West Australia. The facts are valuable as showing how great an interval separates German intelligence from British engineering practice.

Intelligence of any kind, foreign or native, must indeed have been wanting when huge works, regardless of cost, were erected in presence of the published electrolytic method which could have been effectually tested in a single vat.

JOHN HILL TWIGG.

IF, as your correspondent, Mr. Twigg, says, Riecken's electrolytic process has only been worked on a large scale during the last three or four months, it is not unnatural that Mr. Blount has omitted to describe it. In most cases Mr. Blount has endeavoured to describe processes which are of proved utility, and therefore it was hardly necessary to draw attention to the omission. Further, the number of patents on the subject of electrolytic gold refining is very large, so that it would be manifestly impossible to describe them all. Riecken's process is a very neat one, and should any of the readers of NATURE be interested in the subject, an excellent description is to be found in the "Jahrbuch der Electrochemie" (vol. v. p. 380).

F. MOLLWO PERKIN.

Unusual Agitation of the Sea.

ON Wednesday, April 24, on going to the edge of the cliff above Alum Chine, Bournemouth, at 7.50 a.m., I was struck by the appearance of a succession of waves, resembling a slight ground swell, reaching the shore from an otherwise calm sea, there being no wind. The character of the waves was rather peculiar, and I then saw that every now and then, at intervals of about two or three minutes, much larger waves came in, and instead of breaking abruptly, extended quietly up the sandy beach to a greater height than was expected from their apparent elevation. I mentioned the phenomenon on reaching the house, and on the suggestion that the waves were the result of a distant storm, could not see that they might be so accounted for. Between 12 and 1 p.m. I again watched the undulations, and roughly measured the length on the beach by which the larger waves extended further than those of ordinary size. This was about 22 feet. The larger waves were less frequent than in the morning. Later in the afternoon, soon after 3 o'clock, some of my family were caught by the exceptionally large undulations, which rose surprisingly high upon the slightly sloping sand.

I have not heard whether any remarkable disturbance has been recorded by the seismometer, but I see in the *Daily Mail* and *Daily Express* of April 25 and 26 telegraphic reports of earthquakes in Italy, Portugal and Guernsey on April 24.

ROLLO RUSSELL.

RECENT DEVELOPMENTS IN ELECTRIC SIGNALLING.

IT is thirteen years since Hertz carried out the brilliant series of experiments which, apart from their great theoretical value, had the important effect of laying the foundation of modern systems of wireless telegraphy. Three years later we find the *Electrician* making the suggestion that the discoveries of Hertz

might be utilised for signalling to lightships, and five years later still, in 1896, Signor Marconi brought over to England the first practical wireless telegraphic apparatus and awakened public interest by the remarkably successful experiments which he carried out on Salisbury Plain and across the Bristol Channel. For a time the technical and lay Press was full of wireless telegraphy; great prospects were predicted for it; communication with lightships and lighthouses was the least of the feats it would accomplish; telegraphy at sea was to become as common as on land; some even went so far as to say that wires and cables of all sorts for telegraphic purposes were to become a thing of the past. But these revolutionary changes, if they are ever to be made, did not come with the rapidity which many apparently expected. It was soon recognised that we needed to know a great deal more about the subject before Hertz waves were to be even a trustworthy servant to the telegraphist, and even now we can scarcely call wireless telegraphy much more than experiment. But we have now more definite grounds for feeling sure of its ultimate success, and we can predict for it a useful future with much more surety and reason than was done in the first outburst of enthusiasm that followed Mr. Marconi's experiments.

The patient and persevering experimenting of the past five years has led to the gradual surmounting of many of the difficulties which at first beset wireless telegraphy, and Mr. Marconi, Prof. Slaby and the other pioneers who have thrown themselves with vigour into its development have met with a success which, if not complete, is yet very promising. It is not the greatly increased distance over which it has become possible to signal, an increase from a few miles in 1896 to more than 200 in 1901, that marks the most important development that has occurred. The greatest achievement is the successful solution of the problem of tuning. It was early seen that before wireless telegraphy could have at all an extended utility it would be necessary to find some means of confining each message to its correct destination and of preventing each receiving apparatus from responding to Hertz waves sent out from any transmitter in its neighbourhood. It seems that now almost all experimenters have overcome this difficulty, at any rate to a certain extent.

The improvement in distance over which it is possible to signal has been very marked. The empirical law put forward by Mr. Marconi that, other things being equal, the distance over which signalling would be possible was proportional to the product of the heights of the masts at the two ends seems to be fairly well established as a working rule. But the improvements in transmitting and receiving apparatus have been so great that it is now possible to signal over much greater distances with the same heights of masts than was the case in 1898. For example, in 1898 Mr. Marconi was only able to cover 15 miles with vertical wires 120 ft. high, whereas to-day, according to the recent announcement made by Prof. Fleming, a distance of 200 miles from the Lizard to St. Catherine's, Isle of Wight, has been signalled over with masts only 160 ft. high. Mr. Marconi certainly holds the record for long distance work. The example just quoted refers to signalling across sea; across land such great distances have not been attained, but here again we think the credit of having signalled over the greatest distance must be given to Mr. Marconi, who established in 1899 communication between Dovercourt and Chelmsford, a distance of more than 40 miles.

These long distances have been attained by Mr. Marconi partly by the use of a specially constructed transformer in the receiving circuit. Instead of connecting the vertical receiving wire in series with the coherer it is connected in series with the primary of this transformer, the secondary of which is in series with a condenser and the coherer. By this means the voltage of