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haps before drawn, that it is not produced in the iron, but given to it by the external magnetism of the earth ; all that the motion given to the iron in the various mechanical processes used, does, is to render it more susceptible of receiving magnetism. One of his modes of giving this motion to the particles, is to fix one end of a rod of iron or steel steadily, placing the rod in any position required, as either perpendicular or parallel to the dip, &c., and then to make it vibrate by drawing the free end from the axis of the rod, and suddenly letting it loose. If in a favourable position, the iron soon acquires magnetism.

3. *Effect of Iron on the rate of Chronometers.*—Mr. Barlow, of Woolwich, has lately made experiments on the effect of iron, free from any permanent magnetism, in altering the rates of chronometers placed in its vicinity. Mr. Fisher had remarked the difference of rate occurring in his chronometer when on board and on shore, though the vessel was frozen in, and therefore could produce no variation by its motion. He therefore attributed it to the magnetic action of the iron in the vessel, a conclusion that has been confirmed by Mr. Barlow's experiments.

In these experiments, various chronometers were placed in different positions near a mass of unmagnetic iron, and an alteration in the rates of them observed. This alteration varied with their respective situations to the iron, but was always uniform in the same position. The effects amounted sometimes to 5″ per day, and were at last traced to magnetism in the balance and spring of the chronometer.

The plan suggested by Mr. Barlow, of estimating the effects of a ship's metal on the compass needle, namely, by placing a plate of iron in such a position, and so near to the needle, as to be equal in effect to the rest of the metal in the ship, is well known, and the return of his Majesty's ship Leven, from a voyage of sixteen months, affords proof, by the experiments that have been made on board, of its value. The same plan is now proposed by him for ascertaining the ship-rates of chronometers before they go on board, by simply taking their rates on a certain situation, and at a proper distance, from such a plate of iron.

4. *Electro-Magnetic Rotation.*—An ingenious little instrument has been invented by M. Ampere, in illustration of the rotatory motion of the wire round the pole of a magnet. Its advantage consists in comprising the voltaic combination used in itself. Suppose a cylinder of copper, about two inches in diameter and the same in height, and within it a smaller cylinder about half an inch in diameter; these are fastened together by a bottom, having a hole in its centre the size of the smaller cylinder, so

that the two cylinders form, as it were, a circular cell for acid: a piece of metal is fastened from side to side, like a bridge, across the top of the smaller cylinder, and from the middle of it rises a piece of wire, supporting at its top a small metal cup, containing mercury. A short cylinder of zinc is then procured, of a size that will permit it to go freely into the copper cell before described: a wire, in the form like the letter U inverted (∩), is soldered to it at opposite sides, and in the bend of this wire a metallic point is fixed, which, when placed in the little cup of mercury before described, suspends the zinc cylinder freely in the copper cell; then weak acid being put into the cell, the zinc and copper form a voltaic combination, and the two sides of the ∩ wire are both in the same state, so that the pole of a small magnet placed in the cylinder, that is left open in the axis of the apparatus, makes the wire, and the zinc cylinder with it, revolve. If the apparatus be 9 or 10 inches in diameter, it is stated that there is a tendency to rotation by the action of the terrestrial magnetism alone.

5. *Note on New Electro-Magnetical Motions, by* M. Faraday, —At page 96 of this volume, I mentioned the expectation I entertained of making a wire through which a current of voltaic electricity was passing, obey the magnetic poles of the earth in the way it does the poles of a bar magnet. In the latter case it rotates, in the former I expected it would vary in weight; but the attempts I then made, to prove the existence of this action, failed. Since then I have been more successful, and the object of the present note is so far to complete that paper, as to shew in what manner the rotative force of the wire round the terrestrial magnetic pole, is exerted, and what the effects produced by it, are.

Considering the magnetic pole as a mere centre of action, the existence and position of which may be determined by well-known means, it was shewn by many experiments, in the paper, page 74, that the electro-magnetic wire would rotate round the pole, without any reference to the position of the axis joining it with the opposite pole in the same bar; for sometimes the axis was horizontal, at other times vertical, whilst the rotation continued the same. It was also shewn that the wire, when influenced by the pole, moved laterally, its parts describing circles in planes perpendicular nearly to the wire itself. Hence the wire, when strait and confined to one point above, described a cone in its revolution, but when bent into a crank, it described a cylinder; and the effect was evidently in all cases for each point of the wire to describe a circle round the pole, in a plane perpendicular to the current of electricity through the wire. In dispensing with the magnet, used to give these motions, and operating with the terrestrial mag-