For the Scientific American.

The Voltaic Battery.

NUMBER III.—(Concluded.)

As it is now to be premised that it is understood what is necessary to form a battery, and also what the nature of the parts must be, we shall consider the cause of the decline of the battery action, and also what is necessary to sustain the action. At a first view it is only necessary to sustain those conditions which constitute the battery to continue it in action, but we will first recite those conditions and then observe how these conditions are changed by the continued action of the instrument by which we may more clearly see the cause of the declination, and know what is requisite to continued action.

In the first number we defined a battery as an apparatus, consisting of a compound fluid, and two other bodies, one of which is to eliminate one element of the compound fluid, and the other body the other element. Intensity was defined as the measure of the force of the chemical action, and quantity as the amount of the chemical action. All declinations of the battery are the decline of quantity and intensity—or, in other words, of the amount and force of the chemical action. As the intensity which results from any one chemical force, is always the same; the intensity of Smee's battery is constant—but in Grove's battery the chemical actions are constantly changing, for the hydrogen will be decomposing nitric acid at one time, and nitrous acid at another —the intensity will be ever varying.

In all useful batteries, one of the decomposing bodies is zinc, and its relation to the whole apparatus is such that it is called the Electromotor, but zinc is by far the most effective and economical, and therefore we will not consider the substitution of any thing in its place. As the zinc is the electromotor, it is evident that our battery cannot work without zinc, and that any diminution of the surface exposed to chemical action will cause a decrease of quantity. The eyes of the operator will instruct him when the battery declines from this cause.

But the oxide of zinc must be converted into sulphate by combining with acid, and the sulphate must be dissolved by the water. It will be evident that the rapidity with which these actions are performed, will depend on the percentage of acid and the readiness of the water to dissolve the sulphate. Hot water will readily effect the solution, while cold water is more tardy, and when the temperature is near freezing, the solution is scarcely effected at all; therefore, if we want the battery to work, we must keep it warm: in general every thirty degrees above freezing will double the quantity. As the water can dissolve only a certain quantity of the sulphate, the battery may decline and stop altogether for want of water, although there may be abundance of sulphuric acid in the vessel. To obviate this, the prudent operator will never add more acid altogether, to the water, than one-fourth of its bulk, and for large operations it should never exceed one-sixth, for as the water approaches the point of saturation, the solution of the sulphate is effected more and more slowly, and the excess of acid is wasted. To test whether acid is wanted in the battery, or whether it has all combined with the oxide of zinc, a small battery, consisting of a mere strip of silver and zinc soldered above, is thrust into the liquid: the operator judges of the amount of acid by the rapidity of the evolution of gas from the silver strip. What has been said about the conditions of the battery as the zinc and its solvents, will apply to all the batteries for zinc is the electromotor in all of them.

We now come to the second body of the battery, or that one which eleminates the hydrogen. First, we will examine it in Smee's instrument:—Silver is generally used for this part, but other metals will answer to evolve the hydrogen, and of all the metals, iron possesses the property in the most eminent degree. We saw, in a former number, that a peculiar form of surface was requisite for evolving hydrogen, and this form is readily given to iron, but unfortunately the water will act on the iron, and in a few moments the surface is not a surface of iron, but a surface of oxide of iron, and the acid and water will soon eat up the iron plate. This explains how it is that every now and then somebody will discover that iron can be used in the place of silver or platinum, in making batteries, and then we hear no more of it until it is discovered again.

What was said above about iron will apply to all the ignoble metals, as they all become, in a short time, covered with a coating of oxide, and a surface of oxide will not evolve the hydrogen. Here the operator can see the importance of keeping all ignoble metal away from the acid of the battery; although we may use platinum or silver, if ever so small a portion of the brass or copper fixtures is exposed to the acid of the battery, it will be dissolved, and be precipitated as metal or oxide on the silver plate, and render it inert. One of the greatest annoyances the operator has to bear arises from the metals, as iron, &c., with which the zinc is contaminated; as the zinc plate is dissolved, these impurities are gradually precipitated on the silver and hinder its action. From this cause it is generally thought that the platinization of Smee's battery will last only a few weeks; such, however, is not the case, as it lasts for years; but acids will not remove the impurities from the surface: after years of trouble, I discovered that by immersing the plates for a few hours in a weak solution of per-chloride of iron, it will be restored to its action.

VOLTA.

For the Scientific American.

Sub-Marine Telegraph under the Atlantic.

Since the successful attempt to connect England and France, by means of a sub-marine Telegraph, the great question of uniting England, or rather Ireland and America, has been the theme of conversation in various circles, and many sage opinions expressed in regard to its feasibility or possibility. Some speak of the breaking of the wire with an air of triumph, indicative of something more than doubt in regard to the ultimate success of the scheme. We here propose to show in a simple and practical manner how this great and most important undertaking can be successfully carried out. One reason of the failure of the "channel line," was the too small size of the wire, and another was the want of a sufficient number of anchors to hold the wire steady in its position along a rocky bed. There were but sixteen anchors to the mile—when there should have been small anchors of five pounds once in five or six feet, so that the currents or other action, could have no sensible chafing effect upon the wire, which should have been one inch and a half in diameter at least—instead of five-eighths of an inch, as in this instance. A novel and ingenious plan for coating four separate wires in a solid Gutta Percha cord, one and three-fourths of an inch in diameter has been invented.

It is proposed to anchor the wire, when the bed of the ocean will allow of sufficient observation to know its character, once in five, ten and fifteen feet, until deep water is found, when there will be just sufficient weight to overcome the specific gravity of the water, when the line will be run out and permitted to sink, as it surely will, to the bottom, where there is neither life or motion to disturb or injure it. The distance between Cape Clear near Galway, in Ireland, is about 1,600 miles along the banks of Newfoundland, commencing about 100 miles above Halifax, and a line of this length consisting of four separate wires perfectly insulated, in a cord of the size proposed, would last for hundreds of years, as its lateral strength would be almost equal to iron. Such a line would weigh about 8,000 tons, and would require six hundred anchors. The cost of everything, when in complete working order, would be less than 3,000,000 of dollars.

The lines should be in the hands of the governments of the two countries where it terminates, who should agree on a tariff of prices for messages, which should be free to all who chose to pay the rates. In this way much of the uncertainty attendant upon commercial operations, would be avoided. In laying down the line, 15 ships of 1,000 tons would be required, with at least 4 steamers of 1,500 tons, and 2 fast steamers as tenders. The time required to lay down the wire when every thing was on board and the vessels at their stations on the American and Irish coasts would be from 12 to 20 days only, as the ships would lay the line toward the centre from the land, meeting as near midway the ocean as possible.

The line would be sunk below all anchorage, and below all action of the water, and properly protected by lead or sheet copper coating where the bed was rocky and uneven. By the use of "St. John's self-determining variation compass," the wire could be laid down on an exact line, as this admirable instrument tells with unerring certainty by simple inspection, the deviation from the true geographical meridian, without reference to observations, so that all difficulty in locating and finding the wire in case of accident, is provided for by this, the most important invention of this inventive age. Ships using this compass will save time and ensure positive certainty in the safety and regularity of their trips.

Efforts will be made to induce the early action of the government in this important matter. Capitalists stand ready to construct the line for three millions of dollars with sufficient guarantees for faithful performance of contract, and all that remains is for the government to appropriate that sum and the work will be completed in less than two years.

Proposals have been made by S. T. Armstrong, Esq., of this city, to construct a line of Sub-marine Telegraph between England and Ireland on the plan above alluded to. Should he be successful in this, he will soon make proposals in due form to capitalists and to the government to lay down the Atlantic Line, a measure that will regenerate Ireland.

H. L. STUART, Civil Engineer.

British Patent Laws.

It has always been one of the leading objects of the British Scientific Association, and it is now the only one of them which has not been wholly accomplished, to obtain a more general attention to the objects of science, and a removal of any disadvantages of a public kind which impede it progress. Although this object is not very definitely expressed, yet Mr. Harcourt, in moving its adoption, included under it the revision of the Law of Patents and the direct national encouragement of science, two subjects to which I shall briefly direct your attention. In 1831, when the association commenced its labors, our patent laws were a blot on the legislation of Great Britain, and though some of their more obnoxious provisions have, since that time, been modified or removed, they are a blot still, less deep in its dye, but equally a stain upon the character of the nation. The protection, which is given by statute to every other property in literature and the fine arts, is not accorded to property in scientific inventions and discoveries. A man of genius completes an invention, and after incurring great expense, and spending years of anxiety and labor, he is ready to give the benefit of it to the public. Perhaps it is an invention to save life—the life-boat; to shorten space and lengthen time—the railway; to guide the commerce of the world through the trackless ocean—the mariner's compass: to extend the industry, increase the power, and fill the coffers of the state—the steam-engine; to civilize our species, to raise it from the depths of ignorance and crime to knowledge and to virtue—the printing-press. But whatever it may be, a greatful country has granted to the inventor the sole benefit of its use for 14 years. But what the statute thus freely gives, law and custom as freely take away, or render void. Fees, varying from 200*l* to 500*l*, are demanded from the inventor; and the gift thus so highly estimated by the giver, bears the great seal of England. The inventor must describe his invention with legal precision. If he errs in the slightest point—if his description is not sufficiently intelligible—if the smallest portion of his invention has been used before—or if he has incautiously allowed his secret to be made known to two, or even to one individual, he will lose in a court of law his money and his privilege. Should his patent escape unscathed from the fiery ordeal, it oftens happens that the patentee has not been remunerated during the fourteen years of his term. In this case the state is willing to extend his right for five or seven years more; but he can obtain this extension only by the expensive and uncertain process of an act of Parliament; a boon which is seldom asked, and which, through rival influence, has often been withheld

Such was the patent law twenty years ago; but since that time it has received some important ameliorations; and though the British Association did not interfere as a body, yet some of its members applied energetically on the subject to some of the more influential individuals in Lord Grey's Government, and the result of this was, two acts of Parliament passed in 1835 and 1839, entitled "Acts for amending the law touching letters-patent for inventions." Without referring to another important act for registering designs, which had the effect of withdrawing from the grasp of the patent laws a great number of useful inventions, depending principally on form, I shall notice only the valuable provisions of the two acts above mentioned, acts which we owe solely to Lord Brougham. By the first of these acts the patentee is permitted to disclaim any part either of the title of his invention or of the specification of it, or to make any alteration on the title or specification. The same act gives the Privy Council the power of confirming any patent, or of granting a new one when a patent had been taken out for an invention which the patentee believed to be new, but which was found to have been known before, but not publicly and generally used. By the same act, too, the power of letters patent was taken from Parliament, and given to the Privy Council, who have on different occasions exercised it with judgment and discrimination. By the 2d act of 1839 this last privilege was made more attainable by the patentee.

[The above is from Sir David Brewster's address before the British Association for the Advancement of Science; it shows how the great men of that country—the men of science—are interested in the protection of the inventor's rights. A great reform is yet wanted in the British Patent Laws—the fees are too high; they should be reduced nearly to the American standard, yet not quite so low, because a patent is far easier protected there than with us; and another thing, the applicant does not meet opponents in the British Patent Office as he meets oftentimes in the Corps of our Patent Office. When application is made for a patent in London, notice is sent to all those who have patents for inventions of a similar title, and if they show no opposition, the patent is at once issued; if they oppose, evidence is at once taken to prove the correctness of the opposition, and the legality of the applicant's invention is settled at the very threshhold of action. In our Patent Office, objections to the claims of the applicant are often set up by the examiner, and before the applicant can appeal from an unrighteous decision, he must deposit $45; and if he gains the case, is the money returned? No, it must remain in the Patent Office Fund, as a bonus to injustice. This part of our Patent Law certainly demands a reform, as was set forth by our correspondent "Junius Redivivus," last week.

Australian Cotton.

From a series of experiments in the Maitland District some satisfactory results have been obtained. The staple is described as very white, remarkably elastic, of sound strong fibre, long and finer than the good average American cotton imported into Liverpool. At the present time, now that so many of our mills are at a stand for want of the raw material, the cotton experiment in Australia is worthy of public attention. The kinds experimented on have been confined to Bourbon and Sea Island seed, and the success of the trial appears to have satisfied many of the leading colonists that the climate of the colony is extremely congenial to the cotton tree.

The British are making strong efforts, at present, to supply themselves with cotton,—time will show with what success.