NEW THERMO-ELECTRIC BATTERY.

BY M. A. NIAUDET.

This battery is frequently used and is much appreciated in Austria and Germany. It is made of different forms, of which the most recent, represented by Fig. 1, appears to us to be the best, since it requires only two Bunsen burners to set in action forty thermo-electric elements. There is another model of sixty elements, with three burners, which offers the same advantages as the one represented.

Each circular group of twenty elements should be separately considered. The following is the description of such a group:

The elements are arranged in a horizontal plane, and radially; the heated junctions being towards the center of the circle, and the cooled junctions at its circumference.

The two metals are: 1st. German silver (called *maillechort* in France and *neu Silber* in Germany), and, 2dly, an alloy of antimony and zinc, which fuses at a temperature slightly higher than the melting point of antimony.

These two metals are soldered (at least at the heated junction) without the intermediary of any other metal; the ends of the German silver wires pass into a little capsule of brass, which forms the bottom of the mould in which the other metal is cast. This capsule is shown at *c*, in Fig. 2, which represents two elements of the actual dimensions; it remains attached to the element and forms part of the apparatus.

Into the same capsule penetrates a small rod, *r*, of copper, the extremity of which is also enveloped by the cast metal; and by means of this rod the heat is conducted to the heated junction. The extremities of these copper rods are arranged in a small circle, and are held between two circular plates of mica, so that they all become heated by the same flame. In the apparatus shown, a Bunsen burner is adopted; but in some simpler apparatus the flame of a spirit (wood naphtha) lamp is used. The mica plate has the effect of concentrating and directing the heat of the flame on to the copper rods.

The object of using the copper rods at the heated junction will be seen from the following: The heated junction does not obtain its heat directly from the flame, but only through the intermediary of the copper rod; it is therefore protected against any accident through overheating, that is, against the fusion of the alloy, which would cause the immediate break down of the battery.

To avoid, at least partially, the loss of heat by radiation, these copper rods are inclosed, excepting at their extremities, within a small tube, shown at *t*, in Fig. 2. The cooled junction is altogether dissimilar; the fusible metal is here soldered to a plate of copper, to which is soldered the German silver wire of the next element. The plate of copper is of large surface, forming a cylinder through which the air circulates, with the production of a cooling effect.

These batteries have been subjected to careful experimental trial by M. Waltenhofen, of Prague; he has compared them with that of Marcus, and has found them to be much superior to it.

It was found in the previous experiments of M. Stefan, of Vienna, that the thermo-electric elements of Marcus may obtain an electromotive force of one-eighteenth volt, but this maximum is obtained only at a temperature close upon the fusing point of one of the alloys of which they are formed.

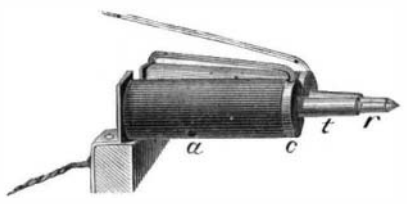
Under similar conditions, M. Waltenhofen found that the Noë elements possess an electromotive force between one ninth and one tenth volt.

In practice, these maxima, or anything near them, cannot be depended upon, and, when several elements are connected in series, they are never attained, because the elements are never equally heated. For ordinary experiments we may calculate upon one sixteenth volt per element. The resistance of each element is one fortieth Siemens' unit.

An improvement which is supplementary, but very useful in practice, consists of the addition of a regulator of the pressure of gas, by means of which any overheating, and the accidents which ensue from it, are avoided. It formerly sometimes happened that an unexpected increase in the gas pressure produced some fusion of the metal, and thus deteriorated the battery.

The safety apparatus here referred to, and which is shown in the front part of Fig. 1, consists of a glass bottle containing water, and closed by a cork. Two tubes enter this bottle through the cork; one, B B, is a branch from the gas supply, and passes to the bottom of the vessel; the other, H, does not reach the surface of the water. Its use is to lead away any gas passing into the bottle, and to conduct it to the small gas jet, I, which is kept constantly lighted. If the pressure of gas be low, the tube, B, is closed by the water; if it should become too great, the gas bubbles through the water and escapes at G, where it inflames. The apparatus thus constitutes a safety valve, preventing the pressure from rising above a certain degree, which can be regulated at will. The gas which escapes, being at once consumed, cannot give rise to accident.

FIG. 2.



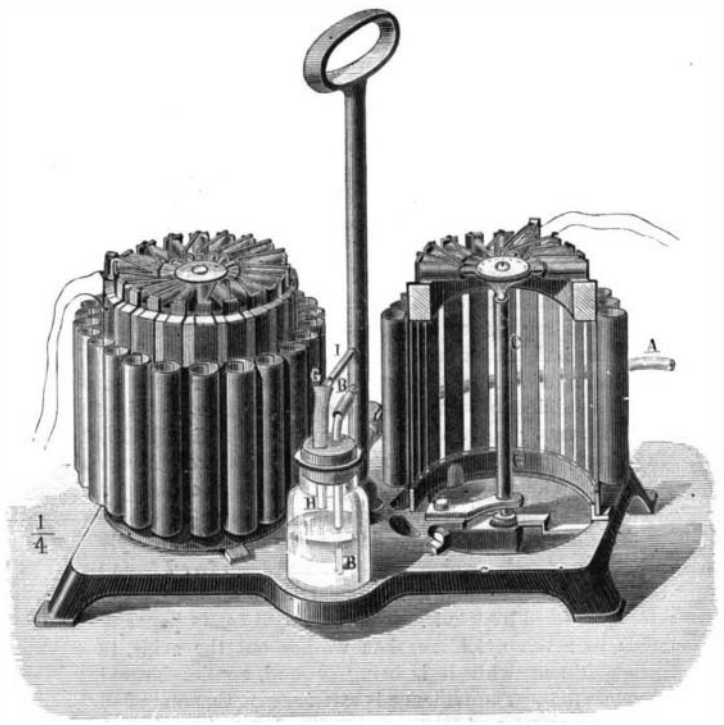


FIG. 1.—THERMO-ELECTRIC BATTERY OF M. NOE.

With a battery of twelve elements, it is possible to work an electric bell; with twenty elements, water may be decomposed in the voltameter; with forty elements, a secondary battery of Planté may be charged, or an induction coil worked. In a word, these batteries allow of most of the experiments in physics, and small industrial operations, gilding, plating, nickeling, etc., being carried into effect.

One great advantage of this kind of electro-motor is that it is set in full action in one or two minutes, and all expenditure ceases the moment the current is no longer required. Lastly, and this is the most important point, the battery undergoes no alteration by use, as in the case of those which have preceded it, and which in a short time show a considerable internal resistance, and a corresponding diminution of effect.—*La Nature.*

THE CARP AND ITS CULTURE.

In the accompanying engraving we reproduce a careful drawing of the mirror carp (*Cyprinus carpio specularis*), so called on account of the large scales which run along the sides of the body. This is one of the three races of carp recently introduced into this country, the other two being the scale carp and the leather carp, the one entirely covered with scales, the other having few or none.

Three years ago the national carp pondswere established at Washington, in the old swamp and canal near the monument, and many thousand young fish have since been distributed for stocking suitable waters in Kansas, Nebraska, Missouri, Ohio, Indiana, Illinois, Pennsylvania, Maryland, Virginia, North Carolina, South Carolina, Georgia, Alabama, Louisiana, Texas, Tennessee, Kentucky, and New York. Persons desiring them for such purpose can be supplied on application to Prof. S. F. Baird, U. S. Fish Commissioner, Washington, D. C.

In a recent communication Professor Baird expresses great faith in the future of this new fish. He is quite well satisfied that within ten years it will constitute a very prominent portion of the animal food of the country. Although scarcely known in the United States, and but little more, as an article of extended application, in England and France, the carp is in Germany and Austria cultivated to the highest degree, so as to constitute a notable article of the market supply.

The fish itself is probably of Asiatic origin, and has been domesticated in China for thousands of years. It has, however, been so extensively distributed in Europe as to have become, in a measure, a native fish, occurring in public waters as well as in private enclosures. It is, Prof. Baird remarks, emphatically a farmer's fish; and may safely be claimed to be, among fishes, what chickens are among birds, and pigs and ruminants among mammals. Its special merits lie in its sluggishness and the ease with which it is kept in very limited enclosures, it being a vegetable feeder, and its general inoffensiveness. Trout and black bass require abundant water and a supply of animal food for their sustenance and growth; the carp thrive in shallow ponds, and while not disdaining flies, worms, larvæ, etc., live on the succulent roots and leaves of aquatic plants, seeds as they fall into the water, and other similar substances, and may be fed very readily upon corn, grain, bread, root crops, raw or boiled, and, indeed, any vegetable refuse.

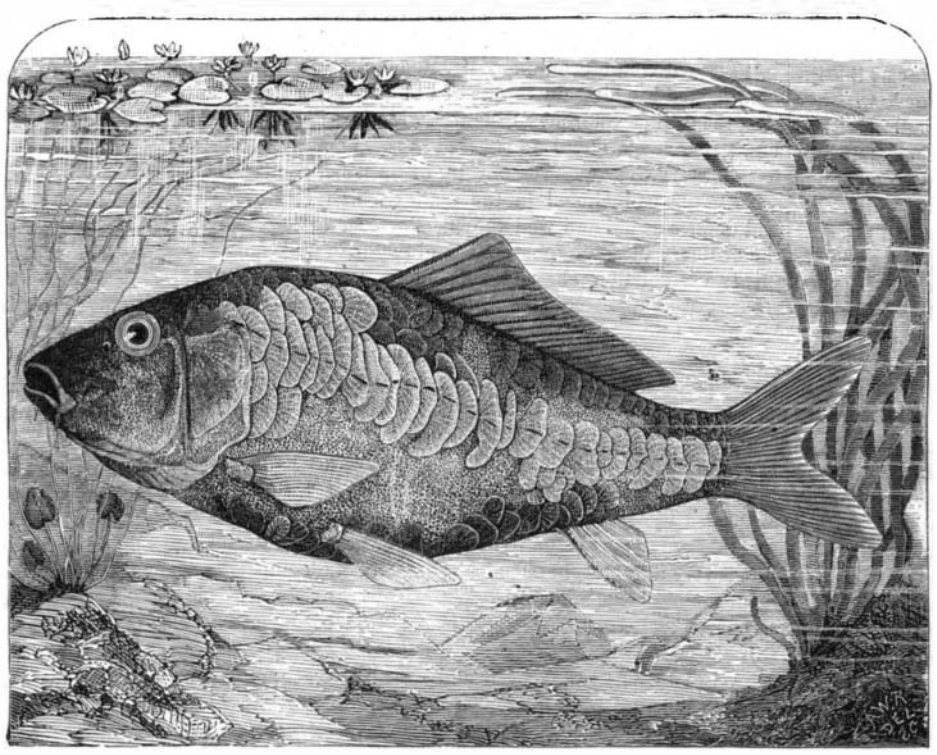
Their rate of growth, too, is something marvelous, and as observed so far in the specimens introduced into the United States, is even more remarkable here than in Europe. Among the original fish imported by the Fish Commission from Europe, and which are now only about three and a half years old, are some from twenty-five to thirty inches in length, weighing from four to eight or nine pounds.

The carp thrives best in artificial or natural ponds with muddy bottoms, and such as abound in vegetation. In large ponds it may not be necessary to furnish any special food, but in restricted enclosures, as, for instance, those of a fraction of an acre, they may be fed with the refuse of the kitchen garden, leaves of cabbage, lettuce, leeks, etc., hominy, or other substances. Grain of any kind is generally boiled before being fed to the fishes, but this is probably not absolutely necessary. The refuse of malt from breweries makes excellent food for them.

The Washington ponds are arranged so that they can be drawn off at will, leaving all the fish collected in a small basin near the outlet. This is for convenience in assorting the fish, and for selecting such as are needed for other purposes.

It is a prime necessity that there be no predaceous fish in the same pond with carp. Of course, the larger fish will be measurably secure against the attacks of carnivorous species of about the same size, but the eggs and young will become a prey to the rapacity of such associates. As a general rule the fish will thrive best when they are the sole occupants of particular waters, although the association of suckers and chubs would be less objectionable than that of sunfish, perch, or black bass.

The carp spawn in the spring, in May and June, and indeed, under some circumstances, throughout the entire summer. The Fish Commission have young fish that spawned from May to September. They are very prolific, yielding from 400,000 to 500,000 eggs, according to size. The eggs adhere tenaciously to whatever they touch, and for that reason it is very important that a new pond should be provided with floating weeds for such attachment. The eggs hatch out in a few days, and the young grow very rapidly. They feed voraciously upon the so called frog spittle, the green alga scum so common in



frog ponds. Consequently such waters are especially adapted to carp.

Whenever the water becomes chilled down to perhaps 40°, and especially when frozen over at the top, the fish bury themselves in the mud, aggregating in lots of from fifty to one hundred, frequently with their tails projecting, and constituting what is called in Germany, kettles or roses. It is very important that they should not be disturbed under such circumstances. Of course, while hibernating in this way they are not feeding, although they are said not to lose appreciablyin weight. In the more southern regions, where the waters do not freeze, they will probably feed throughout the year, and make a more rapid growth

So far, Prof. Baird says, no waters have proved too warm for carp; indeed, they are said to thrive especially well in reservoirs receiving the condensed waters of low-pressure steam engines, in Germany, of over 100° temperature.

As regards the best plants for a carp pond, Prof. Baird mentions the ordinary pond weeds (*Pontederia* and *Sagittaria*), splatter dock, or pond lily, and, indeed, any of the kinds that grow in the water, with leaves floating upon the surface, duckweed among the number. Those which produce seed, like the wild rice, are especially desirable, as the fish feed voraciously upon them.

The great merit of the carp for cultivation, next to its excellent table quality, lies in its adaptation to shallow and warm ponds unsuited for ordinary fish. The country is full of such waters, now useless, which might be made exceedingly productive; and there are thousands of swamps in every State, which might easily be flooded and stocked at small cost in money or trouble. In Germany many villages maintain at common cost for the public benefit carp ponds of a hundred acres or more.

RECENT DECISIONS RELATING TO PATENTS.

U. S. Circuit Court—Southern District of New York.

MANUFACTURE OF CELLULOID.—DANIEL SPILL *vs.* THE CELLULOID MANUFACTURING COMPANY.

(*Decided May* 25, 1880.)

Blatchford, J.: This suit, on the proofs, involves two patents granted to the plaintiff. One is No. 97,454, granted November 30, 1869, for an "improvement in dissolving xyloidine for use in the arts." The specification states that the "invention relates to the preparation and use of certain solvents of xyloidine, and which differ from the ordinary known solvents of xyloidine, in that these menstrua which are employed are not, necessarily, in themselves, solvents of xyloidine, but become so by the addition of the bodies, compounds, or substances herein referred to." It also states that the invention consists in the employment of eight different solvents. Only the second solvent is alleged to have been used by the defendant. It is thus described in the specification: "Camphor or camphor oil, or mixture of the same, in conjunction with alcohol or spirits of wine, the same to be employed in about equal proportions." The claim is in these words:

"The preparation and use of solvents of xyloidine, such as have been before described, so as to render xyloidine more easy of conversion into compounds containing xyloidine, which are suitable for application in the arts and for industrial purposes."

The defendant has infringed this claim by using camphor in conjunction with alcohol, as a solvent of xyloidine. The defendant mixes ground and dried xyloidine with pulverized dry camphor, and then immerses the mixture in alcohol until the xyloidine is dissolved. It is dissolved by the joint action of the camphor and the alcohol. Neither alone is a solvent of xyloidine. It is immaterial, so far as the invention and the claim of the patent are concerned, whether the camphor and the alcohol are mixed so as to dissolve the camphor in the alcohol and then the xyloidine is put into the solution, or whether either the alcohol or the camphor is first mixed with the xyloidine and then the third substance is added. The bringing of the three together, causing the xyloidine to be dissolved or softened, so as to be more easy of conversion or working into compounds or articles containing xyloidine, is the invention. Making use of the solvent power of camphor and alcohol, when in the presence of each other and of the xyloidine, is the essence of the invention. The use of the camphor and the alcohol in about equal proportions is not of the essence of the invention. They are stated by the patentee to be useful in these proportions. But the evidence shows that the real invention was the discovery of the fact that camphor and alcohol, when united, would be a solvent of xyloidine.

The novelty of the invention of this solvent is attacked, but without success. The evidence is voluminous, and has been carefully considered, with the result, that the defendant has failed to show want of novelty. The prior patents adduced and examined are the English patent to Cutting, No. 1,638, of 1854; and the English patents to Parkes, No. 2,359, of 1855; No. 2,675, of 1864; No. 1,313, of 1865; No. 1,695, of 1867; and No. 1,614, of 1868. Parkes' pamphlet of 1867, and Gmelin's Handbook of Chemistry, of 1860, have also been considered, as well as the English patent to the plaintiff, No. 2,666, of 1867. No other anticipation than the above seems to be considered by the defendants' expert, and he does not allude to the pamphlet. Another defense relied on is, that one Parkes communicated to the plaintiff, in England, the knowledge that alcohol and camphor united were a solvent of xyloidine, and that the plaintiff never made the invention himself. On the whole evidence, the defendant has failed to establish this defense.

The other patent involved is No. 101,175, granted to the plaintiff March 22, 1870, for an "improvement in the manufacture of xyloidine and its compounds." There are five claims in the patent. The second alone is alleged to have been infringed. The specification says: "The second part of my invention relates to the bleaching of xyloidine, and is as follows: When it is desired to bleach or whiten the xyloidine, I bleach it directly after the removal of the acids, and before removing it from the vat. This I do by any of the well known means, preferring a solution of chlorine or a solution of chloride of lime or soda, which I add to the xyloidine, making use of alternate stirrings and rests, for a sufficient time, until the xyloidine is whitened. The solution is again drained off, and the xyloidine is repeatedly washed with water, in order to remove any excess of bleaching agents or any residue from such agents, when it will be found to be ready to be submitted to pressure in order to free the same from water, and may then be opened out, so as to prepare it for drying, dissolving, or other purposes." The second claim is in these words: "The process of bleaching xyloidine in the manner herein specified." That portion of the specification which precedes the statement of the second part of the invention relates to the treatment of vegetable fiber or lignine with acids, to convert it into xyloidine and render it soluble in suitable solvents. The fiber is intimately mixed with the acids by appropriate means, then the acids are strained and pressed from the fiber, which is now xyloidine, and it is subjected to a washing and stirring with water until it is nearly or quite free from acids, and the water is then drained off. The washing is done in a washing vat. The bleaching, as before stated, is done "directly after the removal of the acids," and before the xyloidine is removed from the vat. The evidence shows that the real invention of the plaintiff in this regard was to bleach xyloidine by ordinary bleaching agents, directly after the converting acids had been washed out of it, and before anything had been mixed with it which might interfere with the action of the bleaching agents. This is, fairly, the sense of the specification. Whether the bleaching is done in the washing vat or not, or in a solution of the ordinary bleaching agent, or by such agent not in a solution, are immaterial matters. The essential discovery was, that an ordinary and well known bleaching agent, of the character of chlorine, or chloride of lime, or chloride of soda, if applied to xyloidine, when it had become such and had been freed from the converting acids, and while it remained in that state, would act upon it to bleach it. The defendant treats paper with acids to make xyloidine, then washes out the acids, then grinds it, and, while it is being ground, applies bleaching powders to it. The evidence is satisfactory, that one of such bleaching powders is permanganate of potash, and that it was a well known and ordinary bleaching agent at the time of the plaintiff's invention. Therefore, infringement is established.

It is contended for the defendant that the claim in regard to bleaching does not claim a patentable invention, because it is merely the use, to bleach xyloidine, of what had been before used to bleach fibrous material not converted into xyloidine. The true view is well expressed by Professor Seeley, the plaintiff's expert. The defendants' expert, Mr. Edward S. Renwick, had cited four English patents, those to Martin, No. 7, of 1864; to Reeves, No. 2,797, of 1860; to Collyer, No. 550, of 1859; and to Reeves, No. 3,293, of 1866, as describing the treatment of vegetable fiber with a solution of chloride of lime or of soda, substantially as the plaintiff's patent describes xyloidine as being treated with a solution of chloride of lime or of soda. Professor Seeley says:

"The patents referred to by Mr. Renwick cover inventions relating to bleaching, by means of ordinary bleaching agencies, the ordinary fibrous substances which are used for clothing, paper stock, etc. I do not find in them anything which has more bearing upon the novelty of Spill's invention than what might be included in the matter which Spill regards and defines as old and well known. Previous to Spill's time, the ordinary bleaching materials and methods were only applied to a peculiar class of substances, namely, those substances of fibrous character which were useful only by reason of that fibrous character. Spill's invention brings the utility of bleaching upon a new kind of material, and brings it where it was very desirable, but where it was supposed to be impracticable. It is true that pyroxyline (xyloidine) has a fibrous structure, but this fibrous structure is not any essential or useful property in it. In fact, in this art, pyroxyline does not become useful until the fibrous structure is destroyed. Pyroxyline is not useful for any of the purposes to which the materials formerly bleached were applied. Pyroxyline is very different, in chemical character and composition, from the old bleachable materials. If pyroxyline had not the fibrous structure, probably the question of invention in this case would not have arisen, for then it would have appeared plainly that the case would have been very similar to that of (suppose) bleaching charcoal by ordinary bleaching agents. In the absence of experiments, the bleaching of a substance like pyroxyline would seem impracticable, almost incredible. The theory of ordinary bleaching is, that the coloring matter of goods to be bleached is of a complicated and unstable character, and is destroyed by the powerful chemical action of the bleaching agents, chlorine, oxygen, etc. Inasmuch as pyroxyline, in its manufacture, has been exposed to the action of some of the most powerful chemical agents which are known, it is unreasonable to suppose that any of the unstable coloring matter could be left in it. The bleaching of pyroxyline has often been proposed and attempted; it was especially desirable in this art; but it is my opinion that a chemist would exhaust all other theories before he would think of ordinary bleaching agents for the purpose. The subject had come up in my mind several times before Spill's invention, and I was unwilling to credit the efficacy of his plans until they were actually demonstrated to me. I know of very few inventions where so novel and useful results have been obtained by such simple and unlooked-for methods." There is no evidence to countervail this view.

The defendant has introduced evidence for the purpose of establishing that the invention claimed by the plaintiff in regard to bleaching xyloidine was previously known to Parkes, and was communicated by him to the plaintiff, and was not in fact invented by the plaintiff. The burden of showing this is on the defendant, and, on the whole evidence, it has not succeeded in doing so.

The defendant claims to have shown that other inventions claimed in the two patents were not new, so as to affect the question of costs. But the attempt cannot be held to have been successful.

There must be the usual decree for the plaintiff, for an account and an injunction, as to the claims above held to have been infringed, with costs.

Horace M. Ruggles and Edwin M. Felt for the plaintiff.

William D Shipman, Henry Baldwin, Jr., and E. Luther Hamilton, for the defendant.

The Brooklyn Bridge.

On being re-elected President of the Board of Trustees of the Brooklyn Bridge, lately, Mr. Henry C. Murphy promised that the bridge would be ready to open for use by the Fourth of July, 1881. A large body of men are at work upon the approaches to the bridge on both sides of the river. It is thought that a couple of months will suffice to complete the stone and brickwork on this side, after the purchase of certain properties has been made. The Brooklyn approach is shorter and much nearer completion.

The machinery for putting up the superstructure of the bridge is ready in the towers; but the work has been delayed owing to the necessity of constructing special machinery to cut the steel for the chords of the bridge. The largest size of steel hitherto made at the Cambria Iron Works, the most extensive in the country, measured 7 inches by 7 inches The bars for the bridge are 7 inches by 8½ inches, and to cut them enormous shears had to be made and put in position This caused a great delay in the preparation of the first 500 tons of steel. The second lot of 500 tons, it is expected, will be delivered in advance of the time specified in the contract.

New Mode for Photo-Gelatine Plates.

Prof. Geo. Herschell makes the following suggestions in a note to the *British Journal of Photography:*

I found that by adding one drachm of a dilute mineral acid (I used nitro-hydrochloric dil. B. P.) to six ounces of rectified spirit, almost any quantity of gelatine would dissolve in it on the application of a gentle heat. Plates coated with this dried in about double the time collodion takes.

Having got so far, I took some of Kennett's pellicle, and dissolved as much as I could in one ounce of spirit with ten minims of the acid. I got a nice emulsion, which flows over the plate quite as easily as collodion does. The plates are quite hard and dry in ten minutes. The emulsion must be kept warm while coating.

I hope that some of the leading gelatine workers will take these facts up and put them on a good basis, as my time for experiments is very limited. I find that ether and chloro form act as well as rectified spirit as solvents of gelatine when an acid is added. I have not had time to expose my plates yet.

The Survey of the Gulf Stream.

The sundry civil appropriation bill, just passed by the House of Representatives, provides for a survey of the Gulf Stream from its origin to its final whirl around the Sargasso Sea. The plan embraces soundings, deep sea temperatures, and current observations. The high importance of the proposed survey is clear, and when done it will add another valuable chapter to the nation's record of scientific exploration. The practical value of the proposed work, in its bearing no commerce and meteorology, is beyond estimation.

THE WONDERFUL CLOCK.—The astronomical clock invented and constructed by Felix Meier, which was illustrated and described in these columns some time ago, has been brought to this city for exhibition. In workmanship it excels the celebrated Strasburg clock, and it is a masterpiece of mechanical skill. The clock will remain on exhibition at Tammany Hall for some time, and it will repay any one interested in mechanical novelties to devote an hour in watching the movements of the figures and orbits in this wonderous clock.

Last of the Stevens Battery.

The Chancellor of New Jersey has ordered a sale of the Stevens Battery to be made by Washington R. Williams, Esq., Master, whom he directs either to make sale of the battery and its appurtenances as an entirety, or sell its materials, consisting of engines, etc., separately, whichever will yield the most money. Thus the great battery, which cost the projector so much money, and was intended to be the pride of our navy and a terror to other nations, is to be sold for old iron.