Electric Telegraph Experiments.

VERMONT MEDICAL COLLEGE,
Woodstock, March 27, 1848.

To the Editor of the Sci. American.

In your valuable paper of March 4th, is contained the *great* discovery of the use of *water* alone in Grove's Battery, instead of sulphuric acid and water, as the motive power. The least acquaintance with this battery or with any of the common forms, must convince you and all, that the zinc must be acted on chemically by means of an acid. If that acid is not mingled with the water which surrounds the zinc, it must be obtained from some other source, and in the case alluded to, was obtained from the passing of the nitric acid through the porous cup to the zinc It has long been known that nitric acid is an active exciter of electricity on the zinc. As soon as the nitric acid should pass through to the zinc in sufficient quantity, the action would begin, and be increased with the increase, and be diminished with the diminution, of the acid. But, the mercury on the amalgamated zinc would be attacked, and the plates would ere long need re-amalgamation. Well known facts and principles lead to these *necessary* conclusions.

As I had just received a new Grove's Battery of eighteen cups, I determined to try the experiment, and test the 'hydropathic' discovery. The battery was new and clean and in fine state. I charged the zinc plates with pure water and put strong nitric acid in the porous cups. Aided by an assistant, this filling was done simultaneously and rapidly.—The following were the results:

1. On bringing the copper wires from the poles into water, there was indication of only the slightest decomposition of water.

2. On attaching the poles to an electro-magnetic apparatus, there was not the least developement of magnetism at either end of the soft iron. Hence, such a battery of even 18 cups would not move the common Telegraph lever, while three or four cups with the ordinary exciting diluted acid is amply sufficient

3. Waiting a few moments I tried these same experiments again, and found the power of the battery had somewhat increased.—The decomposition and magnetism were thrice as much. Hence the nitric acid had passed in some quantity through the porous cup to the zinc.

4. Repeating the same experiment at the end of half an hour, the activity of the battery had greatly increased, and both the results, already mentioned, were far more manifest.

As I have repeatedly used the same size of Grove's Battery charged in the common way with twelve of water to one of sulphuric acid for the zinc and ordinary nitric for the porous cup, it is evident that the power of the hydropathic solution was far the less efficient of the two.

5. In about an hour and half the "hydropathic system," had attained its maximum efficiency, and I repeated the above experiments before the medical class, and added the following. A large *dancing* iron in the proper helix was suspended or made to dance in the usual manner. A rod of eight inches length and nearly one-fourth of an inch in diameter was made to play beautifully. Dutch gold leaf was finely deflorated, and both silver leaf and gold leaf burned distinctly.

6. When the circuit had been broken, on closing it, the usual effervescence took place around the platinized platina of the porous cup. Had the porous cup been removed and the nitric acid been mingled with the water about the zinc, and the battery thus have been changed into the form actually of Smea's battery, the same results would doubtless have taken place, only with far more energy.

7. In two or three hours afterwards the power of the battery was greatly diminished. The nitric acid in the porous cup was weaker, and the nitrate of mercury and of zinc in the water had lessened its specific gravity compared with that of the nitric acid so that the nitric acid would pass in much less quanti y to the zinc. After several hours more the action nearly ceased, and the plates were taken from the solution and the remaining weak nitric acid was preserved.

8. An examination of the zinc plates showed that the mercury had in part been removed from them, and especially where the porous cups had been in contact with the zinc plates or nearer to them. The "used up" nitric acid showed that the porous cups must be refilled with that powerful acid, and this process be often repeated. Re-amalgamation must be necessary; how often, it is not easy to determine from these experiments. When the zinc is used with dilute sulphuric acid saturated with sulphate of soda, re-amalgamation is not necessary in two months; that this "hydropathic system" will require it very much oftener, there can be no doubt.

In conclusion I venture to infer, that the cost of sustaining the batteries on the "hydropathic system" will be at least five times as great as by the solution just mentioned.

Your obd't. C. DEWEY.

P. S. I have used the phrase "hydropathic system" with no invidious meaning, but as a happy expression, already made public, of the meaning to be conveyed. I rejoice in any improvement in science and art, especially in that which will disseminate knowledge and facilitate communication between the different parts of our country in a cheaper as well as expeditious manner. Honor to whom honor is due. C. D.

Bell Casting.

The casting of common house bells or hand-bells differs in no wise from the processes relating to small castings in metal generally; but for church-bells the case is otherwise. The production of a *sonorous* quality, in addition to many of those which pertain to all large castings in mixed metal, gives occasion for many scrupulous arrangements in the management of the foundry. A bell-foundry must have a furnace which will contain many tons of metal, for the whole of the casting for one bell is made at once. The arrangements as to the central core or mould for casting a large bell are thus made:—Contiguous to the furnace is a pit deeper than the height of the bell. In the centre of this pit is built up a rough mass of brick work, somewhat smaller than the interior of the bell; and this is coated externally with a mixture of earth and horse dung, applied in successive layers, and worked smooth by guages, until the *exterior* of the core presents exactly the same size and shape as the *interior* of the intended bell. When the prepared core is thoroughly dried by means of fires, a second coating of the same composition is laid on of the same thickness as the intended bell; this coating, which is called the "model," is formed of earth and hair, and is, like the former, brought to a very smooth and correct surface by guages, the exact counterpart of the exterior of the bell. A third coating is then applied, called the "shell," much thicker than the others, and formed of a somewhat different composition. A little tan-dust is sprinkled on the first coating, or core, before the second, or model is applied; and also on the latter before the outer coating or shell is laid on. When all is well dried, the "shell," is lifted off from the "model," and the model is picked or cut off from the core piecemeal. If we suppose the core the model, and the shell to be three hemispherical cups placed one within another, and the middle one to be removed, it will serve to illustrate how a vacant space comes to be formed between the core and the shell: and when we further bear in mind that the exterior of the core gives the internal form to the bell, and the interior of the shell the external form, the object of the whole arrangement will be very clearly seen.

This internal cavity of the mould, between the core and the shell, is that into which the metal is to be poured. The casting pit is filled up with loam or earth, to the level of the top of the mould; a shallow channel is cut in the loam from the furnace to an orifice communicating with the vacant space in the mould; and two other orifices are left for the escape of air as the melted metal enters. Meanwhile the metal is being melted in the furnace. The tin employed is in the form of blocks, the copper is old ship-sheathing and other fragments. These are melted in a reverbatory furnace, by the heat of billets of wood. All being ready, the earth which stops an orifice in the lower part of the furnace is knocked or dug away, a narrow jet instantly pours out from the opening, and a stream of liquid fire (for so it seems to the eye) runs along the channel in the loam, and flows into the mould, bubbling and hissing and giving forth greenish sparks. When the mould is full, the metal is allowed to remain till perfectly cool; the loam is then removed the external "shell" lifted or cut from the bell, the bell lifted off the core, and the core pulled down. If the bell be very large, it alone occupies the pit; but if of smaller size such as from three or four to ten or twelve hundred weights, six or eight may be cast in one pit at one time. The tone of a bell depends conjointly on the diameter and the thickness; a small bell or a thick bell giving relatively, a more acute tone than one which is either larger or thinner. Hence the founder regulates the diameter and thickness according to the musical pitch of the tone which the bell is to yield; but as this cannot be rigidly attained by casting only, the bells (say a set to form chimes) are attained by chipping away some of the metal with a sharp-pointed hammer: reducing the diameter at the lower edge when the tone is too low, and reducing the thickness at the part where the hammer strikes when the tone is too acute.

Preserved Potatoes.

An importation of considerable novelty and interest has recently taken place by a vessel arrived from Gottenburg, consisting of some casks of potatoes, in a state of preservation. It is known that this description of vegetable is free from duty when imported into this country in a raw state, the privilege extending to all foreign countries, and for a definite period, without reference to the mode of introduction, and the existing navigation laws, and this parcel was entered as being free of duty. On examination, however, by the officers of the revenue, the contents were found to have undergone a process of preserving by which they were considered to become liable to an *ad valorem* duty of ten per cent, as manufactured goods, the process which they had undergone being the division of the potatoes into small pieces and drying them. We believe that this is a perfect novelty with respect to the importation of the vegetable from foreign countries.

A patent is in existence for a preserved preparation of the potato in this country, which is supplied to the East India Company and Emigrants, and of which an analysis is given by Dr. Ure, the eminent professor of analytical chemistry, to the effect that it is found by chemical analysis to contain the whole nutritious properties of that root in a pure concentrated state, also sixty parts in the hundred at least of starch, nearly thirty of a soluble fibrine of demulcent anti scorbulent quality, five of a vegetable albumen of the nature somewhat of the white of an egg, and five of a lubricating gum—that the fibrine and albumen render it more light of digestion, and the gum more demulcent to the stomach than wheat flour, with which also it may be regarded nearly equally nutritious, and more so than peas, beans, sago, or arrow-root.

It was a matter of some doubt whether this importation was in any way affected by the existing patent alluded to, but we believe it has been decided in the negative, and as of an entirely different character, although similarly designated. Notwithstanding that the importation is a novel one it is understood to be a common preparation of the vegetable in Sweden, from which country this supply took place, and to have been so for a long period, and that the only process in manufacture to which the potatoes have been subjected is that of being dried and forced through a sieve or colander, which, however, is considered to render them liable to the *ad valorem* duty before mentioned.—*London Mining Jour.*

Strength of Cordage.

The strength of ropes and cords depends on the fineness of the strands. Damp cordage is stronger than dry. Silk cords have three times the strength of those of flax of the same diameter, and a remarkable increase of strength is obtained by gluing the threads together. A hempen cord, the threads of which are glued, is stronger than the best wrought iron.

The Mining Population of Scotland.

There are now about one hundred blast furnaces at work in Scotland, each of which will produce on an average five thousand tons of pig-iron a year; or, altogether, about half a million tons. For all the purposes connected with the manufacture of one ton of pig-iron, taking it in round numbers, there will be required about 3 tons of coal, 35 cwt., of calcined iron-stone, and 10 cwt., of lime. According to the restricted "darg" of the Lanarkshire miners and colliers, the labor of one man, supposing him to work the whole, will be equal to the produce of raw material for 50 tons of pig-iron a year. The manufacture of pig-iron in Scotland will therefore give employment to 10,000 colliers and miners. The manufacture of malleable iron in Scotland will be somewhere about 80,000 tons per annum, will give employment to 1000 colliers, each ton requiring about four tons of raw coal for its manufacture Altogether this will give employment to 11,000 colliers and miners in the manufacture of iron alone in Scotand. For each man employed, the population may be estimated at four which will give a population of between forty and fifty thousand.

For supplying the consumption of Glasgow 5000 colliers are required, and taking the whole of Scotland, the number of colliers and miners absolutely working will be about 30,000, and the population about 120,000. This is altogether independent of oncostmen, laborers, mechanics, and others employed in connection with our colleries and ironstone mines, which will give at least one-half more. The population, therefore, belonging to their coal and ironstone working, cannot be estimated at less than 180,000 and is rapidly increasing every day. The quantity of pig-iron made has doubled within the last seven years which must have added to the mining population above 20,000.

Previous to the year 1775, colliers were treated as slaves belonging to the property where they labored. The British parliament that year passed an act which "declared that colliers and salters were to be no longer 'transferrable with the collieries and salt works,' but upon certain conditions which were then deemed 'reasonable,' they were gradually emancipated and set free, and others prevented from coming into such a state of servitude." Since that time, many laudible efforts have been made for the elevation of this portion of British subjects, but their condition still demands the attention of the friends of degraded humanity.

TO CORRESPONDENTS.

"J. B, of O."—Yes. You seem to appreciate the benefit of publishing engravings of your inventions in the Scientific American.—We could mention hundreds who have made extensive sales and realized large profits by just publishing their inventions in the Scientific American. The cost of a cut for your last improvement will be $8. It will appear in two or three weeks.

"J. C. Jr. of N. Y."—We feel under obligation to you for the fine list of subscribers with which you favored us last week, and we hope we shall have occasion to tender our thanks to many others for like favors.

"M. S. of Vt."—See fourth page.

"R. M. J. of Mass."—Get an engraving of your machine, it will only cost $5; better than a caveat.

"S. R of N. Y."—You say that you can gain power by a larger fly. We say you cannot, you are, however, welcome to your opinion, and would recommend your flys as an easy way to transfer a four horse power engine, to one of 20 horse power.

"A. N. O. of R. I."—We really would be happy to give advice, but scarcely know what to say. The name given was the signature and we thought it was also the name proper.

"A. H. of Ky."—The hardness of the castings, we are afraid is not attributed to the true cause, as some of the softest castings in the world are made from the coke of bituminous coal. Copperas is the sulphate of iron. Sulphur is found but in small proportions in any iron. It may be phosphate that is the cause of the hardness. See that you are not chilling too rapidly by damp sand. We know

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