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HINTS TO INVENTORS.

The electro-deposition of metals has attracted the notice of inventors ever since the remarkable discoveries of Jacobi on the subject, and important applications of the knowledge obtained have been made; but there still remains a good deal to be done. Copper plate engravings have been, for a good many years, protected by deposits of hard nickel, but no one seemed to think of extending the application, to other purposes, until quite recently. Nickel plating has now become an important branch of industry, and we are likely to hear much more of its adaptation, to the wants of the arts, the more intimately we become acquainted with it.

There are other metals, which, although they may not promise the same brilliant results as nickel, are, nevertheless, well worthy of careful investigation; and to some of these, we propose to call attention. To begin with, there is manganese, an exceedingly abundant metal, which has been successfully deposited in the form of powder by electrolysis, and has been separated from its amalgamation with mercury, has been reduced at a high temperature, and obtained as a beautiful white metal when alloyed with copper; and yet we practically know nothing about its condition when deposited upon other metals. Some authorities say that the pure metallic manganese tarnishes readily in the air; others say that it is excessively hard, will bear a fine polish, and is not acted upon by ordinary reagents. The probabilities appear to be that it is a permanent metal, of a fine white color when perfectly pure; and, if a method could be found for depositing it in as thin layers as nickel or copper, it would have many valuable applications. Another metal, of still greater abundance, is magnesium. It is only recently that we have been able to prepare and study this metal in large pieces, and we have learned how to manipulate and use it. The next question is, how to decompose its salts in the cold by electrolysis, and plate with it. The metal tarnishes more readily than nickel, and the color is not so fine; but, as it has the remarkable property of throwing down most other metals from solutions, it may be useful as the basis for obtaining these metals for application in the arts. For example, a rod of copper, plated with magnesium, might serve as a method for reclaiming numerous metals from solutions. It is worth trying to find a cheap way of reducing magnesium, as it can be employed for the production of light in photography, and as a reducing agent, and for the preparation of chemical salts. A metal, upon which has been expended much time and research, is aluminum. This metal, as it is usually sold in commerce, is rarely pure, and hence it commonly has a dirty, tarnished appearance. We have seen specimens of it in thin leaves, which presented the white, brilliant appearance of silver, and did not readily tarnish. If aluminum in such purity could be deposited by electrolysis, it could be advantageously employed for many purposes in the arts; how to do this, is the question. It is not worth while for inventors to be discouraged, as it is only a short time since that electroplating was at all understood, and there is easy prospect of our learning much more about it. The three metals, manganese, magnesium and aluminum ought to be more easily obtained, and it is not very creditable to our science that we have not, long since, overcome the difficulty. Silicium, or silicon as it is sometimes called, the base of quartz, is the principal constituent of the crust of the earth. We tread it under foot and discard it in its elementary condition altogether; and yet it has marked properties, that suggest its use for many purposes in the arts. We have seen an alloy of silicium with copper, which no steel file could scratch; and the chemist

who prepared it, said that it could be cast at pleasure, in suitable molds, and he was not certain that it could not be annealed and worked the same as steel. The chloride of silicon can be easily prepared, and this is readily decomposed by sodium, yielding the silicon in pure condition. The chloride can also be reduced by aluminum, in which case the silicon appears in a crystalline form. Perhaps the best way of preparing the crystalline variety is to fuse 5 parts pulverized glass, 10 parts cryolite, and 1 part aluminum, and to wash the resulting slag in hydrochloric acid, and subsequently, in hydrofluoric acid.

Silicium in the form of powder can be obtained by fusing 15 parts silico-fluoride of sodium, 20 parts granulated zinc, and 4 parts of sodium, and washing the slag with hydrochloric and nitric acids. No way of depositing it by the battery has been invented. Silicium, according to our present imperfect knowledge, appears to occur in two conditions, amorphous and crystalline; but these forms are immaterial for our purpose. What we want is the metal, if it may be called a metal, ready for use in alloying with other metals.

The fact that silicium is not soluble in any acids, excepting a mixture of hydrofluoric and nitric acids, at once suggests its use for many chemical purposes.

It is a poor conductor of electricity, an exceedingly combustible substance, even in oxygen gas; and its melting point appears to be between that of iron and steel; but the point of fusion of its alloys, according to the law that obtains on this subject, would doubtless be considerably less. The combination of silicium with magnesium affords an alloy that possesses remarkable chemical properties, and may offer a new compound, to be used as an explosive agent. It is made by fusing 7 parts of the silico-fluoride of sodium, 2.5 parts of chloride of sodium, and 2.5 parts of magnesium, and afterwards washing out the slag in chloride of ammonium. It is a crystalline substance, and, when dissolved in hydrochloric acid, gives off a gas which is spontaneously combustible. If the gas be evolved in a close vessel, where there is oxygen, the combustion ensues with an explosive force, white silicic acid being deposited on the walls of the vessel. It would appear to be well worth while to experiment with a substance of this marked character. It is in the production of alloys that we must look for the chief applications of silicium; and its uses in this direction, are, as yet, very imperfectly understood.

The above are a few of the metals to which we invite the attention of inventors.

MORE ABOUT THE LABOR QUESTION.

The public must become accustomed to see many discussions upon this absorbing question. It is destined to occupy, possibly for many years to come, a prominent place among current topics of newspaper and magazine literature. To those who, as capitalists or as working men, are immediately interested in its permanent settlement upon an equitable basis, as well as to such as make social science a study, it must, until settled, possess interest second to no other likely to be agitated during the present century. Like other social and political questions that involve the welfare of the masses, it has engendered and will yet give birth to bitterness and rancor, and perhaps—though God forbid such an event—to civil and international wars. No human eye can pierce the future; but any intelligent person may read, in the constant growth of the agitation, in the organized marshalling of the two great powers in the conflict, and in the defiant attitude of each, that neither will surrender, until one or the other has obtained a victory, or such mutual concessions and compromises shall have been made as shall bring about the desired adjustment.

At present the attention, of those who have carefully watched the signs of the times, is especially called to the failure, or partial failure, of the courts of arbitration established in England, and from which so much was hoped by Mr. Hughes, their ardent promoter, whose eloquent address at the Cooper Institute, during his visit to this country last November, was quoted and commented upon in this journal at the time.

We also shared the hope that, through these courts, the difficulties and disagreements that have so long burdened the industries of the world would find amicable adjustment, and that their wholesome influence would bring precedents for the establishment of similar courts in other lands. We regret that the result has not justified our hopes. The courts have satisfied neither the capitalist nor the working man, and though they have been the means of retarding crises, they have not been efficient in preventing them.

At the last meeting of the Board of Arbitration and Conciliation for the North of England Iron District, this dissatisfaction was so apparent that Mr. Hughes deemed it necessary to make a long and eloquent address in behalf of the continuance of the system, admitting that its value had been seriously called in question, and that the method is charged with being both expensive and unsatisfactory.

In the course of his argument, that gentleman admitted that neither the working men nor the iron masters would abandon their organizations, but thought that their being brought "face to face from time to time" was not without sufficient advantage to pay for its cost. This is a virtual admission that the system has failed to meet the purpose for which it was originated, and it is not probable that it will long continue.

We need not allude to special decisions and awards that have dissatisfied both employers and employed. It is enough that the dissatisfaction exists, even under the administration of such single minded and true philanthropism as that of Mr. Hughes and Mr. Mundella. Possibly there are features

of the system, that, modified or abolished, would render it more acceptable, and we sincerely wish this may be found to be the case; for if, in such deliberations as have been held under this system, the differences have been seen to be so great that peaceable arbitration is not possible, what will the end be?

The persistent blindness of many to the magnitude of this labor question is a prominent feature of journalism. There are those who either ridicule, or treat in a jocose manner, events which are of the gravest importance, while others seem to think everything will all come out right, without social revolutions; or, if the latter occur, that they are far distant. Others see that there are contingencies that may bring about a labor crisis at any moment, and who raise the voice of warning.

To prove that the demands of the trades' unions are arbitrary and unjust amounts to nothing. They have found themselves in a position to enforce compliance with unreasonable demands. Though only a few of their leaders and comparatively few of those who oppose them realize it, they are making war against the wages system. They will drive capital so hard as to either compel it to withdraw from industrial enterprises or admit the employed into partnership. The wages system, as it exists, will ultimately be compelled to yield to another, if not a better, order of things.

Mr. William Taylor, at the Congress of the British Association, stated that out of 22,704,108 people in England, 8,144,000 do the work, and that they earn in the aggregate 267,000,000 pounds sterling, which, allowing them to work constantly six days per week, is equivalent to an average wages of twenty-one pence per day. A workman takes Mr. Taylor's figures as his text, and shows that the cost for food, of bread, meat, and potatoes, with the luxuries of two and a half pence worth of butter, sugar, and tea, sufficient for the sustenance of a workingman, is eleven and one half pence, leaving, according to Mr. Taylor's statement, less than ten pence per day for clothing, shelter, medicine, and all other demands.

We think Mr. Taylor's estimate of average wages must be too small, but allowing the average to be double that given, we have in it matter for serious reflection.

When working men have the intelligence to figure out such a sum as this, and compare their pittance with the unearned wealth of the nobility and State-fed churchmen of Europe, need it be a matter of surprise that they are dissatisfied? How long need we expect them to remain quiet? What can courts of arbitration, that can only feebly affect their earnings one way or the other, do to convince such men that they are justly dealt with by society? That they are unreasonable need not surprise us; that they have been kept under restraint so long is simply because they have been, as yet, a hopeless minority in numbers and intelligence.

The above figures show that in England the part of society known as the working class are only a little more than one third the entire population. The history of the world has shown, however, that to perpetually oppress even a minority requires more than the might of numbers.

On the other hand it may be shown that industrial capital is really hard pushed as well as labor. In a remarkable letter, vouched for in the London *Builder* as coming from a genuine workman, appears the following paragraph relative to the condition of English manufacturers:

"Workmen and their leaders ought to know that, in the industrial race, the manufacturers are already closely run. In iron and cotton producing countries, the people are beginning to work the raw material. Any reader of the *Times* or the statistical abstract can see for himself the steady advance in exports which a few years ago were peculiar to England. Writers in the so called people's paper may ridicule the idea that other countries are making advance in competition with England. But it is a fact which no one can deny, that some engines and other goods have been imported into this country at a much cheaper rate than English manufacturers can produce them."

So it seems both labor and capital are hard pushed to feed and supply luxuries to the drones in the British hive.

Now if capital and labor could make common cause against the drones, instead of fighting each other, their combined efforts would bring about a better state of things, and the result of the present conflict will inevitably be in time a reorganization of society, in which producers and distributors of production will take pre-eminence over those who are at present fed from the public spoon. In the latter class are included all the paupers who live on homely fare in alms houses, those other paupers who wine and dine with liberal salaries in sinecure offices, those thieves who pick pockets in by-ways as well as those who rob the public purse by legislative jobs or fraudulent administration, gamblers in secret hells or public gamblers in gold and stocks, unnecessary middle men who insist upon clutching bread on its way from the producer to the consumer and cutting off their slice from the loaf, in short, all who, without doing anything for the general welfare, make wages low by making the necessities of life dear through their demand upon the productions of the industrious. All these must be turned out to gather their own honey. Then there will be enough for all. Then will eight hours for a day's work, and even less than that, be the rule without special legislation, and strikes will become things of the past.

ANOTHER GREAT PUBLIC WORK.

The almost unknown countries which form the interior of European Russia have been, of late years, rendered accessible by long and well constructed railroads; undertakings which, in an empire to a great extent thinly populated and divided in itself by vast plains, could never have been made but for governmental authority and substantial assistance in