Galvanizing Iron---Protecting Steel from Oxidation---Sorel's Patent.

The accompanying specification, is in substance that of the patent of M. Sorel, of the city of Paris, France, which was patented in the United States, in December 1837, and for which an extension is petitioned for, as noticed by us in our last number.

It is well known to chemists and scientific men, that a galvanic action is produced by the contact of two metals, different in their natures, and that the most oxidizable of the two metals brought into contact becomes positively electrified, the least oxidizable, negatively electrified. This is the case with iron covered with tin, the least exposure of the iron makes it rust much faster than if none of it was covered with the tin, but the least oxidizable metal is protected from oxydizing by its contact with the positive electrified metal. It is upon this principle M. Sorel protects iron and steel from rusting. The metal chosen for covering iron is zinc, one more oxidizable than iron, and would be totally unfit for the purpose, only it has the quality that when its surface is covered with a thin coat of oxide, all further oxidization is stopped.

The different modes he has employed to carry out his invention are as follows:—

"First, applying the zinc to the iron or steel in the manner in which the tin is applied in the process of tinning.

Second, applying a galvanic powder in the manner of paint, which consists in mixing the zinc, reduced to fine powder, with oils, or resinous materials, so as to form a paint or varnish, with which the substances to be protected are to be covered, in the ordinary manner of painting or varnishing.

Third, covering the article to be protected, with the galvanic powder, consisting of zinc finely comminuted.

Fourth, wrapping the articles to be protected in what I denominate galvanic paper.

Fifth, anointing or covering the articles with a galvanic paste, consisting of any suitable fatty matters, such as purified lard, in which the galvanic powder has been freely mixed.

The first process, that of coating the articles to be protected with metalic zinc, is to be effected much in the same manner in which tinning is performed, that is to say, the articles to be coated must be rendered clean and free from oxide, by processes analogous to those followed in preparing them for ordinary tinning, such as immersing them in diluted sulphuric or muriatic acid, scouring them, and so forth, which processes being well known, need not be described. The zinc, in like manner, must be fused in proper crucibles, or other convenient vessels, adapted to the nature and size of the articles to be operated upon, special care being taken to keep the metal covered with sal ammoniac, or other proper flux; and to regulate the heat in such way as is required by the volatile nature of the metal. The articles to be coated, after being dipped into the melted zinc, are to be withdrawn slowly, that too much of the metal may not adhere to them. They are then to be thrown into cold water, rubbed with a sponge or brush, and dried as quickly as possible, as otherwise they may be injured by the appearance of dark spots, which it is desirable to avoid.

When chains for cables, or for other purposes, are being withdrawn from the zinc, they must be shaken until sufficiently cooled to prevent the links from being soldered together by the melted metal. The coating of small chains requires careful management, but by the following procedure it is effected without difficulty. Whilst in the dilute acid, they are to be moved about to expose all their parts equally to its action, they are then to be dipped into muriatic acid, and immediately dried in a reverberatory furnace, the melted zinc being ready, and covered with sal ammoniac, the chains are to be put into it, and suffered to remain there about a minute; they are next slowly taken out by means of an iron skimmer, or other convenient instrument, which will allow as much of the zinc to drop from them as can be got rid of in that way; the links, however, will still retain too much zinc, and will be soldered together. To correct this they are to be put into a reverberatory furnace, to be covered with charcoal, and retained at a red heat for about a quarter of an hour, during which time they are to be moved about by means of an iron poker; by this treatment the excess of zinc will be discharged; they are then to be drawn towards the mouth of the furnace where they are kept in motion until the zinc is solidified. When small nails, and such like articles, are to be coated, the process should be performed in small crucibles, this being necessary to prevent the danger of spoiling a considerable portion of zinc, which results when iron has been kept in it a considerable length of time, as it is thus rendered unfit for the purpose of a protective coating. In all cases the purest zinc should be employed. Wire may be coated by passing it through the melted zinc, as it is wound from one drum or reel, on to another.

When articles of iron have been coated with zinc, it is sometimes desirable to cover this coating with one of tin; more especially when culinary vessels are the subjects of the operation. It may also be resorted to when it is desired to give a brighter and more handsome surface than the zinc affords; such a coating of tin will not destroy the galvanic effect of zinc; and it is to be effected in the ordinary way of tinning, particular care being taken not to heat the tin too highly, or to keep the articles in it so long as to remove any portion of the coating of zinc.

The foregoing is the only part of this patent in useful practice with the exception of coating metals with zinc paint, which need not be further described than to say, it consists of zinc reduced to powder, either as an alloy or pure, and mixed with oil. A peculiar action takes place with zinc paint, as we have seen with our eyes, viz., the zinc after a time, leaves the oil and adheres to the metal, covering it with a pure metalic surface, and this it does, although the paint may have been applied as an oxide of zinc mixed with oil.

We hereby present the claim, to show the extent of M. Sorel's invention.

Having thus explained the principle upon which my process of protecting iron and steel from rusting, or oxidating, is dependant; and having also given the various modes in which I have contemplated the carrying the same into effect, I do hereby declare that what I claim as of my invention, and wish to secure by letters patent, is the employment of zinc, in various forms, as a covering to the respective articles to be thereby protected, as herein set forth. I do not claim to be the discoverer of the principle of the protection of metals from oxidation by galvanic action; nor do I claim to be the first to have proposed the employment of zinc for the preserving of iron therefrom; masses of zinc having been applied, or it having been proposed to apply it in masses, to steam engine boilers, and probably to other articles, with this intention; but from this, my plan, or mode of procedure, differs as obviously as it surpasses it in efficiency, and in its applicability to numerous purposes in the arts where its application in masses would be impossible, or altogether unavailing.

[We know nothing about the remuneration which the scientific Frenchman has received, but this much we can say about his process, it is one of the most useful ever introduced into our country.

Varieties in Science.

Magnetic Improvement in Railroads.—We have lately seen announced a plan to increase the power of traction in locomotives, by pressing them against the rails by means of an artificial loadstone. We are permitted to describe a recent discovery which the inventors hope to make still more perfect, and which is just the reverse of the above. It consists in reducing the friction of the cars on the rails to a mere nothing, by an electric battery, so arranged as to raise and very nearly suspend them in the air—a perfect suspension being only prevented by the necessity of a slight pressure to maintain the cars on the track. The inventors design first to apply their process to the transportation of passengers, and they expect to travel at the rate of eighty miles an hour, with less expense and greater safety than is now done at twenty-five miles. Their rails are in the H form, and not weighing seven pounds to the foot, and supported by wooden pillars, like lamp-posts, at an elevation of 6 feet above the ground, and three feet apart. The cars, only 2½ feet wide, but 30 feet long, are suspended between them upon wheels of a small diameter, rolling, of course, upon the top of the rails. At the two extremities of each car, and in the middle, at a sufficient distance from the wheels, are attached powerful magnets, made of an immense number of reels of wire, wound round pieces of soft iron, the poles placed directly below the rails, and as near them as practicable.—The effect is easily understood. As soon as the wires are united to a pile to form a circuit, the magnets exercise a powerful attraction on the rail; but this being immovable, the magnet itself obeys the attraction, and the car attached following, the slight pressure which it still exercises on its wheels is just equal to its weight, minus the attractive power of the magnets. It may be observed that electricity in this arrangement will not cost much. It is not used as motive power, but as static pressure; it does not, consequently, become exhausted, and may be continued without much expense. This invention is very good in principle. We cannot yet judge whether it has been sufficiently elaborated to be practicable. The first invention, above alluded to, to press locomotives against rails, is not worth much, in our opinion, to apply to common locomotives, which may, without difficulty, be made weighty enough for any labor required of them; but in connection with the second invention, it is invaluable, as it allows the use of locomotives at least as light as the cars hemselves, and this is of great importance when the structure does not stand upon solid ground.—[New York Tribune.

[This is another static pressure deception. It comes identified with the same features as the centrifugal one. Just think of "the magnets on the cars being attracted to the rails and the cars following," and then the static pressure of magnetism to boot, surely nothing can resist the evidence of this *great railroad improvement*. It is a rich improvement truly, we wonder what other feat is next to be performed by static pressure? There is a great amount of ignorance displayed in the above; it is wrong in principle, while the first one is right—the one condemned. If such a plan could work (but it cannot) the same advantage could be obtained by having lighter locomotives; but how in the name of common sense the author comes to the conclusion that it allows of the use of lighter locomotives, when at the same time, it is intended to raise them off the rails, is more than we can understand. It also puzzles us exceedingly to understand how the electric magnets will be made to operate; and, above all, to account for the *statie* presure of a battery in active operation, which it must be, when the circuit is formed.

A great amount of adhesive surface is what is required in locomotives; this, we think, has been demonstrated by the recent trials at Lowell. The invention above is an improvement on a wrong principle. It very much resembles the old "Dove" scheme, to lighten steamboats—buoy them up—having huge balloons on their decks. In 1844, the scheme of the "Dove" was got up, and many shares were taken in it, as many, no doubt, as in the centrifugal scheme. The green ones got the full value of their subscriptions in 0 0 0.

Gutta Percha Boats.—The late English expeditions in search of Sir John Franklin have proved the value of gutta percha in a remarkable manner, each of them took out sledge-boats of this substance, for use among the masses of ice. Fitted with a skate, the boat served as a sledge; floated, it would carry five or six persons, with ample provisions; at other times it might be folded up, or converted into a wrapper or bed-tent, safe against the cold, that three or four men might sleep under. Its weight was only eighteen pounds. Moreover, after undergoing all the rough work of the voyage, it returned to England not in the least damaged, and in almost as good a condition as when it left.

Daguerreotypes on Glass.—A Berlin artist, says a foreign exchange, has discovered the art of fixing daguerreotypes upon glass, which is covered with fusion of zinc or gold. The operation takes about five minutes.—When dipped into water, or varnish, the subject taken is very distinct. The artist is enabled to give any coloring to the picture he may like, and has even succeeded in combining two different colors upon the same daguerreotype.

Boston Machinists in Cuba.—Cuba is almost wholly suplied with machinists from the United States.

There is in nearly every plantation in Cuba, a sugar mill driven by steam engines, built usually in New York or Boston. In these mills it is necessary to have some one well acquainted with machinery. The Cubans are not qualified for the situation, and the planters are forced to secure machinists from our country. Accordingly during the month of October, some hundred machinists of Boston leave for Cuba. The sugar crop commences soon after their arrival, and they are busily employed till June or July. Each man has a confidential negro whom he can leave in the charge of the mill, besides having as many assistants as he wishes. He is obliged to work but little, simply overseeing and directing.

For this service he receives from six to ten ounces a month, varying from one hundred to one hundred and fifty dollars a month.

In June, the crop is manufactured, and as the weather grows warm and unhealthy, the machinists return home, and spend the summer in a more pleasent climate. During the absence of the overseers, the mills are closed and repaired, and when the delegation again return in October, they find everything prepared for the commencement of the new season.

Hydrogen Gas for Illumination.—Our attention has been called to a short article upon this subject, in the last number of the American Journal of Science, page 260, by Prof. B. Silliman, Jr. In his recent European tour he had an opportunity of seeing the successful application of M. Gillard's patent, by which he claims the production of a useful light, and great heat, from the combustion of hydrogen gas in contact with a coil of platinum wire. The hydrogen is produced by the decomposition of water, effected by passing steam through retorts charged with charcoal reduced to small fragments and heated to an intense degree. The resultant gas after being conducted through lime water, which removes the carbonic acid, consists almost wholly of hydrogen. This is burned in contact with a cage or net-work of platinum wire gauze surrounding an ordinary argand burner, protected by a glass chimney. "This contrivance," he states, "is perfectly successful, and the light given out from gas lamps of this construction is extremely vivid and constant."

The following are some of the advantages claimed by the invention:

"1. The gas so produced is cheaper than any other mode of artificial light, costing, as is asserted by M. Gillard, and sustained by others, only about one-sixteenth the average cost of coal gas. 2. The gas has no unpleasant odor. 3. This mode of producing gas may be applied to any existing gas works by a slight modification of the retorts, and without any essential change in any other portion of the apparatus. 4. the cheapness of this mode enables it to be applied with great advantage as a fuel for cooking and for numerous purposes in the arts. 5. The nuisances resulting from the presence of large coal gas works in populous districts are entirely avoided. 6. The arrangements are so simple and inexpensive that every establishment where it is desired to employ light and heat, may erect its own apparatus, all the materials employed being everywhere accessible."

[The specification of this invention we published on page 333, Vol. 5, Sci. Am. If hydrogen gas can be produced cheap enough, it must be of great benefit for cooking, &c. M. Gillard, however, is not the discoverer of the platinum wire coil for the purposes stated. Sir Humphrey Davy is the discoverer of this property of platinum. This was done while prosecuting his researches upon the "safety lamp." Those who have Ure's Old Chemical Dictionary, published in Glasgow, 1821, will find a description of this in the article on combustion. It says that "when heated platinum was introduced into hydrogen, it ignited and glowed." A very beautiful and full description of the action of fine platinum wire in various gases will pay the reader for a careful perusal of the said article.