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Contents:

(Illustrated articles are marked with an asterisk.)

A SCIENTIFIC AND TECHNICAL AWAKENING.

Our English cotemporary, *Engineering*, appears to have seriously exercised itself in the perusal of our good-natured article on "English and American Scientific and Mechanical Engineering Journalism," which appeared in the SCIENTIFIC AMERICAN, February 4th; at least, we so judge from the tenor of an article in response thereto, covering a full page of that journal. The article in question is a curiosity in literature. It deserves a much wider circulation than *Engineering* can give it, and we would gladly transfer it to our columns, but for its exceeding length—a serious fault generally, not only with *Engineering's* articles, but most other technical journals published in England. It would scarcely do for them to be brief in their discussions, and above all other things, spice and piquancy must always be excluded. *Engineering* evidently labors under the conviction that the heavier it can make its discussions, the more profoundly will it be able to impress its readers. Hence, we are equally astonished and gratified to find a gleam of humor flashing out from the ordinary sober-sided composition of our learned contemporary. The article came to us just as we were laboring under an attack of dyspepsia, and its reading fairly shook our atrabilious *corpus*. We said to ourselves, "can it be possible that *Engineering* is about to experience the new birth, to undergo regeneration, and a baptism of fire?" The article is really worth reading, and we begin to indulge the hope that at least one English technical is going to try to make itself not only useful, but readable and interesting. And what is most perplexingly novel in this new manifestation, is the display of a considerable amount of egotism, which we had always supposed to be a sinful and naughty thing in technical journalism. And, as if to magnify this self-complaisance, it actually alludes to its "*own extensive and ever-increasing circulation in America*." Now to show how small a thing can impart comfort to the soul of our cotemporary, we venture to say that the circulation of *Engineering* in this country cannot much exceed three hundred copies per week.

It evidently amazes our English cotemporary that a journal like the SCIENTIFIC AMERICAN, which, according to its own notions, is chiefly the work of "scissors and paste," should circulate so widely; and it even belittles our weekly circulation by several thousand copies, in order to give point to its very amusing, and, we will also add, generally just criticism.

The writer in *Engineering*, whoever he may be, appears to be a sort of literary Rip Van Winkle, just waking out of a long sleep; and he cannot get the idea through his head that it is possible that a technical journal can become a vehicle of popular information to the mass of mankind, instead of being the organ of a small clique of professional engineers or wealthy manufacturers, such as seems to hold control of the columns of *Engineering*, and who use it either to ventilate their own pet schemes and theories, or to advertise, by illustration and otherwise, in the reading columns, a repetition of lathes, axle-boxes brakes, cars, and other trade specialities, which can lay little or no claim to novelty. It is, furthermore, a crying sin in the estimation of our English critic that American technical journals do not separate their advertisements from the subject matter; and he thinks that when Yankee editors learn that trade announcements are out of place in the body of a journal, they will see how to make their journals pay by making them higher priced. Now we venture to say, without intending to give offence, that Yankee editors understand their business quite as well as do English editors; and it is presumable, at least, that they know what suits their readers on this side, much better than do English editors. We venture to suggest—modestly, of course—that journalism in the two countries is not the same, and should the editor of *Engineering* undertake to transfer his system of intellectual labor to this side of the Atlantic, he would not be long in making the discovery that those wandering Bohemian engineers, who, he tells us, are in sorrow and heaviness over the short-comings of American technical journals, would turn out after all to be slender props for him to lean upon. We think it probable, however, that with a little more snap, a journal like *Engineering* might possibly attain a circulation, in this country, of 500 or 1000 copies weekly.

Why, American engineers have scarcely yet been able to organize themselves into an association for mutual advancement in their profession, much less to give the reading public the benefit of their experience and labors! This fact alone ought, of itself, to satisfy *Engineering* that no such journal could profitably exist in this country. Whenever our American engineers are ready to support such a journal, there will be no difficulty in finding a publisher.

Engineering, in its casual reference to the various technical journals of America, omits to name our leading scientific monthly, but introduces with just commendation a venerable cotemporary, now upwards of three score years of age. Now, it is no disparagement of this really modest monthly to say, that perhaps there are not sixty hundred people in the States who know it, even by name; and so far as the use of "scissors and paste" are made available in our technical journals, we venture the assertion that the editorial staff expenses of the SCIENTIFIC AMERICAN are as great, if not greater, than those of *Engineering*. The question, however, is not so much one of original outlay, but which of the two journals gives most for the money. In this very essential particular, and with no intention to depreciate the value of *Engineering*, we assert, with becoming modesty, that the SCIENTIFIC AMERICAN occupies a position which *Engineering* will never be able to attain.

THE SHERMAN PROCESS.

When people boast of extraordinary successes in processes the details of which are kept profoundly hidden from public scrutiny, and when the evidences of success are presented in the doubtful form of specimens which the public has no means of tracing directly to the process, the public is apt to be skeptical, and to express skepticism often in not very complimentary terms.

For a considerable time, the public has been treated to highly-colored accounts of a wonderful metallurgic process, whereby the best iron and steel were said to be made, from the very worst materials, almost in the twinkling of an eye. This process has been called after its assumed inventor, or discoverer, the "Sherman Process." The details of the process are still withheld, but we last week gave an extract from an English contemporary, which throws a little light upon the subject.

The agent relied upon to effect the remarkable transformation claimed, is iodine, used preferably in the form of iodide of potassium, and very little of it is said to produce a most marvellous change in the character of the metal.

A very feeble attempt at explaining the rationale of this effect has been made, in one or two English journals, which we opine will not prove very satisfactory to chemists and scientific metallurgists. The *Engineer* has published two three-column articles upon the subject, the first containing very little information, and the second a great number of unnecessary paragraphs, but which gives the proportion of the iodide used, in the extremely scientific and accurate formula expressed in the terms "a small quantity."

Assertions of remarkable success have also been given. Nothing, however, was said of remarkable failures, of which there have doubtless been some. A series of continued successes would, we should think, by this time, have sufficed for the parturition of this metallurgic process, and the discovery would ere this have been introduced to the world, had there not been some drawbacks.

We are not prepared to deny *in toto* that the process is all that is claimed for it; but the way in which it has been managed is certainly one not likely to encourage faith in it.

The very name of "process" implies a system perfected, and if it be still so far back in the experimental stage that nothing definite in the way of results can be relied upon, it is not yet a process. If, in the use of iodine, in some instances, fine grades of iron or steel are produced, and in as many other experiments, with the same material, failures result, it is just as fair to attribute the failures to the iodine, as the successes. A process worthy the name is one that acts with approximate uniformity, and when, in its use, results vary widely from what is usual, the variation may be traced to important differences in the conditions of its application.

On the whole, we are inclined to believe Mr. Sherman's experiments have not yet developed a definite process, and we shall receive with much allowance the glowing statements published in regard to it, until such time as it can face the world and defy unbelief.

The patents obtained by Mr. Sherman seem to cover the use of iodine, rather than the manner of using it, and throw no light upon the rationale of the process.

A patent was granted by the United States Patent Office, Sept. 13, 1870, to J. C. Atwood, in which the inventor claims the use of iodide of potassium in connection with the carbons and fluxes used in making and refining iron. In his specification he states that he uses abont *fifteen grains* of this salt to eighty pounds of the metal. This is about $\frac{1}{373}$ of one per cent. He uses in connection with this exceedingly small proportion of iodide of potassium, about two ounces of lamp-black, or charcoal, and four ounces of manganese, and asserts that steel made with these materials will be superior in quality to that made by the old method. These claims we are inclined to discredit. Certainly, we see no chemical reason why this small amount of iodide should produce such an effect, and the specification itself throws no light upon our darkness.

If the experiments in these so-called processes have no better basis than is apparent from such information as at present can be gathered respecting them, it is probable we shall wait some time before the promised revolution in iron and steel manufacture is accomplished through their use.

RUBBER TIRES FOR TRACTION ENGINES.

When it was first discovered that a smooth-faced driving wheel, running on a smooth-faced rail, would "bite," the era of iron railways and locomotive engines may be said to have fairly commenced. The correction of a single radical error was, in this case, the dawn of a new system of travel, so extensive in its growth and marvelous in its results, that even the wildest dreamer could not, at that time, have imagined the consequences of so simple a discovery.

A popular and somewhat similar error regarding the bite of wheels on rough and uneven surfaces, has also prevailed. We say popular error, because engineers have not shared it, and it has obtained, to any notable extent, only among those unfamiliar with mechanical science. The error in question is, that hard-surfaced wheels will not bite on a moderately rough surface, sufficiently to give an efficient tractile power. It seems strange that this error should have diffused itself very extensively, when it is remembered that a certain degree of roughness is essential to frictional resistance. The smoothness of the ordinary railway track is roughness compared to that of an oiled or unctuous metallic surface; and it has been amply demonstrated that the resistance of friction, of two bearing surfaces depends, not upon their extent, but upon the pressure with which they are forced together. A traction wheel, of given weight, resting upon two square inches of hard earth or rock, would develop the same tractile power as though it had a bearing surface of two square feet on similar material.

On very rough and stony ways, however, another element: practically of no importance on moderately rough ways, like a macadam surface or a concrete road, where the prominences are nearly of uniform hight, and so near together as to admit between their summits only very small arcs of the circumference of the wheel; comes into action. This element is the constantly recurring lifting of the superincumbent weight of the machine. Even this would not result in loss of power, could the power developed in falling be wholly applied to useful work in the direction of the advance of the engine. The fact is, however, that it is not so applied, and in any method of propulsion at present known to engineering science, cannot be so applied. Above a certain point, where friction enough is developed to prevent slip, the more uneven the road surface is, the greater the power demanded for the propulsion of the locomotive. And this will hold good for both hard and soft-tired wheels.

What then is the advantage, if any, of rubber-tired wheels? The advantages claimed may be enumerated as follows: Increased tractile power, with a given weight, secured without damage to roadways; ease of carriage to the supported machinery, whereby it—the machinery—is saved from stress and wear; and economy of the power, expended in moving the extra weight required by rigid-tired wheels, to secure the required frictional resistance. The last-mentioned claim depends upon the first, and must stand or fall with it. The saving of roadway, ease of carriage, and its favorable results upon the machinery, are generally conceded.

A denial of the first claim has been made, by those interested in the manufacture of rigid-tired traction engines, and others, in so far as the rubber tires are employed on comparatively smooth surfaces; although the increased tractile power on quite *rough* pavements and roads is acknowledged.

This denial is based upon results of experiments performed on the streets of Rochester, England, between the 9th October and the 2nd November, 1870, by a committee of the Royal Engineers (British Army), with a view to determine accurately the point in question.

Care was taken to make the circumstances, under which the trials took place, exactly alike for both the rubber and the iron tires. The experiments were performed with an Aveling and Porter six-horse power road engine, built for the Royal Engineers' establishment. The weight of the engine, without rubber tires, was 11,225 pounds; with rubber tires, it weighed 12,025 pounds. Without rubber tires, it drew 2·813 times its own weight up a gradient of 1 in 11; with rubber tires, it drew up the same incline 2·763 times the weight of engine, with the weight of rubber tires added, showing that, although it drew a little over 2,200 pounds more than it could do without the rubber tires, the increase of traction was only that which might be expected from the additional weight.

It is claimed, moreover, that the additional traction power, and superior ease of carriage on rough roads, secured by rubber tires, is dearly bought at the very great increase of cost, of an engine fitted with them, over one not so fitted.

This is a point we regard as not fully settled, though it can not long remain in doubt. There are enough of both classes of wheels now in use to soon answer practically any question there may be of durability (upon which the point of economy hinges), so far as the interest on the increased cost of the rubber tires, is offset against the greater wear and tear of iron rimmed wheels. It is stated, on good authority, that a rubber tired engine, started at work in Aberdeen, Scotland, wore out its tires between April and September, inclusive; and when it is taken into consideration, that the cost of these