AN IMPROVEMENT IN PAPER MANUFACTURE.

[Translated expressly for the Scientific American.]

Paper manufacturers and printers often find that engine-made paper, which was delivered perfectly white, turns yellow in a short time. Sometimes the yellow tint is not spread all over, but appears in spots, more or less extended, and of a color similar to iron rust. Some manufacturers have applied to us for means to prevent this defect, and we began our experiments with paper from the manufactory of Essonne, and other kinds received from Mr. Firmin Didot, and finally extended them over numerous kinds of paper made in the trade. We soon found that these spots, or the general yellow tint, were produced by oxyd of iron; alkaline substances do not remove them, while acids make them disappear rapidly. A sheet of paper which we tested was spread upon a pane of glass and equally wetted with water slightly acidulated with muriatic acid; then small pieces of paper which were previously found pure, imbued with different tests for iron, were pressed upon it, and we had all the reactions which are obtained by tannin, prussiate of potash, &c , in a greater or less degree, as the paper tested was of a more or less yellow tint. No doubt could remain as to the cause; but we had now to ascertain the process by which the iron came into the paper, and in what shape it was introduced. It is evident that the chemical and mechanical operations, to which the paper pulp is subjected, are more likely to withdraw any iron it may contain from the pulp than to give iron to it, and we were convinced beforehand that we would find no iron, or perhaps only slight traces, in the fully prepared pulp. Such was the result. We incinerated a certain quantity of paper and an equal quantity of the pulp from which it was made, and found in the latter a much less proportion of iron than in the paper. Some pulp which had been very carefully prepared was entirely free from iron. Hence it was certain that the iron which we found in the paper was introduced after the washing of the pulp, in the spreading and drying machinery; and to this part of the process we directed our attention. By the washing in the beating engine, the pulp is divided and freed from the chlorine with which it is impregnated, and the longer the washing is continued the better, and much depends on the distribution and arrangement of the blades in the engine. A perfect washing is almost impossible, and therefore paper is often found which contains so much chlorine that its smell is yet plainly observable, and this chlorine will soon destroy the strength of the fiber. From the engines the pulp is carried into the spreading machinery, where it is spread out, condensed, dried and wound up. A pulp perfectly washed would not undergo any change in these operations, because neither the steam nor the water which acts upon it can form a soluble substance from the materials of which the machinery is made, that could penetrate the paper. But this is never the case in many mills, and pulp is often worked which is not free from chlorine. Although much of it is pressed out with the water, yet some remains (as it combines most intimately with the fiber), and attacks the iron rolls, forming protochloride of iron which penetrates the felts and paper. The impregnation of the felts is evident. They nearly all have rust spots on them and turn yellow very soon; this is the effect of the soluble protochloride of iron which, on exposure to the air, changes to perchloride, and finally to oxyd of iron, which causes the rusty appearance of the felts. The protochloride of iron is not visible in the paper immediately after it is finished, being colorless, and as long as it remains dry and packed close no change appears; but the slightest dampness and exposure to the air causes the protochloride to pass into the perchloride of iron, and the oxyd becomes visible. This explains the observation which was made to us by a printer, that the yellow spots often appeared when the paper was damped for printing. The origin of these yellow spots being thus ascertained, we turned our attention to the means of correcting or preventing their occurrence. By simply washing the pulp the chlorine cannot be removed unless, perhaps, with a great expenditure of time and water, because the chlorine combines actually with organic matter. If you have put your hands in a solution of chloride of lime or soda, washing will not at once remove a certain roughness of the epidermis, nor the smell of chlorine. The means to be employed must, therefore, be of a chemical character. They commonly consist in materials which, mixed with the paper pulp, can combine with chlorine into soluble substances. These re-agents are commonly called "antichlorine," and deserve the greatest attention, as by their application the loss of time which a long washing requires is saved, and the product protected against such changes as lessen its value and cause even its total destruction. They are not exclusively useful in paper-making, but they should be employed in all branches of manufacturing where chlorine salts are the agents for bleaching. It is a fact known to every one that unbleached cotton cloth is stronger than bleached, and that bleached goods are often strongly tainted with a smell of chlorine; when such goods are destined for dyeing or printing, the colors are frequently sensibly affected by it. When housekeeping linen is bleached with chloride of soda, any trace of it left remaining in the cloths has, in time, a very detrimental effect, and it would be very desirable that the antichlorine should be made use of in all such cases. There are many chemical bodies which can neutralize chlorine. But it is not indifferent which one is made of, because it must satisfy several conditions; it must not leave a residuum in the material, its application must not have any other dangerous effect, and it must not be expensive. As far as we know, it was Mr. Barresvil who first occupied himself in applying such neutralizing materials, and he recommended the sulphite of soda. Afterwards, some one in Amiens proposed the hyposulphite of soda, at a time when it was yet very expensive; and Messrs. Bobierre & Moride (at Nantes) proposed the protochloride of tin.

We will now compare the above three re-agents in respect to their price and efficacy. 1 equivalent of sulphite of soda (NaO, SO^2+7HO) neutralizes 1 equivalent of chlorine, forming hydrochloric acid and sulphate of soda, which go off with the water. The protochloride of tin (Cl Sn 2HO) neutralizes also 1 equivalent of chlorine, and passes into perchloride, which is also soluble. The hyposulphite of soda (NaO, SO^2+5HO) neutralizes a much greater quantity of chlorine. We have ascertained that it neutralizes four equivalents and forms sulphate of soda, sulphuric acid and hydrochloric acid. By calculation it stands thus:—1 kilogramme (2 lbs) sulphite of soda absorbs 281.44 grammes of chlorine; 1 kilogramme protochloride of tin, 315.77 grammes of chlorine; 1 kilogramme hyposulphite of soda, 1,143.98 grammes of chlorine. This shows that the latter salt is 3½ times as effective as protochloride of tin, and nearly 5 times as effective as the sulphite of soda.

The present cost of the above substances (for 100 kilogrammes), is as follows:—Sulphite of soda, 125 francs; hyposulphite of soda, 125 francs; protochloride of tin, 150 to 300 francs.

To neutralize 1 kilogramme or 409.83 litres of chlorine there must be used:—3,116 grammes of protochloride of tin, costing 7 to 8 francs; 3,553 grammes sulphite of soda, costing 4.44 francs; 874 grammes hyposulphite of soda, costing 1.09 francs.

The hyposulphite of soda is, therefore, by far the cheapest, and by its application the washing of the pulp can be so accelerated and made perfect th.. the balance is greatly in its favor. We have now to st..te in what manner it is applied, and its efficacy tested. The latter is done by means of a liquid test thus composed:—Starch, 10 grammes (⅓ oz.); iodide of potassium, 10 grammes; water, 500 grammes (1 pint). The starch is boiled to a thin, clear liquid with the water, and the iodide of potassium is added. This liquid does not remain good for more than 6 or 7 days, and we must not make too much of it. When any substance having free chlorine is brought into contact with this liquid, a blue, purple or brown color appears. The chlorine decomposes the iodide: the iodine is set free and combines with the starch as blue iodide of amylon. After the larger portion of chlorine has been removed by washing, a solution of the hyposulphite of soda is added, in small portions, and the material (pulp, cloth, yarn, &c.), tested with the above. When no blue color appears the chlorine is all removed, and a little longer washing will finish the work. A small quantity of clear solution of soda, thrown lastly into the water, to neutralize the acids formed by the effect of the antichlorine, is also very advisable.—*Journal de Pharmacie et Chimie.*

The Texas papers are filled with accounts of the depredations of the Indians, and of the fights between them and the whites. It is said that the Indians were never so troublesome as they are at the present time.

"WANTED—A COTTON GIN!"

Messrs. Editors:—Having devoted much time and money to the subject of ginning cotton, and taken out several patents in this department through your agency, I have read, naturally with interest, the letter in your last issue (page 212), signed A. J. H.

With your permission, and for the purpose of further ventilating this subject, I would say to your correspondent that, while it is by no means an easy task to gin cotton (even upland cotton) perfectly and *rapidly*, yet the great error in the plan projected by Mr. Whitney, and which has been followed up by cotton gin builders and caused most of the trouble in the after processes of manufacture ever since, may easily be found in his idea of forcing the staple *through a stationary breastwork of iron at the point where the seeds are arrested and abruptly stripped.* Until this mistake is set right we shall never have a pound of cotton properly ginned. However paradoxical it may seem, there is a great difference between stripping the cotton from the seeds, or the seeds from the cotton. If the planters of upland cotton really desire a better gin (which they certainly need), and if they are willing to pay for it, they can have a gin to handle more cotton per day, leaving the staple faultless in preparation, and with less outlay of power, than any of the gins in use. But unless an engineer has more than money enough to live without troubling himself about anybody's wants, he can easily spend *all* in battling the ignorance and prejudice of the planters or their overseers who use these gins.

Let the planters in any State or part of a State, just put up, say $5,000, as the first installment of the "everlasting fortune and eternal income" referred to, to be paid for a gin which shall accomplish a certain specified amount of work, properly done, leaving the decision to proper judges, and there will be no trouble about cotton gins after that. The work can be done, and the machine already patented, but I am not alone in feeling that it is a thankless task for any one to spend time and money to supersede the present imperfect gin, for any section, unless the planters in that section are *pecuniarily* identified with such efforts.

If your friends are in earnest, let them put up the money in any fair way, and there will be plenty to enter the lists to compete for something *tangible.*

Lewis S. Chichester.

85 Maiden-lane, New York, April 2, 1860.

TRIAL OF LOCOMOTIVES IN SOUTH AMERICA.

Messrs. Editors:—Yours, asking for information in regard to the trial of strength of speed of the English and American locomotives on the Southern Railroad of Chili, South America, is at hand; and I will in reply give you such information as I am able. I had, when I left Chili, the data of the respective weight, power, &c., of the different locomotives; but it has got mislaid somewhere. There has been, for a long time, a rivalry existing between the English and American residents in Chili, in reference to the manufactures and machines of the two nations—each claiming a superiority over the other; and there being a good chance to test this question by the fact of having two American and two English locomotives on the same road, it was finally decided that a trial should take place, and be considered conclusive and decisive. Mr. Evans, the American engineer-in-chief of the Southern Railroad, and Mr. Bayles, the superintendent (English) of the works on the Valparaiso and Quilota Railroad, were the judges. The first locomotive tried was the *San Bernado* (American freight engine); she left the station with 35 cars loaded each with 25 bars of railroad iron (21-feet bars), and arrived at San Bernado in 35 minutes, the distance is 12½ miles. The second locomotive was the *Varras* (English freight engine); she left the station with the same number of cars as the previous engine, and in ascending a slight grade, about four miles distant from the station, she got stuck, and came back. The third locomotive was the *Santiago* (American passenger engine); she left the station with 10 cars loaded with railroad iron as above, and five passenger cars, and arrived at the Maipo Bridge in 35 minutes; the distance is 17½ miles. The fourth and last locomotive was the *Moritt* (English passenger engine); she took the same train from the station as the *Santiago*, and arrived at Maipo in 51 minutes; thus ending the trial, which was pronounced by everybody who witnessed it—English, Americans and others—to be fairly won by the American locomotives.

C. F. Pearce.

Providence, R. I., March 30, 1860.