INTERESTING PHOTOGRAPHIC EXPERIMENTS.

The following account of experiments conducted by Niepce de St. Victor, of Paris, possesses great interest to men of science:—

If, upon a metal plate heated in contact with boiling water, we place first an engraving on a printed paper, then a sheet of paper impregnated first with nitrate of silver and afterwards with chloride of gold, we obtain a violet blue image of the blacks of the engraving or of the printed letters. If the paper is only impregnated with nitrate of silver, the whites only of the engraving are reproduced in a bistre color.

A metal tube heated to the temperature of 212° Fah, the opening of which covers the engraving placed upon the sensitized paper, produces the same effect as the warm plate.

With paper prepared with the salts of silver and gold, and with the plate warmed with boiling water, large printed characters are reproduced at a distance of several *millimeters';** but the image is not produced if we interpose a thin plate of mica, metal, or even a piece of *papier vegetal.*

If we place a paper printed with large letters between two glass plates, and warm the whole to a temperature sufficient to slightly scorch the paper, upon removing the paper we perceive the letters have left their imprint upon the glass. If upon this imprint we place a sheet of paper prepared with the salts of silver and gold, and warm the whole upon a metal plate, heated with boiling water, we obtain a new image, as if the sensitive paper had been placed upon the printed characters themselves.

Designs traced with writing ink, black lead or charcoal are not reproduced when they are traced upon ordinary paper, but they are produced upon *papier vegetal.*

An unvarnished positive photographic image upon collodioned glass, formed by reduced iodide of silver, has printed upon sensitized paper, under the influence of heat, many consecutive images of the "darks;" the last proofs being the sharpest and most vigorous.

Some tiles and porcelain plates (glazed) with black letters or painted in various colors, and passed through the furnace without being enameled, gave impressions; but letters and designs covered with enamel gave none.

Tissues shaded with black and white, or with varied colors, impressed their images upon sensitized paper; but the images were very variable. In general the blacks printed the best, but frequently the whites also; the image of every color has a character and intensity peculiar to itself, the variations observed depending doubtless upon the nature of the color. The colors produced by the same coloring matter, applied with different mordants in succession, were printed very unequally and very differently. Madder, for example, which gives upon cotton a red with alumina; violet, with a salt of iron, a deep brown or a red brown, according to the relative proportions of alum and iron; the red was printed stronger than the other hues upon paper prepared with chloride of gold. In the case of whites obtained upon colored grounds by means of a discharge, the whites as well as the grounds left their images upon the sensitive paper; upon cotton dyed with indigo blue, the blue ground is reproduced, but the whites are not; while in those dyed with Prussian blue, it is, on the contrary, the whites that are reproduced. If we spread upon paper or porcelain separate bands of indigo and Prussian blue, only the bands of indigo will be reproduced, never the Prussian blue. Another fact proves the preponderating influence of the peculiar nature of each color and ink. I have seen two engravings of the same drawing, but printed with different inks; one gave a positive, the other a negative image upon paper sensitized with chloride of gold.

I shall conclude with some remarks upon the preparation and use of sensitive papers in thermography.

Prepare two solutions, one of fused nitrate of silver of the strength of one per cent, the other of chloride of gold of the same strength. The paper sensitized with nitrate of silver only is obtained in the ordinary way. To prepare the paper with both salts of silver and of gold, float upon the solution of nitrate of silver a piece of Berzelius's paper, holding it by one corner; dry it slowly without scorching, before a fire, and when dry, pass it through the solution of chloride of gold, floating the same side that was placed on the silver solution; dry it again without the temperature attaining that of boiling water, because at this temperature the paper becomes discolored.

To obtain an image, place an engraving with its back upon the plate, warmed by boiling water, and lay the sensitized paper upon the engraved side, and cover it with a plate of glass of several millimeters in thickness; upon looking through this glass we see the image appear in a few minutes. The image is clearest when the paper is very dry and not over sensitive; if it does not become sufficiently distinct, it may be strengthened by exposing the sheet of paper to the heat of a clear fire. If it be very vigorous, and stands out clearly from a ground slightly colored, it may be fixed by treating it with a solution of hyposulphite of soda, which removes those portions of the salts of silver and gold which have not been reduced by heat. The paper sensitized with the double salt of silver and gold will not keep in the dark; it must be prepared as wanted, and used immediately. Paper impregnated with a solution of nitric acid of a strength of one per cent, or with a solution of potassium of ten per cent, is sufficiently sensitive to yield thermographic images, but only at a temperature much above 212° Fah.

I attempted to obtain images in the focus of a lens which concentrated the rays emanating from a heated object, but the result was always negative. I have not yet ascertained if the images formed in the focus of a concave mirror are more active. At present it appears to be an indispensable condition of success, under certain circumstances, that the radiation be direct without the interposition of a screen.

The action that produces the thermographic image is, doubtless, a very complex one. Calorific radiations play an important part, but the solid vapors emanating from the heated object may also intervene.

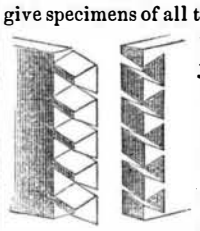
But in the case, at least, of the medals and a dry stamp which were reproduced, notwithstanding the interposition of a thin continuous plate of mica, silver or copper, provided the pressure was sufficiently strong and the temperature high enough, it must be understood that the action of heat preponderates; and it appears to me established that a high temperature produces, under certain circumstances, facts analogous to those we see produced daily by light, such as the fading of colors, the reduction of the salts of gold, silver, &c.

Luminous and calorific action may sometimes coalesce or unite to produce simultaneously the same effect, but they are often separate and distinct, as proved by the experiments of MM. Bouillon and Sauvage.

* A millimeter is equal to ·03937 of an English inch.

DOVETAIL AND TENON CUTTER.

In describing McDonald's machine for this purpose in our last number, we had not room upon the engraving to give specimens of all the work it is capable of doing, and we now show an angle or locked joint which can be cut by this machine, and which the inventor regards as of more importance than the others. The cutter marked *d*, Fig. 2, in our last illustration, should have cutting teeth shown upon the face of the screw, and the inventor states that his machine will cut one thousand dovetails every minute with ease. If this statement be correct his machines should not get rusty for want of use.



DELAYS AT THE PATENT OFFICE.

Nearly every mail brings to us letters of inquiry as to the present condition of the Patent Office, such as: "Why is the Office so far behind in its examinations?" or "When will A B's case come up for examination?" or "Is it not almost time for my case to be decided upon at the Patent Office?" and other equally pertinent questions of our clients from all parts of the country. We append an extract from the letter of an inventor for whom we have acted as attorneys in procuring several patents. It is a fair specimen of the letters we are daily receiving:—

"I am very sorry that the Office consumes so much time before issuing patents. If there is any way of remedying the evil, it should be done. In my case, the delay has operated much against my interest, inasmuch as I expected the Letters Patent to issue in eight weeks at most, and made some arrangements with other parties, whom I told to look for the issue at any time six weeks from date of application. Of course, nothing can be done until we are sure of the patent, and every week's delay causes additional expense. I hope before long to see the business of the Office moving on with its former activity. H. K. S."

It is very annoying to solicitors of patents, as well as to inventors, to have the examination of their cases so long delayed in the Patent Office as some classes of cases have been during the past 12 months, and we trust more vigor and industry will be hereafter manifested. We do not desire to complain of laxness in every department of the Office; but in some of the examining-rooms there is a manifest inefficiency or inertness which does not well comport with the active spirit manifested by inventors throughout the United States; and we trust our worthy Commissioner of Patents will see that the *back work* of the Office is brought up immediately, and hereafter kept up, as we are satisfied the present examining-corps is ample if the labor of the Office is properly distributed, and if each examiner will do his whole duty.

Let us not, we beseech you, Mr. Commissioner, be obliged to call your attention to this matter again.

THE LAST WORD TO FOUR THOUSAND READERS!

The present number of the SCIENTIFIC AMERICAN terminates the subscriptions of about 4,000 subscribers, and the paper will therefore be discontinued after this date to all who have not renewed. We entertain no fear in reference to this large list of readers; we are confident that they will all return their own subscriptions promptly, and we are also fully assured that, among this number, are many of the warmest and staunchest supporters of the paper—friends who esteem it a privilege to recommend it on all proper occasions, and to spend a little of their spare time in inducing others to join them in the formation of clubs. Our readers are well aware that we employ no traveling agents to solicit subscriptions; and this is the principal reason why we so often appeal to them to aid our circulation. We intend, as heretofore, to publish a journal of substantial character and value—one which shall, in some degree, illustrate the amazing progress of our people in material things—a journal that shall reflect the genius of not only our own people, but also, in a measure, the genius of the whole world. With the unparalled facilities at our command for gathering from the Inventor, Mechanic and Manufacturer a knowledge of the latest and best improvements in the arts, and the ease with which we are able to collate and translate from our English, French and German exchanges, we disseminate more valuable information than any other journal now published in this country. Unquestionably, the SCIENTIFIC AMERICAN is the most extensively circulated, and has the best reputation, of any similar publication ever undertaken here. We are able to command the very best means to make our journal surpass all others, and we shall bend our entire energies to render it more and more worthy of public confidence and support. Out readers should distinctly bear in mind that the editorial management of the paper is entrusted to special hands, and receives the attention and mental ability of editors who are well qualified from experience to direct and control its columns—*who have opinions of their own, and are not afraid to avow them.*

Friends! send in your subscriptions without delay, and induce your neighbors to join with you. We wish also to call attention especially to the quality of the mechanical engravings which illustrate our columns. This feature receives much care and attention. They are not mere second-hand stuff, whittled out by a jack-knife, but are designed and executed by our own artist, and under our own supervision.

COST OF RUNNING LOCOMOTIVES.—We have received a pamphlet detailing the cost of running locomotives on the Baltimore and Ohio Railroad, for the month of July, and we find that the cost of their coal-burning locomotives varies, on passenger-engines, from $5·60 per 100 miles run, to $20·30, and the number of miles run by such engines during the month has varied from 1,395 to 3,034 per engine. The tunnage engines have cost from $11·70 per 100 miles to $21·50, and the number of miles run by each engine has varied from 624 to 2,024. The pounds of coal consumed per mile has varied in passenger-engines from 10·7 to 62 (coal and coke mixed), and in tunnage-engines from 28·2 to 88·9. These are the average of 209 engines, and so constitute fair averages. The cost of coal at Wheeling, Va., is $3 per tun.