The dying materials chiefly made use of by Mr. Steart, are, man-grove bark, quercitron bark, best blue Aleppo galls, sulphate of iron, and acetate of alumine. A due combination of these materials produces a great variety of drabs, grays, sand-colours, &c.

[*Abrid. Tran. Soc. Arts.*]

On Etching and Dying Figures on Ivory, at one operation.

By Mr. J. CATHERY.

From the Transactions of the Society for the encouragement of Arts, Manufactures and Commerce.

THE usual mode of ornamenting ivory in black, is to engrave the pattern or design, and then to fill up the cavities thus produced, with hard black varnish. The demand for engraved ivory in ornamented inlaying, and for other purposes, is considerable, although the price paid for it is not such as to encourage artists of much ability, to devote themselves to this work, which consequently is trivial in design and coarse in execution. Mr. Cathery's improvement consists in covering the ivory with engraver's varnish, and drawing the design with an etching needle; he then pours on a menstruum composed of one hundred and twenty grains of fine silver, dissolved in one ounce measure of nitric acid, and then diluted with one quart of pure distilled water. After half an hour, more or less, according to the required depth of tint, the liquor is to be poured off; and the surface is to be washed with distilled water, and dried with blotting paper; it is then to be exposed to the light for an hour, after which the varnish may be removed by means of oil of turpentine. The design will now appear permanently impressed on the ivory, and of a black or blackish brown colour, which will come to its full tint after exposure, for a day or two, to the light.

The property which nitrate of silver possesses, of giving a permanent dark stain, to ivory and many other substances, has been long known; but Mr. Cathery has the merit of having advantageously applied it in a department of art in which it is likely to be of considerable service, by improving the quality of the ornament, and at the same time of diminishing the cost. Varieties of colour may also be given by substituting the salts of gold, platina, copper, &c. for the solution of silver.

Improvement in the manufacture of Magnetic Needles.

By Prof. AMOS EATON.

TO PROF. SILLIMAN.

SEVERAL years of the early part of my life were devoted to an extensive land agency, among the western and northern spurs of the Catskill mountains. During this period, I ran most of the outlines of two hundred thousand acres, besides four turnpike roads across

this Alpine district. The difficulties to which I was almost daily subjected, by the irregularity of the magnetic needle, were often very embarrassing. The old surveyors of that time assured me, that these fits, as they denominated those irregularities, were produced by the action of magnetic ores, which they believed abounded in this mountainous district. At one time I entertained the opinion, that I had collected facts sufficient to demonstrate, that while snow was melting away, these fits were the most frequent.

But on comparing different compasses, I found that they frequently varied, not only from the common direction of the magnetic needle, but from each other. For example, when set in some directions, one compass would vary, while other compasses would vary when set in different directions, and would not vary when set in the same directions. On extensive alluvial plains, where we could not suspect the presence of extensive ore-beds, all these difficulties occurred with equal force. And what appeared to be a still greater mystery, on changing needles, the variation seemed to be governed by the compass, not by the needle.

After considering every proposed hypothesis, and trying every proposed remedy, I abandoned the subject, as totally inexplicable; and contented myself with correcting these aberrations by ranging back-flags and using two compasses.

While exercising the students of Rensselaer school in land-surveying, at the last summer term, the same difficulties revived the same enquiries. In a conversation with an ingenious artist, Mr. Julius Hanks of Troy, I learned that his best compasses had in some instances, been subject to those fits of aberration. He showed me a compass of most elegant and accurate workmanship, with a nonius and double levels, which had been returned by the purchaser on account of the frequency of those fits. I carried this compass to the school with a determination to search out if possible, the cause of its frequent fits. By applying delicately suspended needles, which might be called a suit of magnetometers, I found a point in the limb, which attracted a fine needle at the distance of six tenths of an inch. This point, caused the needle belonging to the compass, to deviate at the distance of half an inch on each side; beyond that limit it was not affected. Consequently, when the course to be taken, brought the needle within that limit, it would deviate, and point accurately in all other directions. Any practising surveyor will readily perceive, that in tracing the lines around a field, the needle might come within this limit several times, or it might not fall within it in running a dozen fields. Hence the supposed irregularity of the fits.

My conclusions from these experiments were, that a scale from a screw-cutter or a punch, or a tooth from a file, &c. too minute for the eye, might have been lodged in that particular point. On consulting Mr. Hanks, he said this might frequently happen, and it was not improbable that all those fits complained of by surveyors, might be traced to the same cause; inasmuch as all compass cards and graduated circles were wrought with very fine steel instruments. To illus-

trate the subject, I took out the screws from the under side of the card, and inserted the point of the finest sewing needle, less than the twentieth of an inch in length; whereby I actually produced four additional points of disturbance.

To obviate the difficulty, Mr. Hanks cut off seven tenths of an inch from each pole of the needle, ground the poles to very sharp points, and tipped them with brass caps, extending to the original length of the needle. This measure, by withdrawing the magnetic poles from the sphere of attraction, proved a perfect remedy. Mr. Hanks presented the same compass to the school, where it has been used almost daily for two months; and it is one of the most perfect instruments that I have ever used. It has no more fits, and is totally undisturbed by magnetic ores, real or imaginary. Mr. Hanks has since corrected a theodolite in the same way, which had been thrown aside as useless for several years. If the disturbing steel scale is in the card near the graduated circle, Mr. H. proposes lengthening the pivot and raising the circle by introducing an additional circle beneath the graduated one. But he has not made this experiment; and it is probable no such case will ever occur. For if it were near the pivot, it would not disturb the needle; and so little work is required in the card with slender instruments, that scales will not often be left in that part.

Another important advantage which will attend tipping needles with silver, brass, &c. is that of preserving the points from rust. It has been demonstrated by conclusive experiments, that magnetism resembles electricity in acting most powerfully from the sharpest points. Hence the absurdity of needles made of square bars. Hence, also, the utility of preserving the finely sharpened points by tips. I will add, that, of all forms of needles which I have used, the flat kinds are best, which are wide in the middle, and of a true taper to the points.

Yours respectfully,

AMOS EATON.

Rensselaer School, Troy, N. Y. Nov. 1826.

[*Silliman's Journal.*

CINCINNATI IN 1826.

We have just received a very interesting pamphlet of 100 pages, under the above title, written by B. Drake, and E. Mansfield, Esqrs. of that place. The facts which it details have been collected with great industry, are skilfully arranged, and well narrated. The 7th and 8th chapters, which present a view of the population and manufactures of Cincinnati, we now present to our readers, and shall prepare for our next number, a general abstract of such other portions of the work, as may come most directly within the scope of our pages.