

glass by iron: he used also an addition of silver in great proportion, for imbibing the gold, and thus required a vast capital for establishing a work in large; but where the lead is to be revived, the silver is rather detrimental than useful; for the gold and silver contained in the sand are imbibed by the lead, and the additional silver occasions an enormous expense of *aqua-fortis* for dissolving it, in order to the separation of the gold. Whether, with this reduction of the expense, of which Becher himself seems to have had some idea, the process might be practicable to advantage, or whether some earthy bodies might not be a useful auxiliary for promoting the fusion of the gold sands, may deserve further inquiry: one kind of earth is frequently observed to bring another into fusion, though both are of themselves unfusible; and the earthy parts of different ores are made fluid in the furnace of the smelter, by the addition of other earths.

On the extraction of Gold from the Ores of other Metals.

When gold is intimately combined with other metals in their ores, the ore is to be run down in the same manner as the same kind of ore without gold. The gold commonly melts out with the proper metal of the ore, from which it may be afterwards separated by different processes, according to the nature of the metal. There are grounds to believe, that most metalline bodies, as extracted from their ores, contain generally a portion of gold, though rarely sufficient to bear the expenses of its separation.

Zinc, arsenic, and mercury, are obtained from their ores by a kind of sublimation: hence, if the ores of these contain gold, the gold is to be sought for, not in the metallic substance separated, but in the remaining matter. There are some other cases also, in which the gold, instead of accompanying the metal in its fusion, is thrown off in the slag: but the ores and slags of this kingdom have been so seldom examined for gold, that I can say but little satisfactory on this subject.

ON ENGRAVING.

(FROM THE MECHANICS' GALLERY. BY C. F. PARTINGTON.)

(Continued from p. 165.)

Engraving in Mezzotinto.

Notwithstanding the great difference in the works of the *mezzotinto* engravers, their operations are nearly the same. The plate must be prepared and polished in the same manner as for other work; and afterwards divided equally by lines parallel to each other, which are to be traced out with very soft chalk. The distance of these lines should be about one-third of the length of the face of the cradle, or grounding tool, which is to be used; and they should also be marked with capital letters, or strokes of the chalk to distinguish them from one another. The cradle is then to be placed exactly betwixt the two first lines, and passed forwards in the same direction with them, being held as steady as possible, and pressed upon with a moderate

force, rocking it from end to end, till it has completely hacked all that part of the plate between those two lines. The same operation must be repeated with respect to all the other lines, till the instrument has passed over the whole surface of the plate, and rendered it uniformly rough throughout. Other lines must be then drawn from the extremities of the other two sides, in the same manner, and at the same distance from each other, as the first set of lines; these lines intersecting the first at right angles, will, with them, form squares. The same operation must be repeated with the cradle, between this second course of lines, as in the case of the first. New lines must then again be drawn diagonally to the former, and, bisecting the aforesaid squares, and the cradle passed betwixt them as before: when the first diagonal operation is performed, the diagonal lines must be crossed at right angles by other lines, as the former, and the cradle passed betwixt them in the same manner. The plate having undergone the action of the cradle, according to the disposition of the first order of lines, as above, a second set of lines must be formed, having the same distances from each other as the first. But they must be so placed as to divide those already made, into spaces one-third less than their whole width; *i. e.* every one, after the first on each side, will take in one-third of that before it; *e g* beginning at A, of which the first third must be left out; a third of B will consequently be taken in, and so of the rest. These lines of the second order must be marked with small letters, or lesser strokes, to distinguish them from the first: and another ground must be laid on the plate, by hacking it with the grounding-tool, between each two of the second order of lines. When this second operation is finished, a third order of lines must be made; the first of which, *e g* in A, must omit two-thirds of it, and consequently take in two-thirds of B, &c. By these means the original spaces will be exactly divided into equal thirds; and the cradle must be again employed betwixt these lines as before. When the whole of this operation is finished, it is called *one turn*; but, in order to produce a very dark and uniform ground, the plate must undergo the repetition of all these several operations for above twenty times; beginning to pass the cradle again betwixt the first lines, and proceeding in the same manner through all the rest. The plate being thus prepared with a proper ground, the sketch of the design, or outline, must be chalked on it, by rubbing the back of the paper, or drawing with chalk, and tracing the outline with a pointer, as in etching. It is also proper to overtrace it afterwards with black lead or Indian ink, to have a more distinct and permanent sketch. The scraping is then performed by pairing or scraping away the grain of the ground in various degrees, so that none of it is left in the original state, except in the touches of the strongest shade. The general method of proceeding is similar to that of drawing with white, upon black paper. The masses of the strongest light are first begun with, and scraped pretty smooth; and some parts, where there is no shade, as the tip of the nose, &c. are burnished, and those parts which go off into light in their upper part, but are brown below. The next lower gradations of shade are then scraped down, after which the reflected lights are entered upon: the

plate is next to be blackened with a printer's blacking ball, made of felt, in order to discover the effect: and then the work is proceeded with again, observing always to begin every part in the places where the strongest lights are to be introduced.

J. C. Le Blon, of Frankfort, pupil of Carlo Marata, applied this art to the method of printing with different colours, to produce the resemblance of paintings. He considered all colours as composed of three primitive ones: the combination of two of these, he asserted would produce a third, such as their compound must necessarily give, and the two primitive colours would preserve their original colour: but if transparent colours be mixed, and three primitive ones combined together, they destroy each other, and produce a black, or a colour approaching towards it, in proportion to the equality or inequality of the mixture: and if these three colours be laid either separately, or upon each other, by three plates, engraved correspondently, on these principles, to the colouring of the design, the whole variety of tints necessary may be produced. The requisites, therefore, to the execution of any design in this method of printing are the following:—1. To settle a plan for the colouring to be imitated, showing where the presence of each of the three simple colours is necessary, either in its pure state, or combined with some other, to produce the effect required; and to reduce this plan to a painted sketch of each, in which not only the proper outlines, but the degree of strength should be expressed. 2. To engrave three plates, according to this plan, which may print each of the colours exactly in the places where, and in the proportion in which they are wanted. 3. To find three transparent substances proper for printing with these three primitive colours. The manner in which M. Le Blon prepared the plate was as follows:—The three plates of copper were first well fitted, with respect to size and figure, to each other, and grounded in the same manner as those designed for mezzotinto prints: and the exact place and boundary of each of the three primitive colours, conformably to the design, were sketched out on three papers, answering in dimensions to the plate. These sketches were then chalked on the plates; and all the parts of each plate, that were not to convey the colour to which it was appropriated to the print, were entirely scraped away, as in forming the lights of all mezzotinto prints. The parts that were to convey the colours were then worked upon, and where the most light or diluted tints of the colour were to be placed, the grain in the ground was proportionally taken off; but where the full colour was required it was left entire. In this method of printing regard was had not only to the effects of the colour in its simple state, but to its combined operation, either in producing orange colour, green, or purple, by its admixture with one alone; and likewise to its forming brown, gray, and shades of different degrees, by its co-operation with both the others. But though the greatest part of the engraving was performed in the mezzotinto manner, yet the graver was employed occasionally for strengthening the shades, and for correcting the outline, where it required great accuracy and steadiness. It was found necessary, sometimes, to have two separate plates for printing the same colour,

in order to produce a stronger effect: but the second plate, which was used to print upon the first, was intended only to glaze and soften the colours in particular parts that might require it. With respect to the black and brown tints, which could not be so conveniently produced, in a due degree, by the mixture of the colours, umber and black were likewise used. From some specimens of this invention, left us by the above artist, and cotemporary accounts of his success, we have reason to believe he met with less impediments in his work than many of his successors; but with respect to the order in which the plates are to be applied, it may be proper to observe, that the colour which is least apparent in the picture should be laid on first; that which is betwixt the most, and least apparent, the next; and that which predominates, last; except where there may be occasion for two plates for the same colour, as was before mentioned; or where there are any more plates required for adding browns and shades.

The above-named ingenious artist, applied this art not only to general subjects, but also to portraits, and showed, by the specimens he produced, the possibility of its being, by further improvements, rendered capable of affording very exact imitations of painting, which might have some value. It must, however, be confessed, that it is much better adapted to the simpler subjects, where the colours are less compounded and intermixed, and where the accuracy of the reflections and demi-tints do not form an essential characteristic; and, in general, it may be observed, that those mezzotints which have their outlines finished with the graver are better adapted to this mode of painting than plates wrought with the scraper and burnisher only. M. Cochin observes, that "though Le Blon confined his method principally to the use of three colours, yet, should this invention be again taken up and cultivated, there would be more probability of success in using a greater variety: and that several different kinds might be printed by one plate, provided they were laid on in their respective proper places by printing-balls, which should be used for that colour only.

(TO BE CONTINUED.)

Progress of manufactures and other improvements in New Hampshire.

PORTSMOUTH, N. H. Aug. 19.

In 1810 there were in New Hampshire but 12 manufacturing establishments, with 5956 spindles; and the whole amount of woolen, cotton, flaxen and tow cloth manufactured by them, and by families throughout the state in that year, was only 4,274,185 yards. There are now in this state more than *fifty* cotton and woolen factories, and the amount of cloth manufactured annually, cannot be far from 30,000,000 yards. Some of the towns in the vicinity of Portsmouth have within a few years been wonderfully changed from agricultural to manufacturing pursuits. The factory establishments of Newmarket, Dover, Somersworth, Berwick, &c. have made our neighbourhood a