Berri, D. G.
The art of lithography

THE ART

OF

LITHOGRAPHY

THE PEOPLE'S PRINTING PRESS.

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OF

LITHOGRAPHY.

BY

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INTRODUCTION.

HAVING published a small Manual of the Art of Letterpress Printing, in connection with the "People's Printing Press," which I have lately introduced to public notice, and as the press has been extensively patronised by the army, navy, missionaries, professional men, tradesmen, amateur and practical printers, and as it can be used for either letterpress, lithographic, or copper-plate printing, I have been asked upon various occasions to furnish directions for practising the Lithographic Art; and not knowing of any work which treated of Lithography that I might refer any one to, it was thought advisable to embody in a small volume a short treatise of the art. Although it is impossible in a work of this description to enter into all the minutiæ, still, I flatter myself that something will

be found useful to those who have not learnt the rudiments of the art.

To those who wish to make Lithography a profession, the alpha-beta of the art will be found in the following pages: but they must trust to themselves, their own ingenuity and perseverance; and only after repeated experiments and many failures they will arrive at the omega.

Those, on the other hand, who wish to make any number of fac-similes of a circular, for instance, will find how easily it can be done by being transferred to the stone, and with what facility the impressions can be obtained. This will be found very useful for business purposes, and save a great deal of time in making a number of copies of anything written or drawn: such facility might be acquired without previous study, insomuch that the amateur will be astonished at the results.

To those who have plenty of time on their

hands, they will find Lithography a most interesting, useful, and artistic employment. Although it is only about eighty years since it was first discovered, yet it has made wonderful progress, and has become of great importance in arts and commerce, although even yet its full powers are not developed: in fact, we can form no idea of what may yet be done in Chromo-lithography, of which beautiful examples are produced every day; and in the new art of Photo-lithography, which is still but imperfectly known.

A few words have been added respecting Copper-plate Printing and Graphotyping, which, although not belonging to the present subject, may yet be found useful to some, especially to those who wish to make a transfer from a plate on to the stone.

THE ART OF LITHOGRAPHY.

CHAPTER I.

THE ORIGIN OF LITHOGRAPHY.

LITHOGRAPHY is the art of printing from a peculiar kind of stone of a calcareous nature (lime and clay), and depends on the facility with which it will absorb either water or grease, and will also effervesce with acid. The stone resembles in appearance a smooth yellow hone; it is found in quarries in Bavaria, where the art was first practised. Similar kinds of stone have been found in France, and also in England, near Bath; but those of Germany are still considered the best. From the great facility with which drawings can be made on, or transferred to the stone, and the rapidity with which impressions can be produced, the art of Lithography has now become an extensive branch of industrial art, more particularly for circulars, plans, drawings, portraits, music, &c., which are intended for circulation. Any person who can write or draw can multiply as many fac-similes of his original pro-

duction as may be required by this, the most interesting of all the printing processes.

Formerly artists, in order to disseminate their works, had recourse to the arts of etching and engraving on copper or steel plates; but the process of both, especially that of the latter, requires long practice, and years had to be spent in acquiring that manipulation necessary to give their productions the desired effect.

Lithography is said to have been discovered, like many other useful things, by accident, about the year 1792, by Alois Senefelder, the son of a performer at the Theatre Royal, Munich. He had studied law at the University of Ingoldstadt, and on the death of his father he took to the theatrical profession for a living; but being unsuccessful in that line, he next became an author. However, he was too poor to pay for the publishing of his works; so he endeavoured to find out a way of printing them himself. After various experiments, he found that a composition of soap, wax, and lamp-black, formed an excellent material for writing on copper, and that, when dry, it was capable of resisting the action of aquafortis; the acid would eat away the metal, and leave untouched those parts that were covered with the composition. In order to acquire facility in writing backwards, as copper was too expensive, he procured a piece of calcareous stone, and having polished the surface, set to work to practise his writing. It afterwards occurred to him,

that by the means of acid he might corrode the surface of the stone, the same as he had already done with the copper-plate, leaving the letters standing out in relief, which would admit of impressions being taken. He tried the experiment, and was successful. After some time he found that it was not absolutely necessary to lower the surface of the stone to obtain impressions of his writings, but simply wetting the surface was quite sufficient to prevent the ink from adhering to it, whilst those parts covered with his composition readily absorbed the ink. This, in a few words, is the secret of the art of Lithography.

Senefelder continued after his discovery to pay great attention to the improvement of the new art, and in the year 1796 he printed some pieces of music, which was the first real use that was made of lithography. To obviate the great difficulty of writing backwards on the stone, the transfer-paper was soon afterwards invented.

About the year 1800, Senefelder obtained a patent at Munich for the exclusive privilege of practising his art, and entered into partnership with a Mr. André, who endeavoured to set up presses and take out patents, in London, Paris, and Vienna; but as far as this country was concerned it turned out a failure—no doubt owing to the difficulty of obtaining the requisite materials.

Senefelder himself visited Vienna, where he endeavoured to apply lithography to the printing of

cottons; but, as it would appear, was unsuccessful. In 1806 he returned to his native town of Munich, where he taught the art to a Mr. Mitterer, Professor of Drawing at the Government School, who is said to have invented the lithographic chalk. Mitterer found the art very useful in multiplying his drawings for the use of the pupils; and also about the same time copies of the greater part of the admirable collection of drawings by the ancient masters in the possession of the King of Bavaria were published.

We find that in 1807 Senefelder was Inspector of the Royal Lithographic Establishment at Munich, and engaged in printing a map of the kingdom of Bavaria.

The art made no progress in England until the year 1817, when it was taken up in earnest, and has since continued to flourish. With vast improvements, and by means of different stones and separate printings, beautifully coloured impressions can be obtained. I may only allude to the exquisite works of art of some of our best masters, which are published from time to time by our leading Lithographic Establishments, elevating the public mind to an appreciation of the Fine Arts, and disseminating within the reach of the poorest cottager the representation of social homely sentiments, in the delineation of which the British artists alone excel.

In France the art of lithography was still more tardy in being developed, although it was introduced

in Paris at the same time it was brought to London. The French Government refused the permission to have a lithographic establishment set up in Paris. About the year 1814 a M. Marcel de Serres, who had been employed in examining the manufactories in Germany by order of the French Government, picked up some information concerning the art, and embodied it in a treatise which he published. This attracted the attention of scientific men, and so far as theory is concerned, is said to be complete. But as the real secret of lithography consists in the printing, and as M. Marcel de Serres was not initiated in the practice, and never had the courage to make any experiments, his treatise, notwithstanding its ingenuity, was not reduced to practical utility.

Count Lasteyrie was the next who devoted his attention to lithography. He made several journeys into Germany, for the express purpose of studying the art. He made himself conversant with all the minutiæ required in the practice of printing: he also procured printers from Germany, and succeeded in making it a profitable speculation.

About the same time a Mr. Englemann, who formerly had tried to found a lithographic establishment at Mulhausen, came to Paris, where he produced some beautiful specimens. He obtained an honourable mention from the class of Fine Arts of the Institution. Both establishments were highly successful in Paris, but, unfortunately for the progress of lithography, Lasteyrie

and Englemann became so jealous of each other that they held no communication, and the improvements effected by the one remained unknown to the other, and both kept the whole process a profound secret from the public.

CHAPTER II.

OF LITHOGRAPHIC INKS AND CHALK.

It is not necessary for a Painter to be his own colour-grinder, nor a lithographer his own ink and chalk-maker; all the requisite materials can be purchased much better and cheaper ready for use, than if the various ingredients were got in their separate state; and a great deal of time and drudgery saved, not to speak of the failures that must be endured in order to obtain experience. Yet it may be useful for some to know the component parts of the inks and chalk used in lithography, that they may be the better enabled to understand the principles of the art, and, under some circumstances, it may be impossible to obtain the materials in their prepared state.

If the only aim of lithography was to obtain an impression from the stone of something drawn or written on it, any fat substance would do instead of chalk, and any greasy liquid might supply the place of ink; but something more is required. We wish to produce a fac-simile of a drawing, therefore it is necessary to furnish the draughtsman with similar materials to those he has been accustomed to use, so

that he might have the same freedom of touch in drawing or writing on the stone or transfer-paper as he would have in the ordinary way, without reference to lithography. Therefore it is neccessary that the chalk should be like the Italian chalk, or the common lead pencil, and the ink should be similar to that in ordinary use.

Lithographic ink is composed of

Tallow	2 ounces.
Virgin wax . . .	2 ounces.
Shell-lac	2 ounces.
Common or Castile soap .	2 ounces.
Lamp-black . . .	$\frac{1}{4}$ an ounce.

To mix the above, it is necessary to have an iron saucepan with a lid. The wax and the tallow must be put in first, and heated until they catch fire. The soap having previously been cut into small pieces, is then added, a small piece at a time, taking care that one piece is melted before another is put in: all the time the whole is kept stirred. All the soap being dissolved, the ingredients are allowed to burn until they are reduced to the same volume before the soap was added. Care must be taken not to allow them to burn too much or too quick. It is necessary to take the saucepan off the fire to prevent the contents from boiling over. The shell-lac is now added, and the flame put out, if it has been possible to keep it lighted during the whole of the operation. If any

of the ingredients should happen not to be dissolved, the saucepan is held over the fire until such time as all are mixed into one substance, but without allowing it to become again ignited. The lamp-black is now added, having previously been mixed with a thick varnish, made by heating linseed-oil, until it will ignite by the flame of a piece of lighted paper, and the whole allowed to burn until reduced to about one-half. The more black that is put in, the more soluble in water the ink will be; but too much black will spoil it.

The ink being now ready, it can be cast into paper cylinders, something like cartridges; or the better way is to have a marble slab, previously rubbed with soap, and pour the ink on it: when it begins to cool, place another slab on the top, and afterwards cut up the ink into square pieces, like sticks of Indian-ink.

It requires some practice to be able to make good ink, and the progress of the flame must be watched with great care. If the flame decrease, the fire must be increased; but if the flame spread itself to the sides of the saucepan, with a crackling noise, the latter must be instantly removed from the fire: if that is not sufficient to slacken the flame, and the contents still keep rising, the cover should be put on the saucepan and the whole allowed to cool for a little. If that precaution were not taken, the ink would boil over into the fire.

If the ink have a slimy appearance when mixed with

water, it has not been sufficiently burned; therefore it is necessary to have it all re-melted, and burnt a little more. If it be not soluble, a little more soap must be added. Sometimes it is too much burned, whereby the greasy particles are more or less destroyed; in that case the ink will have no tenacity, and will appear honeycombed. The remedy for that defect is to have it re-melted, and a little more soap and wax added. This is the ink used for writing or drawing with the pen on the stone. The ink for transfers should have a little more wax in it.

Lithographic chalk is composed of

Common or Castile soap .	$1\frac{1}{2}$ ounces.
Tallow	2 ounces.
Virgin wax . . .	$2\frac{1}{2}$ ounces.
Shell-lac . . .	1 ounce.
Lamp-black . . .	$\frac{1}{4}$ an ounce.

The manipulation of the chalk is exactly the same as in preparing the lithographic ink.

Lithographic printing-ink is composed of burnt-oil or varnish (linseed or walnut is the best; either can be easily procured in the shops), and lamp-black. In some cases about a twentieth part of indigo is added. On the Continent, wax, grease, and tallow are sometimes mixed with the above materials. It has been remarked at the beginning of this chapter, as a rule, that it is better to purchase the various articles ready made; but as an exception proves a rule, it will

be found that the printing-ink supplied by the ink-makers is better when mixed with a little varnish or burnt-oil, according to the kind of work to be done. A great deal of the success of the printing depends on the quality of the ink employed; so the lithographer cannot be too particular in having it to perfection as far as the ingredients are concerned, and of a proper consistency, for the following reason—the ink being used to charge the drawing or writing on the stone, which process will be explained when we come to the printing part. It will be observed that the lines on the stone thus charged are slightly in relief; the stones are of themselves filled by innumerable pores; and that the effect of the pressure employed in the printing must of necessity have the tendency to cause the ink to spread, and thereby to penetrate into these pores.

If the ink is too liquid, it will be forced by the pressure to spread beyond the greasy lines of the work, and penetrate into the pores that are already occupied by water; as soon as the pressure ceases, the ink will be repelled by the natural antipathy which grease and water have for each other. If, on the contrary, the ink is too thick, and is composed of minute separate particles, these would, by the pressure and their own elasticity, adhere to the pores of the stone so firmly as not to be overcome by the chemical repulsion. This would be quite sufficient to spoil a drawing, and what is called by lithographers, "*running smutty.*"

It is, therefore, not only desirable but necessary to

have a perfect ink, possessing a sufficient consistency, so as not to spread when the pressure is applied, and yet liquid enough to prevent its adherence to the pores of the stone, but come clean off on the paper, leaving no traces behind. The ink with which the stone is charged should be retained on it merely by the chemical affinity which it has for greasy lines of the drawing or writing. If the ink is attached mechanically to the stone, it will resist the attempt which is made by the paper to take it up—all harmony of the impression will be destroyed. Sometimes the lines which ought to appear dark and well-defined will be faint, and those which ought to be faint will be dark and thick, and if the printing is continued they will all unite and clog together, and after about thirty impressions the drawing will be completely destroyed.

But as this more properly belongs to the printing, the remedy, when the work runs smutty, will be given under that head.

CHAPTER III.

OF LITHOGRAPHIC STONES.

It has been remarked that the stones used for lithography are calcareous, and will readily absorb grease and water, and effervesce with an acid. Carbonate of lime will fulfil these conditions; and although the stones generally used are imported from Bavaria, where the art first took its rise, yet there is every reason to expect that stones fit for lithography might be found in many other places, as it is well known that lime, next to silex, is most abundantly diffused over the surface of the globe, and chiefly in its carbonate state. In primitive beds it is found in large masses, and of a white colour; in transition beds, proceeding from the detritus of the first, it is also found in masses, but of various colours—such are marbles; but in the beds of later formation it is found in abundant strata: but those beds or deposits being formed by water, the stone is almost always of a coarse texture and intermixed with innumerable foreign substances, such as shells, &c., which would render it unfit for the purpose of lithography. From the coarse calcareous stones which are used for buildings, to the compact sort which

is capable of receiving a polish equal to marble, a great variety exists, containing, lime, silex, and alumina, all more or less fit for lithography.

Any one who has the inclination to search for such stones should provide himself with a small bottle of nitric acid, and when a white stone is discovered that does not strike fire with steel, try it with the acid; if it effervesce, it is a lithographic stone. The best that have yet been found break with a conchoidal fracture, are of a homogeneous texture, and of a uniform yellowish-white, like the colour of a hone for sharpening razors; on breathing on them a slight aluminous smell will be perceived, something like the smell of pipe-clay.

Some ingenious persons have endeavoured to make composition stones; others, a kind of prepared pasteboard. Although I have never used such preparations, nor seen them used, there is no reason why some composition should not be found that would answer for lithographic purposes.

The stones are sawn, like marble, with a saw and sand and water: when squared up to the size required the edges are rounded with a file, and smoothed with pumice-stone.

THE PREPARATION OF THE STONES.

Stones can be purchased ready prepared; but if they have been handled and become dirty it is

always advisable to go through the operation before anything is put on them, as the least greasy moisture from the fingers will show in the printing. The method is very simple. The stones to be used for chalk drawings are rubbed together, with a little silver sand and water between them, taking care, however, that the sand is properly sifted, and there are no large particles or grit, which would scratch the surface of the stone: the upper one is moved in small circles over the under one, until the surfaces are quite even; they are then washed perfectly free from the silver sand, and common yellow sand substituted, by which a much finer grain is procured. For ink drawings exactly the same method is required; but after the brown sand is used and washed off, the stones are rubbed with powdered pumice, which is afterwards also worked off; and each stone is polished separately, either with a fine piece of pumice-stone or water Ayrstone, to give it a higher polish.

Any grain can be given to the stones, either coarse or fine—bold, spirited drawings, requiring a coarse grain, whilst a fine and delicate design requires a very fine grain; and even according to the nature of the drawing different grains can be given to different parts of the stone: for a landscape the distance should be fine, to imitate aërial perspective; and the foreground coarse, to admit of bolder delineation.

The different grains can be given by rubbing the various parts with sand and a small glass muller.

When a stone is done with, and no more impressions required, the drawing or writing may be taken out and something else put on. The stone is first rubbed with sand until the lines disappear, then washed with a solution of aquafortis and water, in the proportion of one part of acid to twenty of water. The reason the acid is employed is, because it is indispensable to destroy the former drawing, which otherwise would reappear in the next printing. After the acid is worked off, the stone is treated in every respect according to the directions given for the preparation of stones that had never been used.

CHAPTER IV.

OF PAPER.

Paper that has been made from rags which have been bleached with oxymuriatic acid will not do for the purpose of lithographic printing; nor paper which has a strong taste of alum. If either kind of paper is used, the drawing on the stone will be spoiled after two or three impressions. A sort of plate-paper is the best for chalk drawings. If the paper is too soft, it will stick to the stone and tear off. Paper of a fine texture, even-sized is commonly used, and should not be damped too much. Five or six sheets at a time may be taken and dipped in a tub of water, then drained and pressed between two boards, with a weight on the upper one. If the paper is too dry, it will not adhere to the stone; and if too damp, it will not take up the ink. It requires less wetting than paper used for letter-press printing: it is sufficiently damp if it do not make a noise when bent.

As the writings or drawings on the stone have to be reversed, it is necessary for those who have not practised the method to use the transfer-paper, which, like all the other lithographic materials, can be pur-

chased. For circulars, ruled paper can be obtained: the lines, though seen distinctly on the paper, will not come off on the stone; consequently, will not appear on the impression.

Transfer-paper may be made in the following manner. Dissolve in water half an ounce of gum tragacanth; strain it, and add one ounce of glue and half an ounce of gamboge; then take

French chalk . . .	4 ounces.
Old plaster of Paris* . .	$\frac{1}{2}$ an ounce.
Starch	1 ounce.

Powder and sift them through a fine sieve; when that is done, grind them with the gum tragacanth, glue, and gamboge; and afterwards add enough water, until the whole is about the consistency of oil; then apply it with a brush to thin-sized paper.

* A piece of an old plaster cast will do.

CHAPTER V.

TO TRANSFER TO THE STONE.

HAVING determined the dimension of the circular or drawing that is to be lithographed, cut the transfer-paper to the size; take a piece of stick ink, and rub it with water in a saucer, in the same manner that China ink is dissolved. If the water is warmed a little it will be all the better: a steel or quill pen may be used, and the transfer-paper may be written on in the usual way. Great care must be taken never to touch the paper on the right, or prepared side, with the fingers; nor to breathe on it. When writing or drawing a piece of clean paper should be kept, so as not to allow the hand to come in contact with the transfer-paper, as the greasy moisture will print as well as the writing or drawing. Having seen that the surface of the stone is free from grease or finger-marks (see Chap. III, p. 23,) the stone to receive the transfer is placed on the press, and two or three pieces of paper are placed on it, and the pressure adjusted. It may be remarked here, that lithographic printing requires a much heavier pressure than letterpress printing. The stone is then taken out of the press, and warmed a little, to about 125° Fahrenheit; that is for

the purpose of opening the pores, so as it will the more readily absorb the ink from the transfer-paper. The transfer-paper is damped on the back, then laid on the stone, the plies of paper placed on it, and passed through the press five or six times; increasing the pressure as often as necessary: a little water is put on the back of the transfer-paper, which is then removed, when an exact impression is left on the stone.

The first thing to be done is to gum the stone, and dry it. The next is what is called "*etching-in.*" This operation is performed by pouring over the stone some weak aquafortis, in about the proportion of one part of acid to one hundred parts of water, mixed with a little gum-water. The stone is held in a sloping position until the acid has run over it; then turned, so that the acid will run back again, producing a slight effervescence: afterwards wash the stone with some cold water, to get rid of the acid. When that is done, pour some weak gum water over it, and the stone is now ready for printing.

The reason why the acid is used is, that the alkali in the lithographic ink or chalk may be destroyed, and cause the stone to refuse the printing-ink, except on the parts intended to print. The gum-water, again, helps to fill up the pores of the stone and prevents the lines from spreading. The acid for etching chalk drawings in the first instance ought to be stronger than for ink drawings, but this depends greatly on the kind of drawing.

CHAPTER VI.

TO DRAW ON THE STONE.

The subject intended to be lithographed should first be drawn on the stone with a red pencil, then carefully gone over with the lithographic ink or chalk. The red pencil-marks do not adhere to the stone: a common lead pencil would do to sketch in the design, but, in going over it with the lithographic chalk, mistakes are very likely to occur, owing to the similarity of colour. It would be impossible to tell which was the black-lead, or which was the chalk. The impressions on the stone, of course, will be the reverse of the drawing. To avoid doing the drawing backwards on the stone the following plan may be adopted. Make a sketch on paper with a soft red pencil, and lay it face downwards on the stone; pass it through the press, and the sketch will be found traced on to the stone.

Another method is to rub the back of the drawing with red chalk; lay it on the stone (for better security it may be gummed or pasted at the corners), then go over every line in the drawing with a blunt needle: the red chalk will repeat the design on the stone. If it is desirable not to dirty the back part of the drawing, a separate sheet of paper can be rubbed with the chalk,

and placed between the drawing and the stone. If the red chalk is not handy, a soft black-lead pencil (say a B B B) will do, or a piece of charcoal: but the black colour has the disadvantage, noticed above, of being of the same colour as the lithographic chalk. When drawing on the stone, place something over to form a bridge, so as not to allow the hand to touch the stone; and be careful not to let the breath fall on it, as the smallest speck of saliva will prevent the chalk from adhering to it, and make a white spot on the impression. Drawing on the stone requires a greater degree of firmness than on paper: each stroke must tell, so as to make the lithographic chalk adhere. Whenever a bright light is required the part may be left untouched, or scraped out with a scraper. The last method is best for white lines, or such as the foam of the sea. If any part of the drawing should happen to be made too dark, the chalk will have to be picked out of the stone with a very fine needle until the requisite degree of shade is obtained. Bold, free drawings, are the most effective in lithography. Going over the work two or three times should be avoided; as the first layer of chalk, if done faintly, will not adhere firmly to the stone; and the second still less, and is apt to come off and spoil the whole.

When the drawing is finished the operation of *etching-in* is gone through, which has already been described in page 32.

CHAPTER VII.

OF ETCHING ON THE STONE.

To make an etching on the stone a high polish must be given to it, the same as for writing or fine drawing. A weak solution of aquafortis is first poured over, and then immediately washed off. As soon as the stone is dry it is covered with gum-water, mixed with lamp-black. This also must be allowed to be quite dry, when the stone is ready to etch upon. An etching-needle is used, which penetrates the gum and makes a mark on the stone, just in the same way that etching on copper is done: with this difference, that when a broad line is required in copper etching, the needle is made to go deeper into the metal; but with the stone, a broader point is used.

When the etching is done, some linseed-oil is rubbed over, and then the gum is washed off with water. There is one thing to be noticed in this kind of work, that the lines always look much thicker than they will come off on the impression.

Pencil or chalk drawings on coloured paper can be imitated on the stone, and produce beautiful effects by using two separate stones. The following is the method given in Fielding's *Art of Engraving*.

"Take wax . . . 2 parts
Soap . . . . 1 part,

and a little vermilion to colour it; melt it in a saucepan and cast it into sticks. Rub this composition with water till it is as thick as cream, and then cover with it a polished stone, such as is used for writing upon. An impression of the first stone is applied to the stone so prepared, and the parts intended to be white are then taken out entirely with the scraper, whilst those intended for half-tints are scraped somewhat less; so that by this method half-a-dozen tints are obtained. The manner of printing is, first to take an impression of the second, or tint-stone, in any colour the artist may think will best suit his subject. On this impression the first stone is printed in black; the greatest care being taken, by marks in the first stone, that the two impressions fit exactly, otherwise the effect will be entirely spoiled.

"Another method is, after an impression has been taken from the first stone to the second, to cover the bright lights, which are to be left white, with thick gum-water and a little vermilion. The whole is then covered by rubbing a stick of the composition all over it, very thick; after which the superfluous composition is scraped off with the straight edge of a piece of ivory or horn, and what remains well rubbed in with a piece of the finest woollen cloth stretched over the end of an oil-rubber, which has never been used.

"In performing this operation a fresh place in the

cloth should be laid over the end of the oil-rubber after each stroke, which should be carried the whole length of the stone; and the greatest care taken to leave on, or rather to rub in to the stone, the same quantity of composition on every part, so as, if printed, it would give one even tint all over the impression.

"The next thing is to procure the different degrees of middle tint, which is to be obtained in two different ways. First, where a defined edge is not wanted, the composition is to be rubbed off with the woollen cloth; and this method is extremely useful for clouds, and to soften the hard edges of the positive whites, which have been laid in with gum. In this way, also, the gradations of evening skies are executed.

"In the second method, all the middle tints, which have a defined edge, must be scraped up very carefully, otherwise they will be uneven. The scraper may also be advantageously used to soften the positive lights.

"When only one tint, with the edges of the lights not softened, is required, the quickest method is to lay in the white touches with gum, as before directed, on the tint-stone, after the impression of the first stone is transferred to the stone intended to print the coloured tint, and in the printing pass the roller two or three times over it, which will give it a tint; and if necessary, the edges of the white places may be softened, or have fresh lights taken out with the scraper."

CHAPTER VIII.

OF THE PRINTING.

HAVING the drawing, circular, plan, or whatever may be required to have impressions taken of, properly put on the stone, either by transfer or drawing, the process of etching-in and gumming gone through (which has already been described), the stone placed on the press, and the printing-ink of the proper consistency; we are now ready to commence printing. The stone is damped with a sponge and cold clean water; and the ink-roller, which has already been charged with ink, is rolled over once or twice (it will be seen that the ink will not touch the blank part of the stone, only the work); the paper is then laid on, and the impression taken.

The wetting and inking are repeated every time. A little ink at a time only should be used on the slab, or ink-table, and well worked by the roller before it is put on the stone; and the operation of inking the stone is to roll it over in all directions.

If too much water be put on the stone the roller will slide over it without appearing to touch it. On the other hand, if the stone be not damped sufficiently, the ink from the roller will adhere to the whole surface of the stone: in such a case the ink can easily be washed

away with water. If the ink should spread, and the lines have ragged edges, which is called "*running smutty*," the following preparation for cleaning the work must be used:—Take equal parts of water, spirits of turpentine, and oil of olives; put them in a glass phial, shake them well until the mixture froths, damp the stone, and then pour this froth over it: rub it with a soft sponge. The whole of the work will then apparently disappear, owing to the printing-ink having been dissolved; but, on looking closely into it, the design will be distinguished in faint white lines; and on applying the roller with the printing-ink, the work will reappear gradually and as clear as at the first. If some parts, however, should be too thick, they may be touched with the acid, and washed with water afterwards.

When the printing is done with, and it is desirable to keep the work on the stone for a future period, it is rolled in with preserving-ink. The ordinary printing-ink would do, if the printing were resumed a short time afterwards; but if allowed to stand for a lengthened period it would become too hard, and the drawing would not take the ink freely. The following is the composition of preserving-ink:—

Two parts of thick varnish of linseed oil, four parts of tallow, one part of turpentine, and one part of wax. These must be melted together; then four parts of lamp-black mixed gradually and carefully with it. This ink should be kept closed up in a tin case.

When the ink is rolled over the stone, just as if an impression were to be taken from it, a coating of gum-water is spread over.

For printing in colours separate stones are employed. Great care must be taken to have the prints to correspond, one printing with another; this is done by making marks on the stones, which must be carefully preserved.

The following has been suggested:—

"That it might be possible, by employing chemical affinities, to print in colours with one stone alone. A red chalk might be made, for example, which would have an affinity with a certain ink, a blue chalk with another ink, and so on. Another method might be employed, which would be to use gummed silk stretched out on frames; to cut out holes in this according to the different colours, and by applying them to the stone to leave uncovered those parts only which are to be charged only with a certain ink. We have not the least doubt that beautiful specimens might be produced by this process."

The following plates will illustrate the different printings in colour by the use of separate stones, each colour requiring to be printed by itself. The next is a specimen of writing on the stone, being a description of the arms on the plate which precedes it.

Although the black lines of the drawing are only shown on the illustration last printed, it is the first that is put on the stone: all the other separate printings are made up from it.

In conclusion, two or three apparently trivial matters should be noticed, which we may call "wrinkles;" as, in a subject like lithography, we cannot be too explicit, even at the risk of repetition. As the beauty of the *tout-ensemble* is made up by the attention to details, the most trifling points should not escape attention.

If the impression on the paper is not dark enough, although it looks so on the stone, the pressure has not been sufficient. On the next impression add a little more.

If the light and delicate parts are too dark, having taken up too much ink, they must be barely touched with the roller; the dark parts should be passed over in every direction several times, until they are sufficiently inked: if some parts refuse to take up the ink readily, rub them well—even using the edges of the roller.

If any part of the drawing or writing should become spoiled, the part may be rubbed or scraped smooth, and re-touched either with ink or chalk, whichever has been originally used, and the part slightly etched in and gummed again.

If part of the impression be wanting, the stone or the scraper is not level: if the stone, it must be packed up with paper.

If when the drawing is charged with ink, and looks quite right, yet the lines on the impression appear ragged, the ink is too liquid: use thicker.

If the stone should always be inclined to run smutty, apply a little etching-water or a little vinegar on the smutty parts, or put a few drops of acid in the water with which the stone is wetted during the printing, or go through the etching-in process already explained.

If there should be dirty spots on the stone, they can be picked out with a steel scraper or a penknife.

When an impression is taken, lift up the paper slowly, so as not to tear it.

If the stone imbibes water with great avidity, becoming instantly dry, so that the ink touches parts not required to be printed, immerse the stone in a tub of water for some time, then continue the printing as before, occasionally using gum-water.

The nitric acid, when used for etching-in or cleaning the parts of the writing or drawing, must be diluted with water until it has the taste of lemon-juice when applied to the tip of the tongue.

A very small quantity of ink should be put on the slab at a time.

CHAPTER IX.

COPPER-PLATE PRINTING AND GRAPHOTYPING.

The cylinder of the press should be covered with a piece of blanket-stuff. The ink which is used in plate-printing is of a different kind from that used for letter-press, but the same roller and ink-slab will do, if properly cleaned. The plate to be printed from is covered over with ink, which is wiped off again with a piece of canvas; and afterwards, the more effectually to clean the plate, with the palm of the hand, rubbed on fine whiting: the surface of the plate is quite bright, and the ink only remains in the engraved lines. The plate is then laid on the carriage of the press, and the cylinder is adjusted to the necessary pressure. The piece of paper or card which is to receive the impression is then placed on the plate and passed under the cylinder. The plate does not require to be fixed on the platen of the press; it can be lifted in the hand before each impression to have the ink cleaned from the surface. Sometimes the paper is damped before receiving the impression; but some good printers have produced specimens of plate-printing when the paper has been printed dry. The plate during the operation should be kept at a moderate warmth. For small

things, such as visiting-cards, &c., the ink is more effectually put on the plate with a small dabber, or with the tip of the fore-finger.

To adapt the People's Printing-press for plate-work, the tympan is taken off, and the two springs that keep up the cylinder are also removed, so as to allow the cylinder to come close down on the carriage; or, instead of taking away the side-springs, the better plan is to have a flat piece of iron or hard wood, about the thickness of the chase, with holes to fit the iron pegs, so as to keep it from shifting.

In copper-plate printing there is a great deal more of the ink wasted than remains in the indentations of the plate, but that cannot be avoided.

The rubbing of the plate tends to wear it out, so that only a few thousand good impressions can be obtained from a copper plate. Subjects requiring a large number of copies are engraved on steel.

One of the greatest uses that lithography has been applied to is taking transfers from copper or steel plates on to the stone; the printing can be done much quicker and cheaper, and the plate, after the transfer has been made, put away and preserved. The mode of taking a transfer from the plate is to take an impression on stout thin-sized paper, lay it on the stone, and go through the same operation already described in taking transfers. The first impressions from a copper or steel plate are always the best and sharpest; they are called *proofs*, and reckoned the most valuable.

GRAPHOTYPING.

GRAPHOTYPING is a new invention, in addition to the already numerous branches of the Art of Printing.

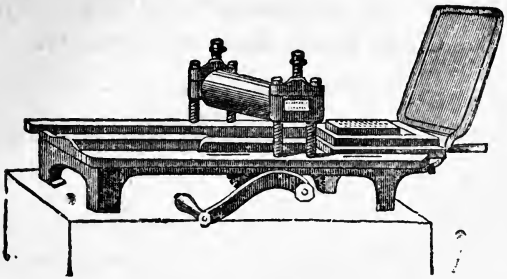
The principle seems to be taken from Lithography, although there is not the slightest resemblence to each other in their productions: Lithography has the appearance of a chalk drawing, whereas, a work executed by the Graphotype process, might be mistaken for a wood engraving. The process is simple—in the first place, there is a smooth plate covered with prepared chalk, then a heavy steel plate is placed on the top, they are then subjected to a very heavy pressure, so as to solidify and give a smooth surface to the chalk; a chemical ink is used for the drawing, which makes the lines quite hard, whilst the chalk remains soft, a brush is applied to the surface which brushes away that part of the chalk which has not been touched with the chemical ink, leaving the lines of the drawing standing out in bold relief similar to an ordinary woodcut.

The chalk block is then hardened with a chemical solution, and is pressed upon a slab of wax from which a mould is obtained.

The mould is then made a conductor of electricity, by giving it a coating of plumbago, it is placed in a bath containing a solution of sulphate of copper, and connected with a Galvanic battery; after some hours, a thin deposit of copper is obtained, the back part is filled up with type metal, then mounted on a wood block, it is now ready for the printing press.

D. G. BERRI, PRINTER, 36, HIGH HOLBORN, LONDON, W.C.

THE PEOPLE'S PRINTING PRESS.



USED BY THE ARMY AND NAVY.

This Press is admirably adapted for Letter-press, Lithographic, and Copper-plate Printing, and will be found invaluable for the Colonies, as all kinds of Job Printing or small Newspapers can be worked on it.

These Presses are neat, portable, and strong, all made of Iron. The following are the dimensions of:—

No.	Length.	Breadth.	Height.	Weight.	Prints.	Price.
1.	22½ ins.	8¼ ins.	8½ ins.	37 lbs.	5⅝ by 4⅜ ins.	£2 2s.
2.	24½	12½	9½	55½	7¾ „ 6¼	£3 3s.
3.	30½	14	9¾	72	13 „ 8	£4 4s.
4.	46	19½	12	186	17 „ 11½	£6 6s.
5.	50	24	12½	233	22 „ 15½	£8 8s.

Ink roller and Ink slab included.

Price of Printing Office, £3 3s.

Containing 12lb. fount of Pica, 1lb of Fancy Type, 1lb. of Border, Composing Stick, Case for Type, Chase, Leads, Rule, and Furniture.

Any quantity of Type supplied, from 1s. 6d. per lb. upwards.

Lithographic Materials complete, in Mahogany Box, £1 5s.

LITHOGRAPHIC STONES, FROM 2*d.* PER POUND.

PRINTING INK OF EVERY DESCRIPTION.

Lithographic Writing Ink and Transfer Paper at Trade Prices.

Parties purchasing Press without Type, can have Stereotype Plates of Copy furnished at Cost Price.

A Sketch of the Art of Printing, Price One Shilling, or forwarded for 13 Postage Stamps.

WOOD ENGRAVING, ILLUSTRATIONS FOR BOOKS, NEWSPAPERS, &c.

ELECTROTYPING AND STEREOTYPING FOR PRINTING, EMBOSSING, BOOKBINDING, &c.

ELECTROTYPES TAKEN OF SEALS, MEDALS, COINS, &c.

Arms and Crests found and sketched.

Herald Painting, Illuminated Writings, Testimonials, &c.

FLAGS AND BANNERS PAINTED.

Arms, Crests, and Monograms Engraved on Seals, Dies, and Rings. Envelopes and Note-Paper Stamped.

PEDIGREES TRACED.

THE PATENT

HINGE STAMP,

USED IN

HER MAJESTY'S POST OFFICE.

Adopted by several of the Continental Governments.

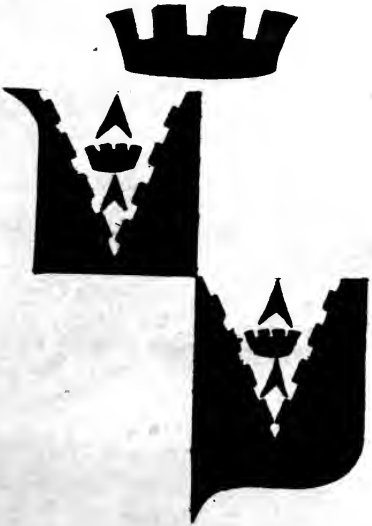
This Stamp is made upon a simple and easy principle, it can be opened and the shifting types changed quicker than by any other stamp in use.

D. G. BERRI,

INVENTOR AND PATENTEE,

36, HIGH HOLBORN,

LONDON, W.C.




NIL DESPERANDUM

EXAMPLE OF WRITING ON STONE.

DESCRIPTION OF PRECEEDING ARMS.

HE BEARETH *quarterly first, and fourth, erminois on a pile embattled az a mural crown between two galtraps in pale or, second & third, a chevengr gules, between three stalks of rye, slipped ppr Crest on a mural coronet or an Ostrich resting its dexter claw upon a Bomb fired ppr.*

Motto *Nil Desperandum.*

Name, Walker