

too weak it will etch too quickly all over the surface, and give a flat, thin picture. Here is a plate which is fairly well etched, together with some proofs. The plate, you will observe, is steel faced, which is always advisable; the hard facing protects the delicate details from being too rapidly worn away in the printing.

ZINC ETCHING.

The principles of the process of photo-lithography I have described to you are, by slight variations of working, employed in the processes of photo-zincography and photo-zinc etching, for the production of type blocks. Supposing, now, we take one of the lithographic transfers we have just been dealing with, and, instead of transferring its inked image to stone, we lay it down on a sheet of smooth zinc, the result will be as this, a print on metal which forms the basis of operations for the production of a relief block, *a block on which the lines are raised above the white portions of the picture*, and can be used in the printing press exactly in the same way as a woodcut or type.

Nothing can be simpler than the abstract principles of photo-etching; but, as not uncommonly happens, a considerable amount of skill and experience is required to put these abstract principles into practice.

The theory of etching is that the surface of a metal, like zinc, is easily dissolved, or etched, by nitric or hydrochloric acid, so long as there is no grease or varnish on the metal to interfere with the dissolving action of the acid. Supposing a piece of clean zinc is coated with wax all over, and it is dipped into acid, no etching will take place, because the wax prevents the acid from touching the metal; but if a drawing is made through the waxed metal with a sharp point, and then the plate is dipped in acid, etching immediately takes place wherever the point has bared the surface of the zinc, and the result would be a sunk or intaglio picture engraved into metal which could be printed from in a copper-plate printing press.

Before we proceed to the etching of

such a plate, we ought to tell you how to obtain greasy ink prints or photographs on metal by means other than of the transfer process, and the bitumen process, described to you yesterday. There are several methods, but it will be sufficient for our purpose this evening if we describe one.

The first thing, and the most important thing, is the negative; it must be perfectly sharp, the lines of the subject must be represented by clear glass, and the white paper by dense black deposit, and for the processes we are dealing with the negative must be reversed; that is, the negative image on the glass must be the opposite way round to that on a negative used for printing from direct, the reason being that a reversed picture is required on the metal block, so as to give a *non-reversed* result when the block is finally printed. There are a number of reversed negatives on the table which you may examine after the lecture.

Having obtained a proper negative, the next thing is to print the image on metal. A piece of clean polished sheet zinc, about three thirty-seconds of an inch, is cut to the size required for the negative, and is thinly coated with a solution of gelatine or albumen, water, and bichromate of potash. The plate may be coated with a large camel's hair brush, or the solution may be flowed over the metal. It is then dried by heat in a non-actinic light, and placed in a printing frame with its sensitized surface in contact with the negative. (Mr. Geddes will prepare before you and endeavor to print such a plate by means of magnesium, and will show you the results of each operation described.)

A few minutes' exposure to electric light or sunshine renders the bichromated gelatine insoluble wherever light has obtained access to the plate through the clear parts of the negative, the action being precisely the same as in the case of a transfer. The plate is next covered all over with a thin coating of greasy printing ink, and is then dropped into a flat dish containing cold water. The inky surface of the plate is gently rubbed with a sponge or wool, and the ink coating, together with the