*Substitutes for Wood-Engraving.*

Formerly the only available method of obtaining illustrations which could be printed on the letter-press in conjunction with type was that of wood - engraving. At the present time a number of comparatively new processes are in operation, in which the engrav­ing is done almost automatically by the adoption of chemical pro­cesses and the well-known principles of photography. Engravings of this kind are called in the trade *process blocks,* or sometimes *zinco- types,* owing to the metal of which they are formed. There is space here for only the barest possible account of the processes.

In the first method, which is sometimes called *typo-etching,* the drawing is made with ordinary lithographic ink on stone, or on paper and transferred to stone. It is then re-transferred to a plate of polished zinc by the ordinary lithographic process. Zinc is employed on account of its cheapness and its ready solubility in the acids used for etching. It has properties similar to those of the lithographic stone in taking up the ink and the water. The transfer is made to adhere to the plate by being passed through a lithographic press ; the paper is then stripped off ; and the whole of the ink is left on the plate, which is inked up as a litho stone with a view to render the lines as solid and strong as possible to resist the acid. The covering of the lines is strengthened by dust­ing powdered asphalt or some other suitable material over the plate, which is warmed just sufficiently to incorporate the asphalt with the ink. The plate is next placed in a bath of acid (its back and other parts, where the acid is not required to act, being protected by varnish), in order that the unprotected parts, or those which are to form the whites of the finished picture, may be dissolved away. In order to prevent the acid eating not only straight down into the plate but on the sides of the furrows it forms, and thus undermining them, an ingenious device has been adopted. As soon as the etching has proceeded to a very slight depth, the plate is removed from the bath, washed, and heated. The ink and other protective medium are thus melted and run down the sides of the little furrows formed by the acids and thereby protect them from further action. Inking and dusting with resinous material are repeated, and etching resumed, until the depressions of the block have been brought to the proper depth. The etching is carried on in troughs to which a rocking motion is given, so that the acid flows to and fro in waves over the surface, and little bubbles of gas, &c., are carried away. Where large spaces of white occur, the metal is cleared away by a drill ; after the block has been mounted type high, it is ready for the printer.

This process is only available for the production of “ line blocks,” *i.e*., those in which the original drawing is done in lines or dots, as for an ordinary woodcut. The highest achievement of process blocks has been the production of *tone blocks,* which may be made direct from oil-paintings, water-colours, photographs, draw­ings in chalk, wash, pencil, &c., or indeed from anything from which a photographic negative can be taken. The exact nature of the processes is a trade secret, but the rationale is given in Mr Truman Wood’s *Modern Methods of Illustrating Books (London,* 1887), to which we are indebted for the following details. The problem is to translate, as it were, the light and shade of the negative into solid outlines of black and white. The shades must be lines of various breadths or of various distances apart, or spots or grain of various degrees of fineness or closeness. In a surface­block any part that touches the paper prints, and any part that does not touch the paper does not leave any mark at all. The photographic image is continuous : there are no outlines in it, the picture being formed of graduated tints or shades, ranging from the white of the paper up to the darkest colour that the process employed can give. To make a block for letter-press printing the graduated tints of the photograph have to be broken up into stipple or grain, and it must be a stipple closest in the shadows, gradually becoming more open through the range of the intermediate tones, and vanishing altogether in the highest lights. To describe the ingenious methods adopted to secure this end would involve an account of several photographic operations which would be out of place here. In one process, perfected by Meisenbach of Munich in 1882, grained negatives are produced by placing a transparent screen, on which a suitable grain is imprinted, in contact with the negative or the positive to be copied, and then photographing the two together. The negative is transferred to a plate of suitable material, which is graved or etched in the usual manner, to form a typographic block. Another device is to print from the original negative upon a piece of silk, the threads of which break up the picture into a regular grain. The positive on the silk is then photographed and a printing block made. These blocks require from their very low relief delicate and careful printing, but are made to give excellent results.

A process of typographic etching has been invented by Messrs Dawson, in which the design is drawn with an etching needle on a brass plate covered with a wax etching ground, in the same manner as for an ordinary etching. The metal is therefore bared at the lines, which are separated by ridges and spaces of wax. These spaces are strengthened by the addition of melted wax, which runs up to the edges of the lines, but does not run over on to them as might be expected, filling them up. The supply is continued until the spaces between the lines, representing the whites of the finished print, have been raised to a height sufficient to give the necessary relief, when an electrotype is taken. This electrotype forms the printing surface.

Shanks’s process is a device for producing pictures simply by the use of mechanism, and is an application of the eidograph. The plate to be drawn upon is moved under the drawing implement, which is a rapidly revolving cutter, and the plate on its carrier is mounted on the end of a series of levers in the same way as the slide rest of a lathe, so as to have motion in two directions, one at right angles to the other, and consequently by a combination of the two to have motion in any direction in the same plane. If a plate of a suitable substance, such as hardened plaster of Paris, be mounted on the carrier, and the bracing point at the other end of the lever be moved over the lines of a drawing, the cutter will plough a little furrow, which will follow these lines. When the plate is finished, a stereotype is taken from it and forms the print­ing surface. The lines of the casts are remarkably strong owing to the conformation of the furrow of the mould, and they can be printed on fast rotary machines. The weather charts given in some newspapers are produced by this process. A block with the recurring outlines being made, plates are moulded from it, so that the details alone have to be separately cut upon future plates. Mr Shanks’s method is remarkably simple and expeditious, and the results are economical and trustworthy.

*Press - Work and Presses.*

The characteristic of printing, as already pointed out, is that the pigment—the ink—with which the printing surface of the type is coated is transferred to the paper or other material by pressure. The manner in which this pressure is exerted gives rise to two classes of machinery,—those in which the platen and the cylinder respectively are employed. After the paper is placed on the type, in the one case a flat plate of iron moves parallel to the forme and comes in contact with it, causing the impression on the paper, while in the other case a cylinder revolves over the surface, which travels in gearing with the cylinder.

Space does not permit of any sketch, however slight, of the origin and progress of type-printing machinery. We can only refer to what may be regarded as representative appliances in present use. In America all kinds of apparatus for printing are called “presses”; in England, however, an appliance of a more automatic character than the hand-press is usually called “a machine.” As the hand-press is now almost obsolete, this dis­tinction will probably be abandoned, and the shorter and more expressive word “press” be applied to all. Venturing to adopt this suggestion, we may say that of platen presses there are the hand-press, the treadle platen press, and the steam or other power- driven press.

Fig. 10 is a view of the Albion press. It is wholly of iron and steel. Although this press is nearly superseded, it is desirable to point out its component parts, as they indicate the general principles on which all typographic machinery is based. The flat plane on which the type is laid is called the *bed* of the press ; the other flat plane which moves vertically and presses the paper on the type is the *platen.* These are the two essential parts of the press. The platen is perfectly smooth and level on its under surface, in order to give the whole of the type forme an equable pressure. It is mounted in a strong iron frame, with a cross­piece or head. The platen is propelled by a piston, which moves up and down. The power is gained by bringing an inclined bar of steel perpendicular to the direct line of pressure, and in doing so the piston is forced down. This steel bar is the *chill,* shaped like an elbow. At one end is a bar or handle which, on being pulled towards the operator, straightens the chill or brings it into the vertical position. At the sides are guide-plates fixed into the frame, to preserve the parallelism of the platen, for the slightest vibration or lateral movement would prevent a clear sharp im­pression being taken. There are appropriate appliances, such as a helical spring, fixed on the head of the press, whereby the platen raises itself when the pressure is not required. In order to bring the forme readily under the platen, and to withdraw it so that it may be inked and the sheet to be printed placed in position, the table is mounted on a carriage, that runs on two rails by turning a handle connected with two endless bands. The paper is fixed to certain marks on the *tympan,* a kind of metal frame hinged on to the carriage, when it is in a sloping position. This ensures the paper being printed in the exact place required. The tympan, over which calico or parchment is stretched, is double, and contains within it a pad of paper or a piece of blanket, to moderate the force of the impression of the platen. To it is hinged another metal frame, the *frisket,* which is covered with paper, cut to correspond with the shape of the type forme on the press. The ink is applied with a cylinder or *roller,* which revolves in an iron frame, and is