

## THE MANUFACTURE OF WALL PAPER.

(See page 240).

There is much in the manufacture of paper-hangings (so called) that differs from the ordinary idea concerning the modes employed; and feeling this to be the case, we have made special effort to present herewith in popular form a brief account of the processes involved.

In the first place, the materials employed—paper and pigments—have in themselves difficulties in working, owing to the fact that the latter are not oil paints, but water colors, and the paper has to be constructed specially "sized" in order to withstand the softening and stretching action of the water. Again, the pigments are not ground in varnish, as in the case of this and other printers' ink, which enables them to have comparatively easy "feed" and distribution, and to adhere first to the type and blocks, and then to the paper; but the colors are used as a thin mud devoid of "tack," and which would rapidly clog up blocks having only ordinary "depth" and relief. Further, the patterns must be continuous or printed in continuous rolls without a break—involving fresh questions of design to effect this continuity, and of execution to effect perfect "register," or placing, of the various colors. In fact, then, we must have different blocks, modes of applying the color to these blocks, and of printing, than for ordinary color printing from relief blocks.

A design having been chosen which is capable of being made continuously on a roll of paper, a full sized original is prepared in all the necessary colors—from one to eight, including the "ground." There must be made one block for each of the primary colors used; and nearly always one block for each color shown, whether primary or secondary. Thus there is not only a yellow and a blue block, but a green block also, where these three colors occur in one pattern. The red block contains in relief only those portions of the design which are to be printed in red, etc.

The cuts show photo-reductions of impressions made from four color blocks which combine to form a four-color pattern. In the example chosen, each block has sixteen squares thereon, of which we show but four, the remainder being repetitions.

According to whether the printing is to be done by hand or by machine, the blocks are made flat or cylindrical. In either case the operation is a tedious and delicate one. Having sketched all the portions of one color upon a block or roller (the material chosen is maple), there are three modes of procedure to choose from.

(1) To cut away all but the portion intended to print this given color. This is as in ordinary wood engraving, and is done by gouges, chisels, etc.; the depth cut away is about one-quarter inch.

(2) To insert thin slips of brass so as to produce the desired outlines. This requires chisels and gouges to effect a lodgment for the brass rules or slips, which are brought to the desired outline by means of pliers, files, etc., and are then driven in firmly, being left to project about one-quarter inch. This gives outlines of figures.

(3) To proceed as in the last operation, but to fill up the spaces between the brass rules with compressed felt carefully cut to fit. This gives an impressing surface of felt, held together firmly by brass, and gives better work, with the pigments employed, than the wood blocks give—showing no grained or watered appearance.

Where the printing is done (by hand) from square blocks, register or proper superposition (so as to make the impression with each color properly continuous and also in correct relative position with the others), is secured by two fine points at each end of one side of the block; these pins are in the same relative position on all the blocks.

The paper comes in rolls of about  $\frac{3}{4}$  mile each, in widths from 20 to 40 inches, and in three grades of quality. For all grades of hangings, except the very commonest, the paper is uniformly covered with a "ground"—the basis of which is clay or whiting, suitably colored. This color is licked up by a roller which transfers it to a stiff rotary brush, which revolves in contact with the paper, coloring it in spots. Five transversely reciprocating brushes, with successively increasing speed and shortness of stroke, distribute the ground color evenly over the surface. The issuing roll, or ribbon, which is quite wet, is laid in looped folds hanging from rods which are, by an ingenious machine, carried along the elevated railway to the other end of the room, there turning with the track and returning to the first end of the room. This device shortens the required length of factory one half. By

a series of simple wooden friction wheels the rods on which the loops hang are turned at every few feet of the track, to prevent the roll from sticking to the rod in drying.

The ground being laid and the paper dried, it is ready for the pattern. If it is for machine work, the roll is wound over a large drum and in contact with the cylindrical blocks, which are revolving very rapidly, each being suitably supplied with its own pigment by rollers and aprons dipping in troughs containing the "color." Eight or twelve colors may be printed at once in the machine, from which the paper is taken as before upon a drying track. Accurate register of the colors necessitates (1) absolute uniformity in diameter of all the printing rollers; (2) that all shall be started right. It is evident that a difference of 1000 inch in circumference of any two rollers would, after 1000 revolutions, show an inch out of register. A delicate adjusting screw on each roller axle enables the first register to be made in proper coincidence of parts; after which it must be maintained by absolute uniformity in circumference of the rolls, etc.

For hand printing the most primitive kind of a press is used. The flat block, say 20 to 24 inches square, is hung by a cord which permit its being swung on to the coloring pad (which is made of wet paper pulp and forms a perfectly elastic and yielding cushion). The pins on the side of the block permit the register to be kept right; and as the roll of paper is passed along from right to left, one square at a time, of each color, is printed thereon, the impression being given by a foot-lever. All the higher grades of hangings are hand-printed in this tedious manner. For gold work, the figure is first printed in size, or rather varnish, and either gold dust (ground gold leaf) made to adhere thereto by revolving brushes in a closed box, or whole gold leaf is laid on by hand—this last in the case of large surfaces. Superfluous gold is removed and saved by a boxed-in machine which crubs the paper with reciprocating brushes; a blower, making 4000 revolutions per minute, exhausting out the removed dust, which is collected in a proper closet.

A machine with rapidly revolving and reciprocating brushes is used to glaze the "satin-finished" papers.

To make embossed paper, the desired pattern is made upon the surface of a paper cylinder of exactly equal diameter, against which it is pressed with great force, thus making the reverse patterns; the paper is then fed through between these rollers, and thus receives the desired impressions in relief.

The measuring, cutting, and rolling into "pieces" (a piece contains eight yards in these days), is effected by a very simple machine. There is an inclined table eight yards long, with a knife hinged at each end, and a rotating spindle on the lower. The long roll of paper is fed down this table, and when the end has reached the spindle, the knives are brought down together—the upper one cuts partly through, eight yards from the lower one, which makes a clean cut; the spindle is then rotated and swings the upper partial cut under the knife; eight yards are then on the spindle; a second stroke of the knives severs the measured portion and makes a second partial cut, eight yards further on; and so on.

**BRAZING BAND SAWS.**—Good brass rich in copper is generally used. Bring the two ends of the saw close together and fasten, then take a small pan of charcoal, and place it under the ends and direct the flame of a blow pipe on it. As the ends will soon become red-hot, sprinkle some powdered borax upon them and add the solder with a piece of iron. The way to make the solder melt: three parts of brass filings with one part of silver; cast in ingot and file away; collect the filings, and put into solution of sal-ammoniac in water, and so keep until wanted.

**BRASS LACQUERING.**—If you want a good deep gold lacquer you should make up a small stock bottle, holding, say, half a pint, according to the following recipe. You can then add as much as may be required for the tint you wish to get: Alcohol,  $\frac{1}{2}$  pint; dragon's blood, 1 dram; seed lac,  $1\frac{1}{2}$  oz.; turmeric,  $\frac{1}{2}$  oz. Shake up well for a week, at intervals of, say, a couple of hours, then allow to settle, and decant the clear lacquer, and if at all dirty, filter through a tuft of cotton wool. Mix with the pale lacquer a day or two before you wish to use it.—*English Mechanic*.

**COLORLED LEAD-PENCILS.**—Red, brown, green and other colored lead-pencils are made by bringing kaolin or pipe-clay to a doughy consistency with water, and then mixing the mass in a paint-mill with any earthy or metallic pigment of the color desired.—*Papier Ztg.*, 1877, 402.