### Calico Printing.

Calico Printing is an art possessing an interest for all, inasmuch as it is one of adornment, to which all persons in every civilized community are much indebted. We believe that the great majority of our people are not acquainted with the modes of producing such beautiful fabrics; this, so far as the sphere of the "Scientific American's" influence extends, shall be the case no longer.

Calico Printing consists mainly of two branches, viz., hand and machine printing. Its nature is the same in both branches, so far as the ultimate objects to be attained are concerned; this is to impregnate cloth with different colors, in such a manner as to form an ornamental pattern or design.

For the engravings to illustrate this subject, we are indebted to the "Encyclopedia of Useful Arts."

Hand Printing—This is accomplished by blocks, on which the pattern is cut, which take up the color from a seive and transfer it to the piece of cloth. The process is applicable to linen, silk, worsted, and mixed fabrics, but we usually refer it to cotton cloth. Hand calico printing is a very old art, and resembles the old Chinese mode of book printing. The annexed cut (fig. 1) represents a block used in this kind

Fig. 1.

of printing; the pattern is cut out in relief upon the face of the block, which is a piece of sycamore or pear tree (hard maple would no doubt answer well). The backing of such blocks is pine—they were at one time made wholly out of sycamore wood. These blocks are of different sizes; those which are now used in France are the old fashioned small kind, by which the printers make very neat work, but much less of it in the same time, than English calico printers. The finer kind of such blocks have the patterns made on them by the insertion of narrow and round strips of copper and brass into them, the interstices being filled with fine felt, named *hat*. The art of calico block cutting is entirely different from that of engraving on boxwood for book printing.

Figure 2 shows two printers at work on different tables. These tables are exactly like a book printer's "imposing stone," they being generally composed of a strong wooden frame with a smooth stone flag for the top. The table is snugly covered with two or three thick woolen blankets, to render it soft yet firm. The piece of cloth to be printed is prepared for that purpose, by boiling, bleaching (if necessary), and a partial calendering, to smooth its surface, take out all the wrinkles, and make it track square on the printer's table. As it is printed, it is rolled up over rollers, one above the other, and not suffered to be folded up until the colors, which are printed, are quite dry. The block of the printer is charged by pressing it, for every impression, upon the color on the surface of a felt cloth stretched tightly over a woolen drum; this is called a *sieve*,—it floats in a tub of thick gummy varnish, for the purpose of giving it elasticity. This *sieve* contains the color which the printer puts on to the cloth. If it is purple it may be made of a very strong decoction of logwood thickened with British gum and *raised* with a little of the chloride of tin and alum. This color is kept in proper order by a boy, named a *tearer*, who takes up a small quantity of color from an earthenware pot at his side, as required, with a brush, and spreads it uniformly over the surface of the sieve; and every time the printer presses the block on the sieve, the tearer brushes over its surface to erase the mark of the block and charge the surface equally with color for the next impression. A number of pieces of calico are generally stitched together or connected together by pin-sticks, and drawn off the table in lengths as printed. The print shop is kept warm, in order to dry the colors rapidly as they are put on. There is a pin on every corner of the block, by which the printer is guided where to set down every new impression by matching two pins in the two end marks of the previous impression. When the block is laid down on the piece of cloth, it is struck smartly by the printer, with the bottom of the shank of a mallet, the head of which is generally a piece of cast-iron or lead. This is a peculiar method of using a mallet. For some colors a slight blow with the heel of the hand is sufficient to press the color into the cloth. Were it not that the cloth has the quality of absorbing the color from the block, it is very evident that this branch of the art could have no existence. If the pattern is to consist of three or more colors, there must be as many blocks used, the raised portions of one being made to fit into the depressed portions of the other, to put in a different color, where no color was laid down by the previous block. Handkerchiefs and shawls require more work from the *tearer* and printer, as they are made with borders.

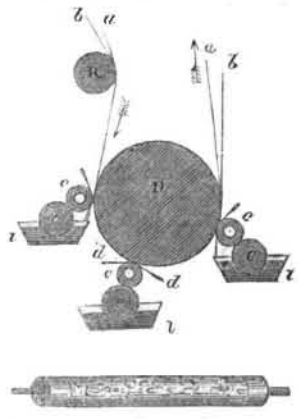
Fig. 2.

The tearer has to lay *cuts* of oiled paper at the crossings, to prevent the blocks from being laid down on the wrong place. In printing muslin de laines, which take up the color rapidly, and dry faster than cotton goods, long tables are used, and three and four men print after one another in a row, putting in the different colors of the same pattern in succession. Figure 2 represents the printers at work on tables, to show how the colors are put on. But if a design of calico consists of parallel stripes of different colors, they may all be put on with one block at once. The colors are arranged for this purpose in small tin troughs, and transferred to the sieve by means of a brush, and then distributed evenly by a roller in stripes.

Stereotyping has been applied to the production of printing blocks. A mould is produced from a pattern and copies are then made by pouring fusible metal into it.

Oil cloth printing is conducted exactly like calico printing, only a more severe pressure is applied to the block, and oil colors, instead of gum water colors, are employed for the pat-

Fig. 3.

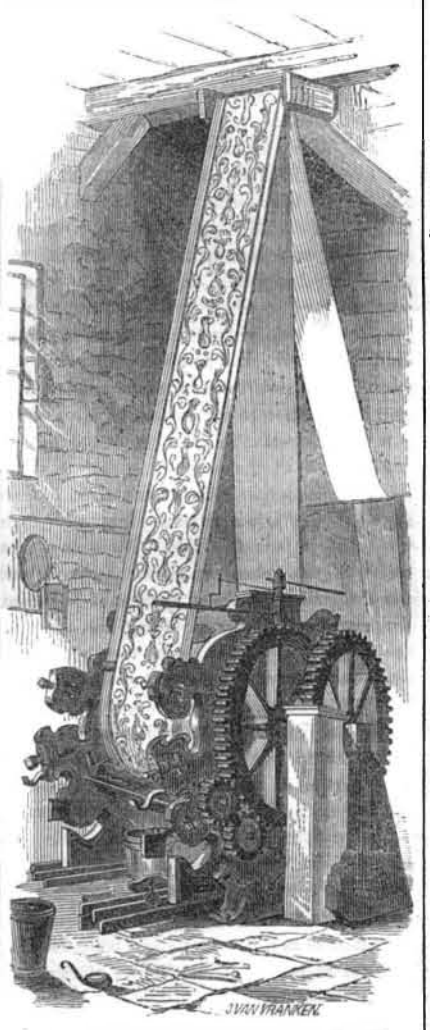


tern. Ten years ago it was proposed to employ sections of type metal to make varying pattern blocks for oil cloth printing; a patent was granted for the same improvement only three weeks ago; one of its original inventors is dead; the other, named B. True, we believe, now resides in Cincinnati.

Cylinder Printing.—There is very little hand printing done in our country—nearly all the work is done by figured rollers. This invention is the parent of the rotary newspaper printing press. It is the greatest achievement that has been made in the art. One mile of calico, by this method, may be printed with a pattern of six colors in one hour, and with more accuracy than by hand blocks. One cylinder machine, attended by one man, will do as much work as 100 hand block-printers attended by 100 tearers. This machine, above all other improvements, has greatly reduced the price of calicoes. Its invention, in 1785, is ascribed to two different men, who had no connection with one another, and who were residing in separate places when they made the invention. The one was a Scotchman, named A. Bell, who was living in Preston, England; the other, named Oberkampf, a Frenchman, residing at Jouy, France.

Fig. 3 is a transverse section of a cylinder printing machine, arranged for three colors. A roller, *c*, is engraved with its pattern for its own color. A perspective view of one of these rollers or cylinders is shown at the foot of the engraving. Each cylinder is mounted on a strong frame-work, so as to revolve against the cylinder, *e*, and the iron drum, D. The cylinder, *e*, is a color roller; it is covered with felt cloth, and dips into the trough, *i*, which contains the color. As it revolves, it gives off the color to the engraved roller, *c*. The drum, D, is covered with several blankets, so as to form an elastic printing surface, like the printer's table. An endless web of blanketing, *a a*, is made to travel round this drum, and this serves as an endless apron, guide, and defence to the piece of calico, *b b*, which is being printed by

Fig. 4.



being carried round said drum. It is evident that ten or twelve colors can be put in by such a machine, by increasing the number of color rollers and cylinders. As the cylinder, *e*, revolves it spreads the color on the pattern roller and the scraper, *d*, called the "doctor," removes the superfluous color from the face of the roller, before it touches the cloth, in order to have the color left only in the interstices of the roller. The color that is scraped off falls back into the trough, *i*. But for the "doctor," nothing but a blotch of one color, would be impressed on the cloth by each roller. There is a doctor on each side of the pattern cylinder, the one to scrape the face of the roller, before the impression is made, and the other to scrape its face after an impression; so as to remove wool and threads that may be taken up from the cloth.

Fig. 5.

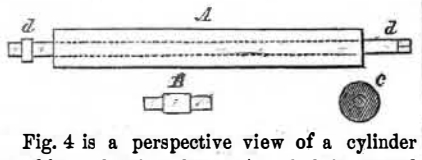


Fig. 4 is a perspective view of a cylinder machine, showing how the cloth is passed through it. A great many pieces of cloth are sewed together, and passed through in one web. As the cloth is printed it is drawn through a long gallery or stove room, which is kept at a temperature of about 200°, which dries the colors with great rapidity. The printing cylinders vary in length from 30 to 40 inches, according to the width of the calico; their diameter is from 4 to 12 inches. Each cylinder, (A, fig. 5) is bored through the center as seen by the section, C. An axis, *d d*, is accurately fitted into the bore, and on this the cylinder rotates. For some styles of patterns the engraving is done on these rollers by hand, but this is an expensive process, and the usual plan is to adopt Perkin's method of transferring engravings from one surface to another, by means of steel dies, B. This is done as follows:—

The pattern is first drawn upon a scale of about three inches square, so that this size of figure being repeated a number of times will cover the printing cylinder. The pattern is then engraved upon a roller of soft steel about one inch in diameter, and three inches long, so as to occupy its surface exactly. This small roller, which is called the die, is next hardened by heating it to redness and suddenly quenching it in cold water. The roller thus hardened is then put into a rotary press, and made to transfer its design to a similar small roller in a soft state, called the mill. The design which was sunk in the die, now appears in relief on the mill. The mill in its turn is hardened, and being put into a rotary press, engraves or indents upon the large copper cylinder the whole of the intended pattern. This is of course a work of time, and requires considerable care to make the numerous junctions of the small roller exactly fit each other upon the printing cylinder. By the method just described, a worn cylinder can be renewed and made equal to a new one. The pattern is also sometimes produced by etching, in which case the cylinder is covered with a thin coat of varnish, and on this the pattern is traced with a diamond or steel point. Nitric acid is then applied to the surface, which bites into or corrodes the parts which have been removed by the point. This point or tracer is sometimes applied in a manner similar to that of the eccentric chuck of a lathe, by which means the surface is covered with patterns, or a ground-work for patterns of great variety and beauty. The electrotype has also been used for producing the design on the printing-cylinder. The design is also sometimes cut in relief upon wooden rollers, or formed by the insertion of flat pieces of copper edgeways. This is termed surface printing, probably from the circumstance of the thickened color being applied to a tense surface of woolen cloth, against which the cylinder revolves and takes up color. A combination of wooden and copper rollers form what is called the union printing machine.

[Remainder next week.]

The Palace of Industry in the Champs Elysees, Paris, which was so immense as to inspire astonishment, turns out to be too small by one half for its destination. On being measured in every direction, it only offers a surface of 48,000 metres, and the Commission of the Exhibition, in accordance with the Engineers, declares that it can do nothing with less than 95,000 metres. A report has been addressed to the Emperor, demanding the authorization to create additions to the edifice. After some hesitation he has acceded to it, on the express condition that not a single tree shall be cut down.

### A Strike against Sewing Machines.

The tailors of Hamilton, U. C., have "struck" against the sewing machines. Recently, a reinforcement of fifty tailors arrived in that place from Yankeedom, to supply the places of the anti-sewing-machine tailors who had struck. The strikers got up a demonstration threatening the new comers, who took the evening train and left the tailors of Her Majesty's dominions in possession of the—cabbage field.

### A Bed of Amber.

In digging for a well in the coal mines near Prague, the workmen met between the bed of gritstone which forms the roof of that mine and the first layer of coals, a bed of yellow amber, apparently of great extent. Pieces Weighing from two pounds to three pounds, have been extracted.