

veils, canopies, curtains, door-screens, and corridor-linings, were all operated upon by the needle; noble ladies and their hand-maidens produced the specimens for domestic use; while nuns produced the chief portions for ecclesiastical and sacerdotal adornment. There were three modes practised in those days:—the *low* embroidery, in which the threads were laid flat on the groundwork; the *raised*, in which the figures were in relief, and rounded by means of wool, cotton, parchment, or paper placed beneath the thread; and *gimped*, in which the figures were formed by cords of gold, silver, or silk, and pieces of velvet, satin, silk, or gold. The finest modern examples of hand-embroidery are those produced by the Chinese, Turks, Hindoos, and Persians; some of these workers will put as many as 700 stitches in a square inch.

Embroidery, as a handicraft employment, is in our day singularly affected by changes of fashion. About the year 1846, embroidered dress-pieces for ladies came into vogue; and in a short time there was employment for 2000 hand-embroiderers in London alone, and many thousands in Scotland and Ireland. A pattern was printed in outline on the merino or other material; the stuff was then distributed by travelling agents; and after the embroiderers had worked it, the agents re-collected it. Such dresses are now (1859) nearly out of fashion, and embroidery (as a regular branch of trade) is chiefly applied to window-curtains, table-covers, valences, borderings, and other furniture fabrics. The sewed-muslin work, sent out by Glasgow manufacturers to the Scotch and Irish peasantry, has sent to those countries a certain facility in doing embroidery work whenever the fashion tends in that direction.

At the Paris Exhibition, in 1855, several machines were shown, much used in France for pricking or piercing the lines of embroidery, to enable the embroiderers to transfer these lines to the cloth by rubbing coloured powder through the holes. This pricking, which is a very tedious process when performed by hand, is effected by the machines with great rapidity and precision. A jointed frame carries a needle, which vibrates vertically by means of a treadle and connecting cords passing over pulleys. The pointer or pricker, when guided over the traced lines of the design, will make as many as seventy or eighty holes in an inch.

Mr. Hope, in 1855, patented a method of producing effects somewhat resembling what is called *appliqué* work: not by actual embroidery, but by printing patterns on the textile material, either by block-printing alone, or by block-printing combined with embossing. The pattern produced is subsequently finished at pleasure by the needle. Any tint or shade of colour may be used, different from that of the textile material. Surface-printing will suit in some instances, but block-printing is better, seeing that it causes the colouring material to enter more durably into the fibres.

What is now called *Berlin Work*, though not exactly embroidery, may be briefly touched on here. Miss Lambert, in her 'Handbook of Needlework,' gives some interesting details concerning its origin. The kind of work itself is, of course, old enough; the only novelty consists in the care bestowed on the production of patterns. About the year 1805, a Mr. Phillipson published some patterns, which, being badly executed and devoid of taste, did not meet with encouragement. In 1810, Madame Wittich, a lady of great taste and an accomplished needlewoman, justly appreciating the advantages which the art would derive from the production of better patterns, prevailed upon her husband, a print-seller of note at Berlin, to undertake the publication of a series of designs. He did so; and the designs were got up in so superior a manner, that many of the first patterns which were issued from his establishment have had a continued demand almost to the present time. The designer and engraver of these designs are paid as *artists*, in proportion to their talents. The cost of the first coloured design on point paper (divided into small squares) varies from three to thirty or forty guineas; but in some instances, such as the large patterns of Bolton Abbey, Boccaccio's Garden, &c., it is considerably more. The colouring affords employment for men, women, and children. A dozen or so of copies are given to each person at a time, with the original design as a guide. The earnings are from sixpence to three shillings a day, according to the age and skill of the persons employed. Berlin workers have had their work facilitated by an ingenious frame, registered by Mr. Lisle. From a flat horizontal stand rise two pillars, which support the frame somewhat in the same way as a toilet looking-glass is supported, so that the frame may be placed and secured in any convenient position. The canvas or other woven material is wound on rollers, which turn easily on their axes; all the canvas is wound on one roller in the first instance, and is unwound to the other roller as fast as the work proceeds; the space between the two rollers being occupied by a smooth well-stretched portion of the canvas. The rollers are worked by small handles, and there are crotchet-wheels to prevent them from slipping backwards. The side or selvage edges of the canvas are kept stretched by two rods. By this apparatus the Berlin worker or embroidress can work on a piece of canvas of almost any length.

In reference to the designs for patterns in hand embroidery, Mr. Wallis, in a paper drawn up in 1856, said: "In embroidery, the ultra-naturalistic forms which prevailed some six or seven years ago are giving way to a class of designs more suited to production by the needle. Much of this is doubtless to be attributed to the severe

EMBROIDERING AND SEWING-MACHINES. The word embroidery, as employed in the writings of the ancient historians, has reference to all kinds of ornamental work done with the needle; thus comprehending within its meaning every description of decorative needlework, including tapestry and some descriptions of weaving. At the present day, however, the application of the term is much more limited, relating to one kind of needlework only, which, nevertheless, embraces great variety, both as to the materials employed and the mode of using them. The recent invention and amazing extension of *sewing-machines* give a new scope to the term; seeing that the embroidering-machines and sewing-machines are so nearly alike in principle, that they had better be described together. It will be convenient, therefore, to treat the subject here under the sub-headings, —Hand-embroidery, Embroidering Machines, and Sewing Machines.

Hand-embroidery.—Some of the modes of hand-embroidery partake of the nature of TAPESTRY; but there is one method, in which a very rich effect is produced by inserting pieces of cotton wool, or slips of parchment cut to suit the devices, between the fabric upon which the embroidery is executed and the threads of silk or other material of which the pattern is formed, so that the embroidery may be raised considerably above the surface. Gold and silver thread are often used in embroidery with good effect, and spangles or tinsel are occasionally mixed with the needle-work. The fabric to be embroidered is usually stretched in a kind of frame or loom, and the pattern is drawn either upon its surface, or, if it be very transparent, upon a piece of paper applied underneath it.

The Orientals have always paid more attention to this art than Europeans. The Hebrews had elaborate embroideries in their tabernacle and on their priests' vestments. The Egyptians embroidered their linen garments, and the linen-wrappers of their mummies. The Greeks, the Sidonians, and the Phrygians, were all skilled in this art. The Peruvians, too, when discovered by the Spaniards, astonished them by their elaborate embroideries of gold and silver on feathers. In the embroidery of the middle ages, priests' vestments, hangings,

character of the ecclesiastical embroidery, for which there has more recently been so large a demand."

Embroidering Machines.—Although embroidery has, until within a few years, been a purely handicraft employment, chiefly cultivated by females as a tasteful and elegant occupation or amusement, it has also assumed the character of a manufacture, a most ingenious machine for executing it having been invented by M. Heilmann, of Mühlhausen. This admirable contrivance, which enables a female to embroider any design with 80 or 140 needles as accurately and expeditiously as she formerly could with one, requires the labour of one grown person to superintend the work, and of two children to change the needles when their threads are used, and to watch continually for any irregularities of action which may need attention. The chief parts of the machine may briefly be described as follows: The needles, which are pointed at both ends, and have their eyes in the middle, so that they need not be turned round between each time of passing through the web, are passed backwards and forwards by the action of small pincers, of which there are two pair to each needle, one on each side of the web, each pair being alternately employed in pushing and pulling the needle through the web. As soon as the needles have passed completely through in either direction, a kind of carriage or framing, which carries the series of pincers by which they have been drawn through, begins to move along a railway so as to draw the needles to the full length of their threads; after which the carriage returns to its original position, and its pincers put the needles again through the web, to be received on the opposite side by the other set of pincers, which then retire with them in like manner. So far as the action of this part of the machine can affect the matter, the needles would continually pass through the same holes in the web; but to enable them to pass through it at different points in succession, according to the pattern required, the web itself, which is placed vertically in a frame furnished with rollers on which it can be wrapped as on the roller of a loom, is caused to assume a different position after each passage of the needles. This is done by connecting the frame with a kind of pantograph, the point or tracer of which can be moved at pleasure over every portion of a drawing or pattern, which represents, on a greatly enlarged scale, the flower or device to be embroidered. The operator brings the point of the pantograph successively to every point of the pattern device at which it is desired to plant a stitch; and by this means so moves the web-frame that the corresponding point of every flower, or place where a flower is to be worked, upon it, is brought opposite to the point of one of the needles. The mechanism by which the pincers are worked is then brought into action by means of handles and pedals, by which every needle of the series is put through the web, and drawn until its thread is brought home; after which the needles return to their original position, while by the working of the pantograph another point, or rather series of points, of the web is brought opposite to them ready for the return stitch. By such means every needle of the series produces a distinct and separate copy, on a small scale, of the pattern, the arrangement of the stitches being precisely according to the movements of the pantograph.

This very ingenious machine was sold by M. Heilmann to Messrs. Köchlin, of Mühlhausen, who patented it in England. All the English rights were afterwards purchased by Mr. H. Houldsworth, the eminent silk-manufacturer of Manchester; he greatly improved the machine, and made an arrangement with Messrs. Schwabe for the joint use of the patent. In its present and most improved form, the machine consists essentially of four parts—an embroidering frame, on which the cloth to be embroidered is stretched; a pantograph attached to the frame; a series of needles and pincers; and mechanism for passing and re-passing the thread through the fabric. The cloth is stretched vertically. The design is sketched on stout paper or on tin-plate, usually six times the size of the work to be done. The pantograph conveys the design, as it were, from the drawing to the cloth. The length of all the stitches is arranged to a definite scale; a hole is punched in the paper at each end of every stitch; the pointer of the pantograph is moved backwards and forwards over the system of holes, thrusting into each hole in turn; and with each movement the needles are drawn backwards and forwards through the cloth. The action of the needles, although improved like everything else belonging to the machine, may be understood from the description given in the last paragraph. Some of the machines are large enough to employ six persons; some are small enough to be worked by one. Very little hand-work is necessary in finishing embroidery worked by these machines. There are certain limits, beyond which, machine-embroidery is not so useful as that effected by hand; but it has this merit, that the embroidering is equally good on both sides of the cloth. Mr. Houldsworth has invented a mode of embroidering in curves; he stretches the fabric on elastic cross-pieces; screws it up so as to draw the threads into a curved line; embroiders in a *straight* line; loosens the screws; and allows the cloth to resume its original position—the rows of embroidery stitches then appear in curved lines instead of straight. In producing a chintz-like effect, many colours are used in many needles. Another mode of producing variegated effects is to dye the silk thread differently at different parts of its length.

Attention has been drawn by Mr. Wallis to two circumstances affecting in an important degree the use of embroidering machines; namely, their limited scope for elaborate work; and their influence on

artistic design. On the first point he says: "In variety of effect the embroidering machine can never compete with hand-embroidery; and although, as in the dress embroidered for her Majesty by the late Mr. Louis Schwabe of Manchester, the effects of the original drawing are given in all their variety, this has only been effected at a great sacrifice of all the economical powers of the machine. When Mr. Schwabe first showed me this specimen in 1844, he said, 'I am written to, and asked if my machine would execute the design? I replied, that any design which her Majesty wished executed should be produced by it. When the drawing came, I saw the mistake I had made; but resolved, cost what it might, that the work should be done—and there it is.' As an illustration of what can be done by the embroidering machine, the example is interesting; but as an illustration of its economical use, or its superiority over hand-embroidery, it is worthless." On the other point, Mr. Wallis remarks: "Silk at 40s. a pound is too costly to be wasted; therefore, it is desirable that each needleful should do its work, and that no fragments should remain to be cut away at a loss. Hence patterns have to be designed to the needleful. If a pattern, however excellent in the abstract it may be, consumed one needleful of 36 inches out of two needlefuls of 42 inches each, it would be considered anything but sound economy in machine-embroidering to execute it, as 8 (6?) inches would be lost for each needle employed—a waste, upon any extent of production, which would astonish those who are not in the habit of thinking about mere fragments in the materials of manufacture. It will at once be seen from this fact, that the design for machine-embroidery must ever be somewhat peculiar, and to a certain extent limited in range of form; and that all the most successful—certainly the most economical—are made almost in the presence of the machine by which they are to be executed, and for the most part under no higher inspiration than that of a species of artistic measure-table: such as 'two needlefuls make one flower; three flowers make one repeat; twenty repeats make one border; four borders make one table-cover decoration.' One can thus tell, almost to an inch, certainly to a yard, how much silk will be consumed in a given operation."

Sewing Machines.—We must now pay attention to those machines which perform the operations of sewing and stitching, instead of that of embroidery.

It is evident, on a slight consideration, that the principle of these machines is nearly identical, however dissimilar may appear the mode of working. In both, there are needles threaded with cotton, silk, or other material; and in both, the needles pass to and fro, from one surface to the other of the piece of cloth, leaving tightened convolutions of thread to mark their passage. The two chief points of difference are, that the needles are more fixed in position in the sewing than in the embroidering machines; and that the object in view is rather to fasten and strengthen than to decorate. To describe the numerous patented sewing-machines in detail would be both tedious and unnecessary; a few words relating to Newton and Wilson's Boudoir Sewing-Machine will suffice, as giving one particular type of a large class. This machine is constructed chiefly for domestic sewing, and for light manufactures. It is mounted on a portable table; under the table, is a treadle acting on a small friction-wheel, which drives two small levers, one above and one below the bottom of the machine. The upper lever carries a *piercing needle*, and at the same time feeds the machine with its work, carries it forward, and regulates the length of the stitches. The under lever carries a *looping needle*, for completing and securing the stitch on the under side of the cloth. This looping needle, or looper, is a hook, which takes hold of the loop of thread after it has been passed through by the piercing needle, and retains it till this last-named needle, passing again through the cloth, enters this loop and leaves another, drawing the first loop tight in its receding motion. The stitch thus made is what embroiderers call the *tambour-stitch*. Instead of this a different stitch is formed, by using a looper which has a hook with a longer point, with an eye formed to carry a second thread; the needle and this looper, by alternately intercepting the threads they respectively carry, form an interlaced or *chain-stitch* on the under side of the piece of cloth; while both together form a *back-stitch* on the upper surface. This machine can turn down, fold, hem, and lay on and fix binding, as well as perform sewing and stitching.

A few figures were given in the 'Mechanics' Magazine,' about the middle of the year 1859, showing to how astonishing a degree the use of sewing-machines has extended. The following appeared as the result of inquiries made in England, and in the United States:—

	Great Britain.	United States.
No. of patents granted	200	300
Manufacturers	5	25
Kinds of sewing-machines	6	30
Kinds of lock-stitch machines	3	10
Machines sold weekly	100	1500
Prices	3 <i>l.</i> to 30 <i>l.</i>	1 <i>l.</i> to 30 <i>l.</i>
Lowest prices for lock-stitch machine	11 <i>l.</i>	10 <i>l.</i>
Whole No. in all	10,000	100,000

Some of the English patents (dated before 1852) do not extend to Scotland or Ireland, and American sewing-machines are largely em-

ployed in those two portions of the United Kingdom; but in England and Wales the American machines are virtually shut out.

In both England and America the use of the machine is largely extending. The shirts, collars, and mens' clothing sold in the London shops, are in considerable part either stitched or sewn by machines. Army clothing is beginning to be sewn in the same manner, especially in Ireland, where the cheaper American machines may be employed. Mr. Peter Tait, of Limerick, in evidence given before the Contracts' Committee of 1853, stated that he cuts out army clothing by steam-power, and effects much of the sewing by machines worked also by steam-power; he can make 4000 suits of Infantry clothing per week, if needed; and employs several hundred men in the finishing operations, none at less than a guinea a week. In America, Cincinnati is the great clothing town for the Western and Central States. The articles are cut out in large warehouses, then given out by contract to master-tailors, who employ hands by the day or by the piece; sewing-machines are very largely employed in the making up, each doing as much work as ten hand sewers. In 1851, there were 108 establishments employing 10,000 hands; and in the next eight years there was a large increase. The owners of most of the establishments are German Jews, and the workmen Germans.