

**Lace** (Du. *Kanten*; Fr. *Dentelle*; Ger. *Spitzen*; It. *Merletti*, *Pizzi*; Rus. *Krushevo*; Sp. *Eneajes*), a plain or ornamented net-work, tastefully composed of many fine threads of gold, silver, silk, flax, or cotton, interwoven, from *Lacina* (Lat.), the guard hem or fringe of a garment. This delicate fabric appears to have claims to high antiquity, but its origin is involved in considerable obscurity. That it was worn by Grecian females is certain, and the derivation of the word *lace* affords presumptive evidence that it was also in use among the Romans. In Venice, and the neighboring States of Italy, it was very early worn; and Mary of Medicis is supposed to have been the first who introduced its use into France; but as early as 1483 it was included in a list of articles prohibited from importation into England. Hence it had been made in this country prior to the period above mentioned; and this prohibition, like many other subsequent acts, was for the protection and encouragement of home manufactures. But *pins*, which are indispensable in the process of fine lace-making, were unknown till long afterward; so that it is probable the fabric made was neither very fine in texture nor produced to any great extent. It is uncertain by whom the manufacture of lace was originally introduced into this country. About the middle of the 17th century the lace trade was flourishing in Buckinghamshire; and so greatly had it advanced in England, that, by a royal ordinance in France, passed in 1660, a mark was established upon the thread lace imported from this country and from Flanders, and upon point lace from Genoa, Venice, and other countries.

*Pillow, or Thread Lace*, is made by placing a perforated pattern on a hard stuffed pillow, and the thread required is wound upon bobbins with a groove in the upper part for retaining the thread; while, to form the meshes, pins are stuck in the cushions, and threads woven or twisted round them, the pattern showing the points of insertion for the pins, and also the direction for the gimp, which is interwoven with the fine threads of the fabric to form the pattern. At the commencement of the work the bobbins are arranged on one side of the cushion, and are brought to the front side, two pairs at a time, and twisted together. The woman holds one pair of bobbins in each hand, and twists them three times over each other to form the sides of the mesh, the adjacent bobbins of each pair are next interchanged, so as to cross these threads over one another to form the bottom of the next. Supposing the four bobbins to be marked 1, 2, 3, 4,—No. 1 is twisted round 2, and No. 3 round 4; these, in order to cross 2 and 3, are interchanged, so that 1 and 3 and 2 and 4 come together, and at the next twist these pairs of threads will be combined. As the meshes or half-meshes are formed, they are secured by pins. These four bobbins are now put on one side of the cushion; two more pairs are brought forward, twisted and crossed as before, and these operations are repeated until a row of meshes is formed of the required breadth, when the bobbins are worked over again to form another row. From 48 to 60 bobbins are required for every inch of breadth. Pillow or thread

lace, formerly employed a large number of women and children in the counties of Bedford, Buckingham, Northampton, and Oxford, but the demand for this kind of white thread lace failed, and black lace took its place. *Honiton lace* differs from pillow lace in having the pattern made separately. The ornaments were formerly confined to simple sprigs and borders; but the fabrics now produced show extreme delicacy of execution, with beauty and taste in design: flouncings, shawls, scarfs, handkerchiefs, berthes, etc., now vary in price from 10 to 200 guineas. The Honiton lace district extends about 30 miles along the coast of Devonshire, and about 12 miles inland. In 1851 from 7000 to 8000 persons were employed in the manufacture.

*British point, tambour, and Limerick* laces are chiefly imitation, and are produced in shawls, scarfs, dresses, court trains, flouncings, lappets, etc. British point is made chiefly in the neighborhood of London, tambour chiefly at Islington, Coggleshall, and Nottingham, while Limerick lace is peculiar to Ireland. Black laces now occupy a considerable portion of the attention of the trade. The most celebrated laces have been classed as—1. *Brussels*, the most valuable. There are two kinds: *Brussels ground*, having a hexagon mesh, formed by plating and twisting four threads of flax to a perpendicular line of mesh; *Brussels wire ground*, made of silk; meshes partly straight and partly arched. The pattern is worked separately, and set on by the needle. 2. *Mechlin*: a hexagonal mesh, formed of three flax threads twisted and platted to a perpendicular line or pillar. The pattern is worked in the net. 3. *Valenciennes*: an irregular hexagon, formed of two threads, partly twisted and platted at the top of the mesh. The pattern is worked in the net similar to Mechlin lace. 4. *Lille*: a diamond mesh, formed of two threads platted to a pillar. 5. *Alençon*, called *blond*: hexagon, of two threads, twisted similar to Buckingham lace; considered the most inferior of any made on the cushion. 6. *Alençon point*: formed of two threads to a pillar, with octagonal and square meshes alternately.

In the manufacture of lace, France takes the lead; and it is calculated that the production of lace by hand gives employment in that country to upward of 200,000 females of all ages. It is all made with bobbins upon a small pillow, except at Alençon, where the needle only is employed. The materials used are hand-spun linen thread, cotton, wool, silk, and gold and silver thread. *Point d'Alençon* is the only lace made with pure linen hand-spun thread; this thread is worth from \$500 to \$600 per pound. White lace is now chiefly made with cotton thread, Nos. 120 to 320. The principal seats of the manufacture are—Caen and Bayeux, Chantilly and its neighborhood, Lille, Arras, Mirecourt, Puy, Bailleul, and Alençon. Each of these districts has its own peculiar style; and although the lace may be made in the same way, and with the same material, in all these districts except the last, yet each is easily recognized. Silk blond originated at Caen, and was so called from being made of undyed silk of a nankeen color: the finest white or the finest black silk is now employed. Caen and Bayeux excel all other places in the production of piece goods, and manufacture shawls, robes, mantles, etc., more extensively than any other districts in the world. By means of a stitch called *racros*, the women of the department of Calvados join several parts into one piece so cleverly as to defy detection, even with a magnifying glass. Most of the improvements and novelties in lace-making originate at Mirecourt; it produces the same kind of lace as Lille and Arras, viz., clear foundation, *fonds clair*, and also *fonds de champs*, in white thread, also a lace resembling the Honiton called *guipure*.

Flowers are also made, and sewed upon the extremely fine net called Brussels net, closely resembling

the Belgian fabric. The whitest and cheapest French lace is produced at Bayeux.

Belgium is the great rival of France in the manufacture of laces, the chief varieties of which are known as *Brussels, Mechlin, Valenciennes, and Grammont*. Brussels produces two descriptions of lace, known as *point à l'aiguille*, and *Brussels plait*, the one made entirely with the needle, and the other on the pillow. The finest kind is made of very fine flax thread, and some of cotton. It is remarkably soft and clear, but very costly. Mechlin laces are made at Malines, Antwerp, etc. They are made in one piece on the pillow, and the flowers are surrounded by a plait thread, which designs the outline, and has the effect of embroidery. Valenciennes laces are made chiefly at Ypres, Menin, Courtrai, Bruges, Ghent, Alost, and their respective neighborhoods, each town having its characteristic peculiarities by which its productions are identified. Ypres produces laces of the finest square grounds, varying in price from 12 cents to \$250 the English yard.

It is natural to suppose that attempts would be made to lessen the cost of production of so beautiful and costly an article as lace. It was not, however, until machinery had been largely introduced for the purpose of manufacturing textile fabrics that lace machinery can be said to have been successfully employed. About the year 1768 a frame-work knitter of Nottingham employed the common stocking-frame in the manufacture of lace, and about the same time another person of the same place introduced a pin machine for making single-press point-net in imitation of the Brussels ground. Various machines were from time to time introduced, all of which, except the *warp machine*, have been superseded by the *bobbin-net machine*, so called because the thread that makes the lace is partly supplied from bobbins and partly from a warp.

*Brussels and Mechlin Lace*.—The spinning of the fine thread used for lace-making in the Netherlands is an operation demanding so high a degree of exquisite skill, minute manipulation, and vigilant attention, that it appears impossible that it can ever be taken from human hands by machinery. None but Belgian fingers are skilled in this art. The very finest sort of this thread is made in Brussels, in damp underground cellars, for it will break by contact with the dry air above ground; and it is obtained in good condition only when made and kept in a humid, subterranean atmosphere. There are numbers of old Belgian thread-makers, who, like spiders, have passed the best part of their lives spinning in cellars. This sort of occupation naturally has an injurious effect on the health, and the eyesight of the operatives is impaired at an early age.

In former days Mechlin was renowned for its lace manufactures. For a century and more it held supremacy in the markets of Europe, and the Mechlin lace was considered the perfection of that article, commanding by far the highest prices, and being the source of a large revenue to its fabricators. It has, however, fallen off very considerably of late years in supply and demand. While this lace is not so fine as that which is made at Brussels, it is much more durable, and therefore of more intrinsic value as an article of use. In regard to lace not produced by hand, that which is known as bobbin-net may be said to surpass every other branch of human industry in the complex ingenuity of its machinery, one of the "spotting frames," as they are termed, being as much beyond the most curious chronometer in multiplicity of mechanical device as that is beyond a common hand-saw.

*Bobbin-net lace* owes much of its beauty to the quality of the threads, and the correct shape of the meshes. By increasing the number of warp-threads within a given space the meshes are reduced in size, and finer lace is formed. There may be from 700 to 1200 and upward of warp-threads in a piece one yard wide. The fineness, or *gauge of points*, as it is called, depends

on the number of slits in the combs, and hence on the number of bobbins in an inch; thus *gauche wire points* indicates nine openings in one inch of the comb. The length of work counted vertically, and containing 240 holes or meshes, is called a *rack*. A circular-bolt machine may produce about 360 racks per week. Bobbin-net is made up in pieces of from 20 to 30, or more yards in length, and of variable breadth. Narrow quillings are worked together in a number of breadths, united by threads, which are afterward drawn out. In well-made lace the meshes are slightly elongated in the direction of the selvage. Ornaments, consisting of separate flowers, sprigs, etc., are worked in by a Jacquard apparatus attached to the frame; but as the ornaments are all necessarily connected by the thread of gimp which forms them, the connected thread is afterward cut out with scissors, by children employed for the purpose. Where the machine produces only one plain net, the pattern is worked in by hand, the lace-runner being guided by a lithographic pattern placed under the net. When the embroidery is complete, it is examined, defective parts are marked by tying the lace in a knot, and these are restored by a distinct set of women called *lace-menders*.

In addition to the bobbin-net machine for making lace, there is also the *warp machine*, invented about the year 1775. It was suggested by the stocking-frame, in which only one thread is required, while in the warp-frame there is a thread to each needle. The first articles made by it were silk stockings, with blue and white zig-zag stripes, or *vandykes*, as they were called, from the name of one of the four claimants to the invention of the warp-frame, the other three being Englishmen. About 1784 a Nottingham mechanic greatly improved the warp-frame by the application of the rotatory motion, and the cam-wheels to move the guide-bars, still known as *Dawson's wheels*. The improved frames produced officers' sashes, purses, braces, and other elastic textile fabrics, the manufacture of some of which still continues. In 1796 a new fabric was produced from the warp, and employed for sailors' jackets, pantaloons, and the article known as Berlin, so much used for making gloves. Warp machines were the first to produce ornamental patterns on lace, such as spots, bullet-holes, etc., which had been previously embroidered or tanned by hand. The bobbin-net machine, invented in 1809, soon became a formidable rival of the warp, and influenced its fortunes in various ways, until 1839, when the Jacquard apparatus was applied to it, and so much increased its capabilities as to introduce into the warp-lace trade of Nottingham a new class of products of elaborate design, such as shawls, scarfs, mits, falls, laces, etc. Of late years the *twist machine* has been employed on similar goods, and has to a great extent superseded the warp. Great improvements have also been introduced in the English methods of *dressing* lace, especially in silk goods. Many new kinds of elastic fabrics, in gloves, in silk, and other materials, have been introduced. Velvet, and velvet in combination with lace, have also been produced at the warp-frame. At the time of the Great Exhibition there were about 1400 warp-frames in operation, namely about 600 in Leicestershire, about 400 in Derbyshire, and about the same number in Nottinghamshire. The employment in the various branches was estimated as follows: 150 machines engaged in the production of blond, and other silk laces; 150 in cotton tattings, 550 in Leicester hosiery, etc.; 100 in lace gloves and mits, 150 in woolen cloth, hosiery, purses, and various fabrics for gloves, etc. The first machines were about 16 inches in width; they are now, in the Nottingham trade, from 30 to 150 inches in width, and in the Leicester hosiery trade, from 44 to 72 inches. The number of persons employed in the warp trade in Great Britain, in 1851, was estimated at 10,000, and the capital invested at \$1,800,000, making a return per annum of

\$3,500,000. In the Great Exhibition was exhibited a power machine, capable of producing (working 12 hours per day) 800 racks per week, which, when dressed, would be equal to about 1200 square yards. A yard of 4-quarter white silk blond, which in 1850 cost 50 cents, can now be had for 12 cents.

*Gold and Silver Lace.*—The textile fabric known as gold or silver lace consists of warp threads of silk, or of a mixture of silk and cotton, while the weft or shoot is a silk thread covered with silver, or with silver gilt, as the case may be. The production of this thread is a remarkable illustration of the extensibility of gold, and of the ductility of silver. The silver preferred by the wire-drawers is that which has been separated from argentiferous galena, this being less brittle than the silver obtained from purer sources. From 400 to 500 ounces are cast into an ingot about 2 inches in diameter, and from 20 to 24 inches in length. This is made red-hot in a charcoal fire, and hammered until sufficiently reduced to pass through the first hole of the draw-plate, the hammering increasing the tenacity and elasticity of the metal. After the bar has been reduced by passing through 10 or 12 holes, it is planed, in order to remove any imperfections from the surface which would interfere with the perfect gilding; the blemishes are readily detected by the reflection of a sheet of foolscap paper slightly arched, and placed over the bar. The bar is now gilt, by placing on it a number of gold leaves, varying from 10 to 30, according to the richness of the wire required, the higher qualities being used for military purposes, and pearls and bullions for embroidering, while the lower qualities are used for liveries, the ends of muslins, and for skein threads exported to India and China. The gold leaves are placed in a row, side by side, nearly the length of the bar, on a piece of cartridge paper; the bar is then gently placed on the leaves, pressed close, and the edges of the leaves raised up until the silver is entirely covered. The bar is next enveloped in paper tied tightly round with cord, and placed in a charcoal fire, where it is left until it becomes of a bright red heat, the paper not burning, but becoming red with the metal, when it slowly consumes, after which the bar is withdrawn. While still red-hot it is furnished with a blood-stone or with South Sea ax-stone, for the purpose of uniting the gold and the silver perfectly. When cold the surface is covered with wax, and the bar is drawn into wire through graduated steel dies, and, after one or two annealings, finished by drawing through perforated rubies, so fine that from an ounce of metal a wire a mile and a quarter in length is produced. At this point the wire has not so rich and deep a shade of yellow as is required, but this is given by winding the wire round a copper cylinder, with the addition of a small portion of wax, and filling the cavity of the cylinder with red-hot charcoal made from birch-wood, the effect of which is to deepen the color, and render it permanent. The next process is to flatten the wire by passing it between a couple of steel rollers, one of ten, and the other of four inches in diameter, made of the finest steel, and of exquisite polish. They are manufactured in Rhenish Prussia, at a cost of \$600 for a single pair of rollers. The flattened wire is wound on small bobbins, which are placed in the centre of circular rings, attached to a bar over a spinning frame. On the front of the frame are bobbins of silk, the threads of which pass through the centre of the ring to which the reel of wire is fixed. The whole is set in motion, and while the thread is being twisted, the ring with the wire revolves round the thread in the opposite direction. In this way from 30 to 40 threads are covered at once, the result being a resplendent flexible gold thread, adapted to the purposes of lace-making, embroidery, etc. Of this thread, although gold only appears, probably 9-10ths of its bulk is silk, while of the remaining 1-10th only 1-50th part is gold. See details on this subject in the *Journal*

of the Society of Arts, No. 178, in the Report of Mr. F. Bence's paper on "Thread or Fibre Gilding."—  
E. B.

The exports of laces from the United States for the year 1856, were as follows :

Countries.	Thread and insertings.	Value.
Canada.....	\$15,759	\$25,573
British possessions.....	1,440	.....
Mexico.....	249	1,372
Total.....	\$17,458	\$26,945

STATEMENT SHOWING THE IMPORTS OF LACES AND EMBROIDERIES INTO THE UNITED STATES FOR THE YEAR ENDING JUNE 30TH, 1856.

Whence imported.	Laces.		Embroideries of wool, cotton, silk, and linen.
	Thread and insertings.	Cotton insertings, trimmings, laces, braids, &c.	
Sweden and Norway.....	.....	.....	\$12
Hamburg.....	\$29	.....	11,542
Bremen.....	32,704	\$18,655	186,754
Holland.....	.....	.....	746
Belgium.....	111	85	2,254
England.....	275,546	1,151,222	3,294,092
Scotland.....	279	3,940	198,194
Malta.....	27	28	.....
Canada.....	.....	.....	15
British West Indies.....	.....	873	46
British pos. in Africa.....	.....	.....	40
British East Indies.....	.....	.....	252
France on the Atlantic.....	100,352	19,743	958,483
France on the Mediter.....	112	.....	1,735
Canary Islands.....	.....	.....	258
New Granada.....	1,502	2,023	7,210
China and other places.....	29	.....	2,724
Total.....	\$410,591	\$1,191,019	\$4,664,353