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E. BÖSEBECK ET AL

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MACHINE MADE LACE

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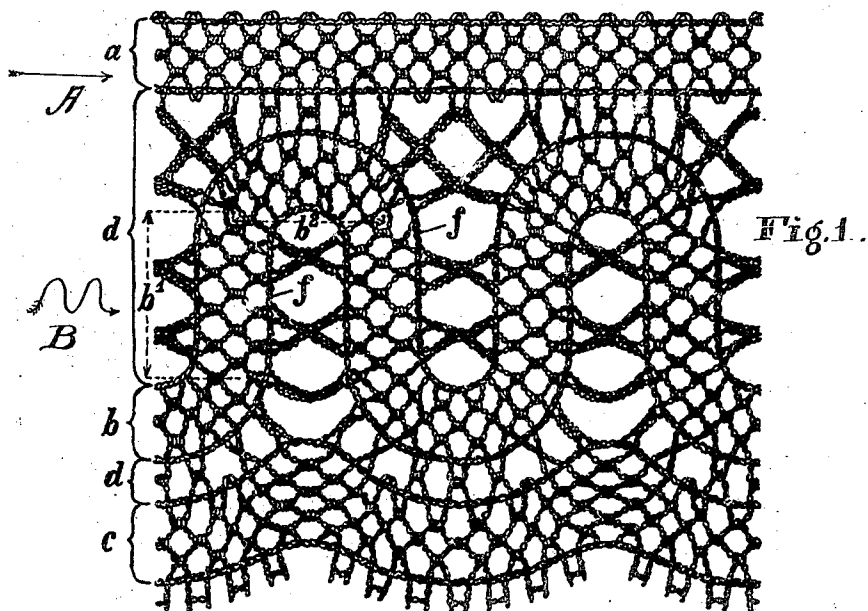
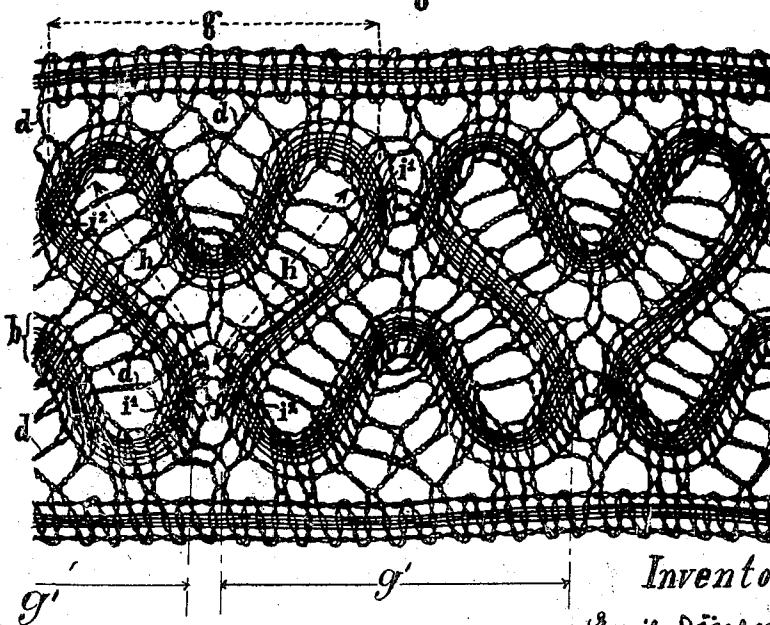


Fig. 2



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MACHINE-MADE LACE.

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(GRANTED UNDER THE PROVISIONS OF THE ACT OF MARCH 3, 1921, 41 STAT. L., 1313.)

To all whom it may concern:

Be it known that we, EMIL BÖSEBECK and EUGEN TÜRCK, both citizens of the German Republic, residing at Barmen and Langerfeld, near Barmen, Germany, respectively, have invented certain new and useful Improvements in Machine-Made Lace (for which we have made application in Germany, June 2, 1920, Patent No. 359684, and June 24, 1920, Patent No. 377131; England, July 5, 1921, Patent No. 186707; France, June 1, 1921, Patent No. 536385; Belgium, June 15, 1921, Patent No. 296935; Italy, June 20, 1921; Austria, June 1, 1921), of which the following is a specification.

The production by hand of so called ribbon laces, that is, of laces having continuous ribbon-like elements of substantially uniform width and texture throughout which runs sinuously to and fro within the lace, has been effected in this way. The ribbon-like element is plaited step by step in its own longitudinal direction, independently of the ground-work of the lace. The successively plaited portions of the element are first held in the desired curved forms by the insertion of needles, whereupon they are connected at their edges with the ground-work of the lace which is also plaited step by step. Production of ribbon laces on braiding machines in a manner corresponding with hand production is, of course, out of the question since, in the operation of these machines, the bobbin threads can run only in the working direction, that is in the direction of length of the lace, while at the same time the lace on the machine must always be simultaneously produced along its entire width.

It has already been proposed to produce braided lace with ribbon-like elements by employing mechanical means only in part. The miniature ribbon was then manufactured by itself on the braiding machine as a preliminary product, portions were then laid together to form loops or curves and the separate loops were subsequently connected to the hand-made ground-work. This method of production is however at all times both troublesome and tedious, so that not much profit results. Moreover, the range of pat-

terns obtainable by such a method is very limited.

The object of the present invention is to provide lace with ribbon-like elements in which all braiding threads run substantially in the longitudinal direction of the lace and which is, therefore, adapted to be manufactured as a whole on the lace braiding machine. This end is attained by a novel arrangement of threads according to which the element which runs transversely and sinuously to and fro within the lace and which resembles a miniature ribbon therein, is formed not by a separate group of threads as in the hand-made lace, but the threads for forming the ribbon-like element are in each place taken from the adjacent ground-work, that is to say, at those places where the ground-work is interrupted by the miniature ribbon, a certain number of ground-work threads are interbraided in such a manner as to form a portion of the ribbon-like element, whereupon they are again worked into the lace ground.

The most popular form of lace with miniature ribbon is that in which the ribbon-like element resembles a woven ribbon, i. e. a ribbon having warp threads extending longitudinally with respect to the ribbon's own direction and weft threads running transversely to the warp threads, and in which the ribbon runs not only sinuously to and fro in the lace, but also partly diagonally forwards and partly diagonally backwards. Making such lace on a machine is especially difficult, because in machine-plaiting it is quite impossible to guide the bobbin threads which are intended to form the warp threads of the ribbon, alternately forwards and backwards, according to the course of the ribbon.

To overcome this difficulty, the warp threads of the miniature ribbon are no more formed by one and the same group of threads extending continuously across the entire length of the ribbon, as is the case in hand-made lace, but, according to the present invention, the warp threads of the ribbon are formed by several groups of threads selected from the ground-work threads, each of said groups of warp threads at the re-

turning points, i. e. at the points where the direction in which the ribbon runs changes from the direction of braiding to that opposite thereto, or vice versa, being exchanged with another group which enters the ribbon, while that group of warp threads which leaves the ribbon passes on to be utilized for forming the ground-work of the lace, until it re-enters the ribbon at another returning point. Whereas, in the portions intermediate the returning points, the warp threads of the ribbon are formed by threads of the adjacent ground-work which are conducted transversely across the ribbon-like element, the resemblance to a woven effect is formed at these returning points by intercrossing the two groups of warp threads which are interchanged.

It thus appears to the eye as if the entire ribbon-element were formed by the same warp threads, running alternately forwards and backwards, as has hitherto been possible only in the genuine hand-made lace. Consequently, by the novel arrangement of threads, it is now possible to produce a striking imitation of the hand-made ribbon lace on the lace-braiding machine, thus rendering the manufacture of such lace more rapid and economical. In addition to this, in comparison to the hand-made ribbon lace heretofore known, the new lace is characterized by its high degree of tenacity since the lace is a unitary structure, the number of threads at any cross-section of the lace being equal.

Two examples of lace manufactured in accordance with the present invention are shown in the accompanying drawing wherein:—

Fig. 1 shows a lace wherein the miniature ribbon runs transversely to-and-fro, and

Fig. 2 shows one wherein the miniature ribbon runs not only to-and-fro but also, at places, forwards and backwards.

In the example shown in Fig. 1, *a*, *b*, *c*, indicate portions of the pattern which are formed with a predetermined kind of interbraiding and which are connected one to another by means of the intermediate web-portions *d*. The web-portions constitute the groundwork of the lace which, as the drawing shows, is of considerably wider mesh than the pattern-portions. Of the latter the portion *b* constitutes the ribbon-element proper which runs sinuously to-and-fro in the directions transverse to that of the braid. The direction of the braid is shown by the arrow A, the direction in which the ribbon runs is indicated by the arrow B. The ribbon-like element *b* is bordered by firm edges *f*, *f* which to a great extent give the element the appearance of a miniature ribbon and demarcate the groundwork, the latter being braided as a wide-meshed web.

The various braiding threads mainly run through the lace in its longitudinal direction and the ribbon-element is formed chiefly owing to a change in the mode of interbraiding.

The threads forming the ribbon-like element *b* which, like the threads of the remainder of the braid run mainly in the longitudinal direction of the latter, are taken in all cases from the adjacent ground, i. e. at the points, where the ground is interrupted by the ribbon-like element *b*, a number of threads from the ground are braided into the ribbon-like element itself, and subsequently are again worked into the ground. The same holds good for the threads which form the edges *f*, *f* which are also formed by threads from the ground which are so worked in that they resemble on each side of the ribbon-like element a group or a pair of threads running in the direction of the ribbon. Where the latter coincides with the longitudinal direction of the braid, that is for example in the parts *b*² of the ribbon-element, the edges may, however, be formed by one and the same group of threads.

The groundwork of the ribbon-element itself, like the other portions of the web, is formed throughout in the longitudinal direction (working direction) of the braid, so that in the middle, sinuous ribbon-element *b* the portions *b*¹ at right angles to the longitudinal direction of the lace are braided transversely to the ribbon's own direction, while the portions *b*² co-directional with respect to the said braid are braided longitudinally with respect to the ribbon's own direction.

In the lace shown in Fig. 2 the ties *d*, which are formed by comparatively tight interbraiding, produce a wide meshed groundwork, and the ribbon-element is formed of the strip-like or ribbon-like portion *b* which runs sinuously through the lace, in part transversely to-and-fro and in part backwards and forwards with respect to the direction of braiding. As in Fig. 1, the direction of braiding is taken from left to right and the ribbon's own direction is from left to right where the ribbon enters the left of the figure. This ribbon-element is filled with a weave-like ground by arranging that the braiding threads corresponding to the warp threads always run parallel to the firm edges of the ribbon, this being done in such manner that it appears as if one and the same group of warp threads runs through the entire ribbon in the manner of the warp threads of a woven ribbon, co-directional with the ribbon's own direction.

In order to produce this effect in machine-made lace, however, three groups of threads to serve as pseudo-warp threads are employed, one group to produce the upper

wavy ribbon portion g , a second group to produce the lower wavy ribbon portion g^1 , and a third group to produce the portions h , h^1 , wherein the ribbon's own direction is counter to the direction of braiding. These groups replace one another at the places, such as i^1 , i^2 where the ribbon's direction is reversed relatively to the direction of the braid, so that, considering the course of the ribbon, the pseudo-warp threads are formed successively first by one and then by another of the three groups which at other places form the adjacent ground. Considering the course of the ribbon shown in Fig. 2, the pseudo-warp threads of portion g^1 are replaced at the lower returning point i^1 by the group in the ribbon portion h , and this group is replaced at the upper returning point i^2 by the pseudo-warp threads of the ribbon-portion g . At the returning point i^1 next-following, the latter threads are replaced by the group for the ribbon-portion h^1 ; at the returning point i^2 next succeeding, this group is replaced by the group for the ribbon-portion g^1 . In all cases, the individual groups serve to make up the ground where they do not form a ribbon-portion, and as shown, form the ties connecting adjacent returning points of the ribbon.

The pseudo-weft threads of the ribbon b in the portions g , g^1 , h , h^1 thereof are also taken from the adjacent ground. As this is not possible at the returning points, the groups of threads mainly serving in the ribbon as pseudo-warp threads intercross each other at these points, thus resembling a woven effect at least as closely as the remaining part of the ribbon-like element, while the replacement of one group by another simultaneously occurs and the pseudo-warp threads in the ribbon give the impression of continuity. In the same manner as the pseudo-warp threads, also the pairs of threads forming the edges f , f^1 , are changed at the returning points i^1 , i^2 .

In this manner is obtained a striking resemblance to a ribbon running forwards and backwards in the interior of the lace, as has hitherto been possible only by hand-braiding.

Claims:

1. An all-machine-braided lace, comprising a ground-work and an element resembling a continuous miniature ribbon of substantially uniform width and texture throughout, running sinuously to and fro within the lace, said ribbon-like element being formed integral with said ground-work, part of the ground-work threads, at the points where the ground-work is interrupted by said ribbon-element, being interbraided in a manner corresponding to the texture of said element.

2. An all-machine braided lace, comprising a ground-work and an element resem-

bling a continuous miniature ribbon of substantially uniform width and weave-like texture throughout, running sinuously to and fro and simultaneously partly diagonally forwards and partly diagonally backwards within the lace, said ribbon-element being formed integral with said ground-work, part of the ground-work threads, at the points where the ground-work is interrupted by said ribbon-like element, being interbraided in a manner corresponding to the texture of said element, the warp threads of the successive portions of said ribbon-like element being formed by different groups of threads selected from the ground-work threads and guided in the longitudinal direction of the respective portion of the ribbon-element, each group of warp threads being exchanged at the returning points of said element with another group of warp threads.

3. An all-machine braided lace, comprising a ground-work and an element resembling a continuous miniature ribbon of substantially uniform width and weave-like texture throughout, running sinuously to and fro and simultaneously partly diagonally forwards and partly diagonally backwards in the lace, said ribbon-like element being formed integral with said ground-work, part of the ground-work threads, at the points where the ground-work is interrupted by said element, being interbraided in a manner corresponding to the texture of said ribbon-like element, the warp threads of said element being formed by several groups of threads selected from the ground-work threads and guided each in the longitudinal direction of a portion of said element, each group of warp threads being exchanged at a returning point of the ribbon-like element with another group of warp threads, all said groups of warp threads forming part of the ground work between the points where they leave and re-enter the ribbon-like element, respectively.

4. An all-machine braided lace, comprising a ground-work and an element resembling a continuous miniature ribbon of substantially uniform width and weave-like texture throughout, running sinuously to and fro and simultaneously partly diagonally forwards and partly diagonally backwards within the lace, said ribbon-like element being formed integral with said ground-work, the warp threads of the successive portions of said ribbon-element being formed by different groups of threads selected from the ground-work threads and guided in the longitudinal direction of the respective portion of the ribbon-like element, each group of warp threads being exchanged, at the returning places of said element; with another group of warp threads, the weft threads of said ribbon-like element being formed in the

portions between the returning points of the element, by other threads of the ground-work which run transversely through said portions, while the groups of warp-threads which are interchanged, are intercrossed at the returning points, so as to obtain an effect resembling a woven texture.

In testimony whereof, we affix our signatures in the presence of two witnesses.

EMIL BÖSEBECK.
EUGEN TÜRCK.

Witnesses:

M. STEINVASCHER,
OTTO FISCHER.