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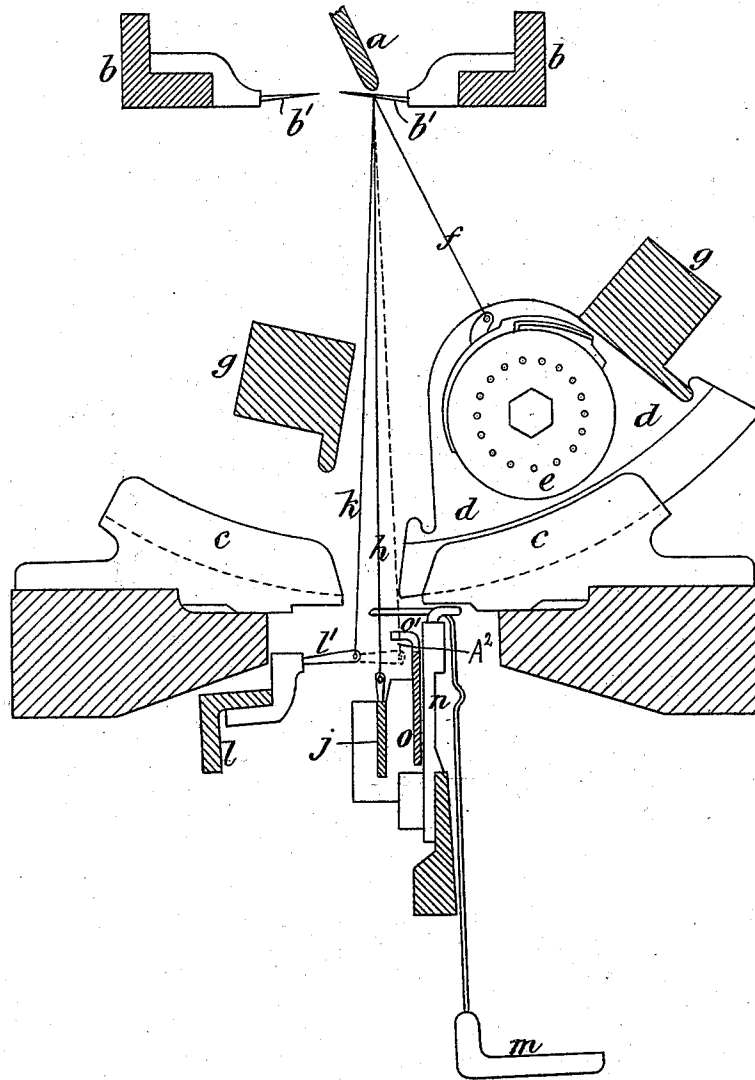
4 Sheets—Sheet 1.

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TWIST LACE FABRIC.

No. 550,745.

Patented Dec. 3, 1895.

*Fig. 1.*



Witnesses  
*B. W. Miller*  
*C. W. Burke*

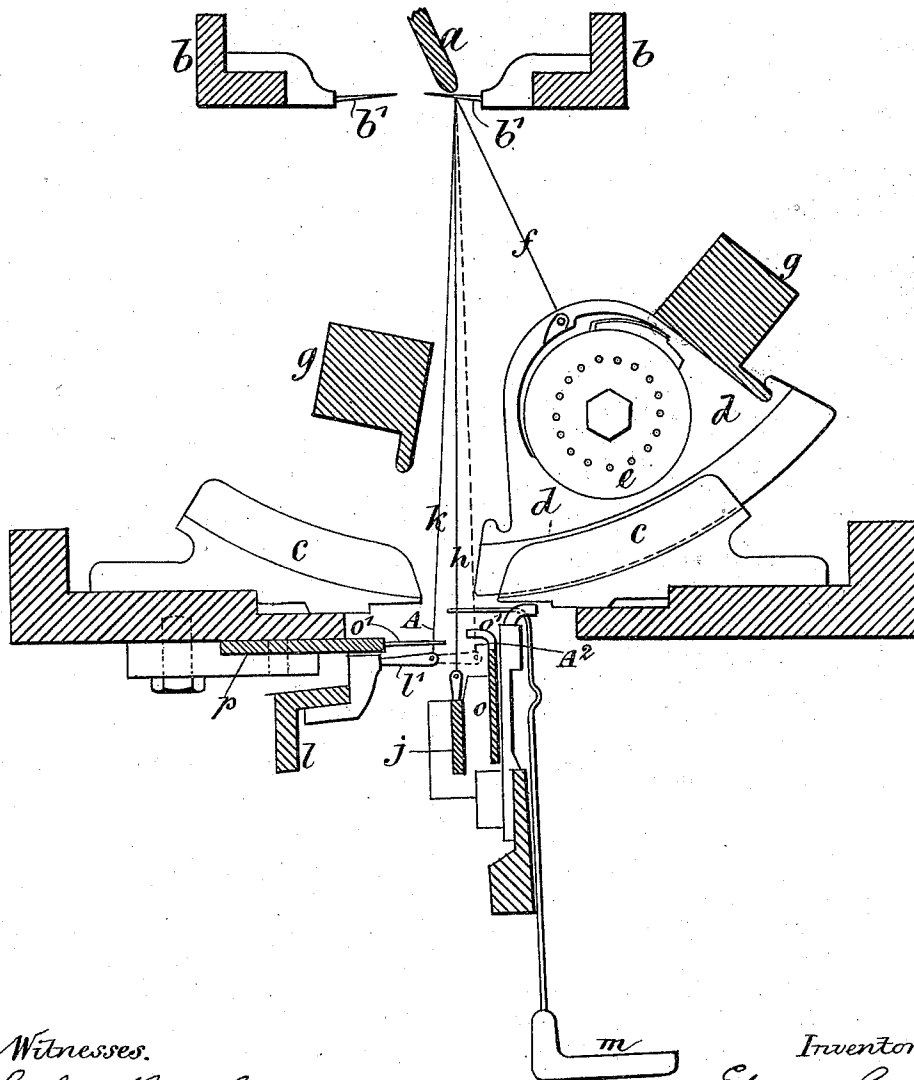
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Fig. 2.



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(Specimens.)

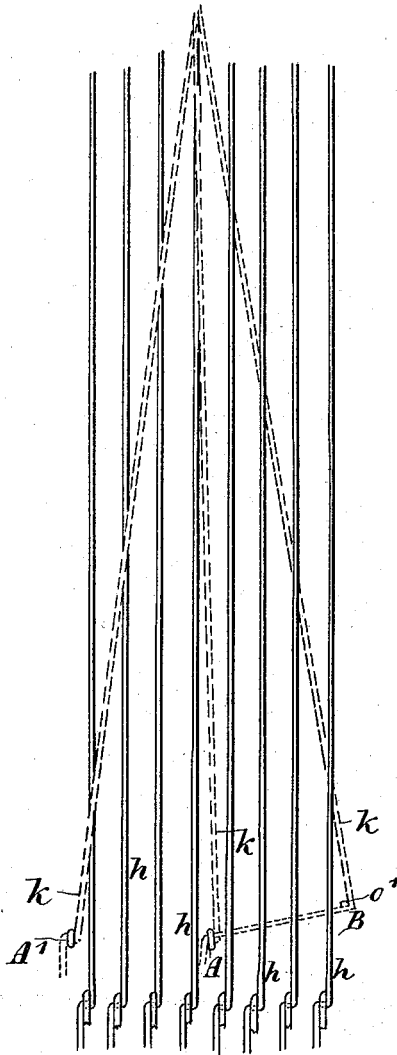
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*Fig. 3.*



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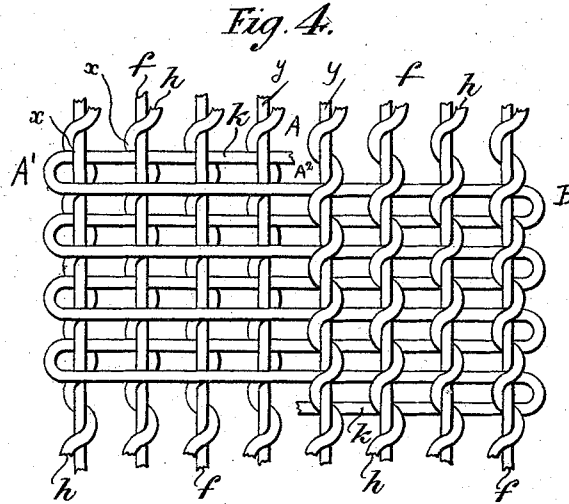
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# UNITED STATES PATENT OFFICE.

EDWARD COPE, OF NEW BASFORD, ENGLAND.

## TWIST-LACE FABRIC.

SPECIFICATION forming part of Letters Patent No. 550,745, dated December 3, 1895.

Application filed March 30, 1894. Serial No. 505,741. (Specimens.) Patented in England May 13, 1893, No. 9,643; in France March 22, 1894, No. 237,251; in Belgium March 23, 1894, No. 109,192; in Switzerland March 24, 1894, No. 8,456; in Germany March 25, 1894, No. 78,915, and in Austria May 31, 1894, No. 44/1,997.

*To all whom it may concern:*

Be it known that I, EDWARD COPE, lace manufacturer, a subject of the Queen of Great Britain, residing at New Basford, Nottingham, England, have invented certain new and useful Improvements in Twist-Lace Fabrics, (for which I have received patents in the following countries: in Great Britain, No. 9,643, dated May 13, 1893; in France, No. 237,251, dated March 22, 1894; in Belgium, No. 109,192, dated March 23, 1894; in Switzerland, No. 8,456, dated March 24, 1894; in Germany, No. 78,915, dated March 25, 1894, and in Austria, No. 44/1,997, dated May 31, 1894,) of which

the following is a specification.

The object of this invention is to produce double-faced fabrics (that is to say, fabrics having a pattern on both sides) on twist-lace machines.

Figure 1 is a transverse vertical section of a portion of an ordinary twist-lace machine modified to produce a fabric in accordance with my invention. The left-hand side of the figure is the front of the machine and the right-hand side the back. Fig. 2 is a similar view showing a modification. Figs. 3 and 4 are diagrams illustrating the movements of the spool-threads relatively to the warp-threads, and Fig. 4 also shows the nature of the fabric produced.

The drawings show mechanism adapted to produce double-faced fabrics in accordance with my invention.

I will describe the construction and operation of the machine.

$a$  is the work-bar;  $b b$ , the point-bars;  $b' b'$ , the points;  $c c$ , the combs in which the carriages work.  $d$  is one of the carriages;  $e$ , one of the bobbins;  $f$ , the bobbin-thread;  $g g$ , the catch-bar by which the carriages are drawn backward and forward between the warp-threads  $h$ ;  $j$ , a warp guide-bar, (there may be one or more;)  $k$ , a spool-thread;  $l$ , a spool-thread guide-bar (there may be one or more carried on supports in the usual manner or each guide-eye  $l'$  may be moved independently of the others;)  $m$ , the jack-bar, and  $n$  one of the jacks. All these parts are old, and their functions and the manner in which they are moved are well understood and require no description.

For the purpose of this invention I modify the machine in two respects: First, the spool-thread guides  $l'$ , in addition to their usual longitudinal shogging motion to and fro in front of the warp-threads in a direction at right angles to the plane of the figure, are made capable of being moved backward—that is to say, from left to right of the figure—so as to carry the spool-threads  $k$  between and to the back of the warp-threads  $h$ , assuming the position shown in dotted lines in the figure; second, I provide at the back of the machine instruments for moving the spool-threads  $k$  to and fro longitudinally in a direction at right angles to the plane of the figure. The instruments shown consist of a number of points or pickers  $o'$  on the bar  $o$ . It will be seen that by these means the warp-threads may be covered by the spool-threads on the back of the fabric, just as in ordinary working they are covered at the front, and thus a double-faced fabric is produced.

Figs. 3 and 4 illustrate, respectively, the relative movements of the threads and the fabric produced. In Fig. 3 the bobbin-threads  $f$  are omitted for the sake of clearness. When the carriages  $d$  are at the front of the machine, the guide  $l'$  moves from  $A$  to  $A'$ , Fig. 3, in front of the warp-threads  $h$ , carrying the thread  $k$  with it. The carriages  $d$  then move from front to back of the machine, so that the bobbin-threads  $f$  catch and hold the spool-threads  $k$ , tying them, as at  $x$ , into the pillars  $y$ , and then the guides  $l'$  move back from  $A'$  to  $A$  again in front of the warp-threads  $h$ . So far this is the ordinary process of making twist-lace; but now, in place of continuing to move in front of the warp-threads  $h$ , as is usual, the guides  $l'$  move between the warp to the back of the machine, as shown in dotted lines at  $A^2$ , Fig. 1. The point  $o'$  then carries the thread  $k$  at the back of the warp-threads  $h$  from  $A^2$  to  $B$ , Fig. 3, and when it has been secured by the bobbin-threads  $f$  it brings it back again to  $A^2$ . The guide  $l'$  then moves to the front of the machine to  $A$ , and the above-described motions are repeated with the results shown at Fig. 4. It will be observed that in the left-hand half of this figure the spool-thread  $k$  is always in front of the warp-threads  $h$ , while its convolutions lie al-

ternately in front of and behind the bobbin-threads  $f$ , the result of this being that every alternate convolution is tied into the pillars formed by the twisting together of the warp-threads  $h$  and bobbin-threads  $f$ . Similarly, on the right-hand side of the figure the spool-thread is always behind the warp-threads and has every alternate convolution tied into the pillars. The other spool-threads move in the same way, the result being that "cloth" is produced both at the front and the back of the fabric.

It will be obvious that in place of the spool-threads being shogged only in one direction from and back again to its central position on each face of the fabric it may be shogged in both directions on both faces, or it may be shogged in the same instead of different directions on the two faces.

In place of shogging the spool-thread guides at the front of the machine they may simply be moved from back to front, or vice versa, by Jacquard or otherwise. In this case pickers  $o'$  are provided at the front of machine, as well as at the back, for giving the longitudinal movement to the spool-threads. This modification is shown at Fig. 2, where the pickers  $o'$  at the front of the machine are carried by the bar  $p$ , free to slide longitudinally in guides on the under side of the comb-bar. It will be obvious that a like result may be obtained by moving the warp-threads from front to back,

instead of the spool-threads. This result may be attained by threading the warp-threads through the eyes on the bars  $l$ , Figs. 1 and 2, and the spool-threads through the eyes on the bars  $j$ . It will also be obvious that the spool-threads (or warp-threads, as the case may be) may either be all moved from front to back simultaneously or they may be moved independently of each other.

In cases where there are two sets of warp-threads the spool-threads may be carried behind one set only and be then shogged longitudinally, so as to cause them to lie between the two sets.

What I claim is—

1. A twist lace fabric in which the same spool threads clothe the fabric on both sides.

2. A twist lace fabric composed of warp, spool and bobbin threads in which the same spool threads clothe the fabric on both sides and are tied to the warps, substantially as described.

3. A twist lace fabric in which the warp and bobbin threads twist together in longitudinal pillars, and in which the same spool threads which are tied to the pillars clothe the fabric on both sides.

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Witnesses:

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