J. E. DUDSON.

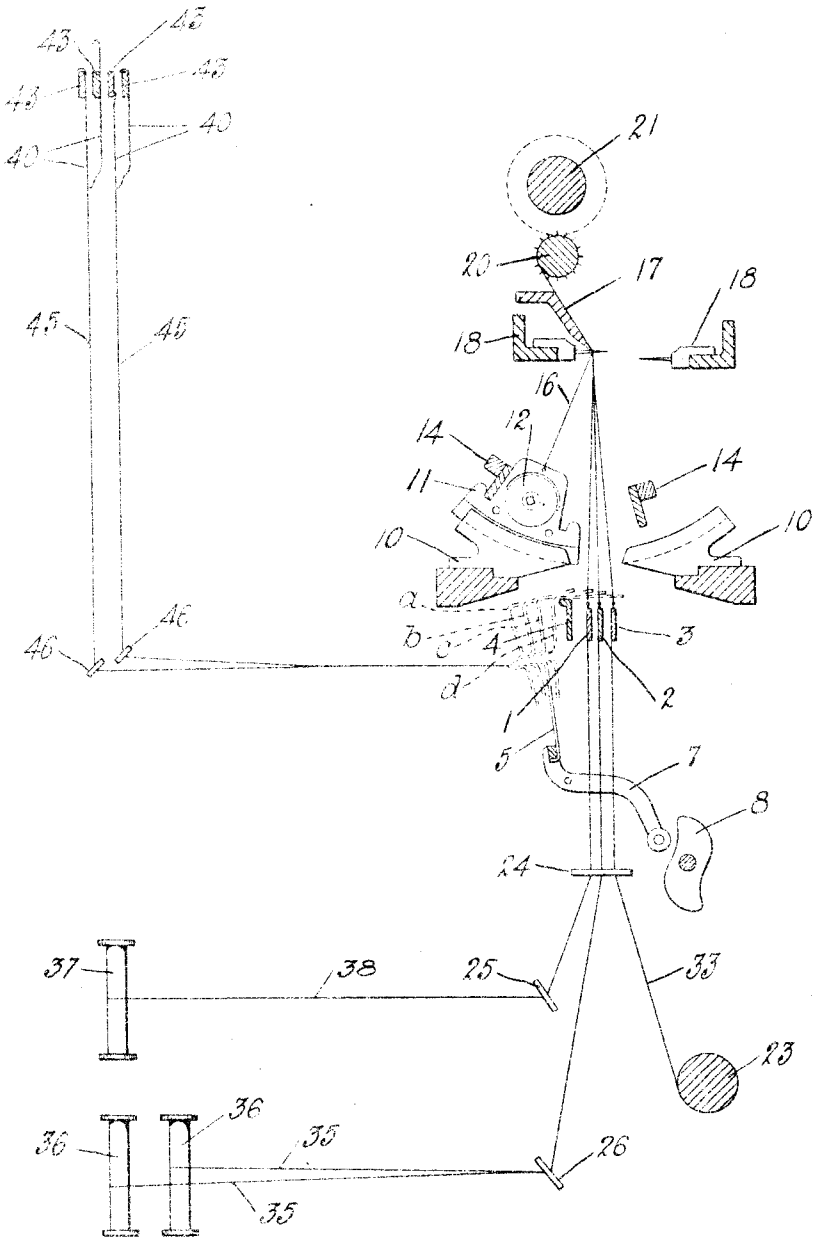
MANUFACTURE OF LACES.

APPLICATION FILED JUNE 3, 1912.

1,067,324.

Patented July 15, 1913

4 SHEETS—SHEET 1.



WITNESSES.

Albert G. Reginthowski.

Robert E. Kamphear.

FIG. 1

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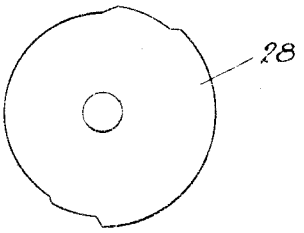


FIG. 2.

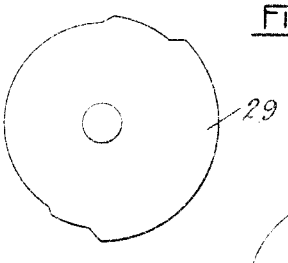


FIG. 3.

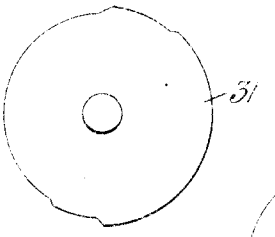


FIG. 5.

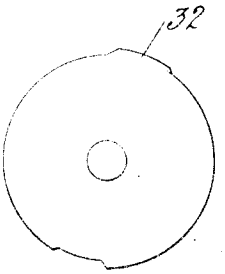


FIG. 6.

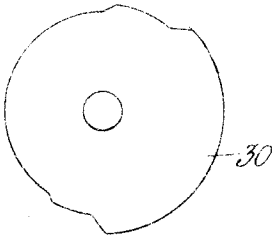


FIG. 4.

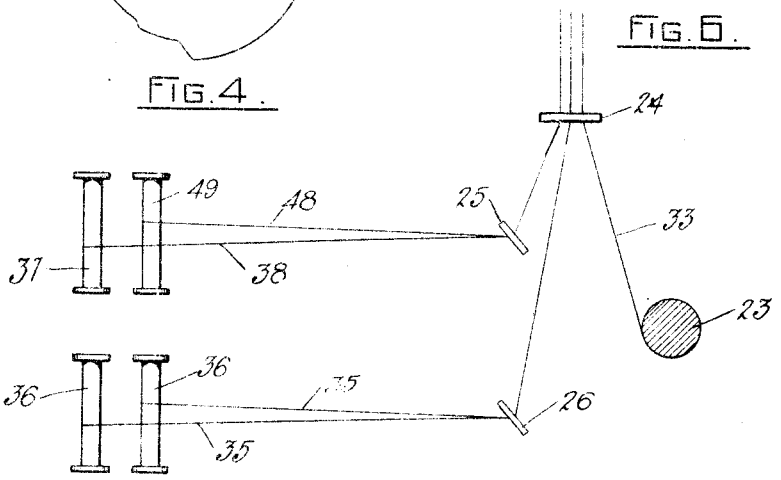


FIG. 7.

WITNESSES.

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4 SHEETS—SHEET 3.

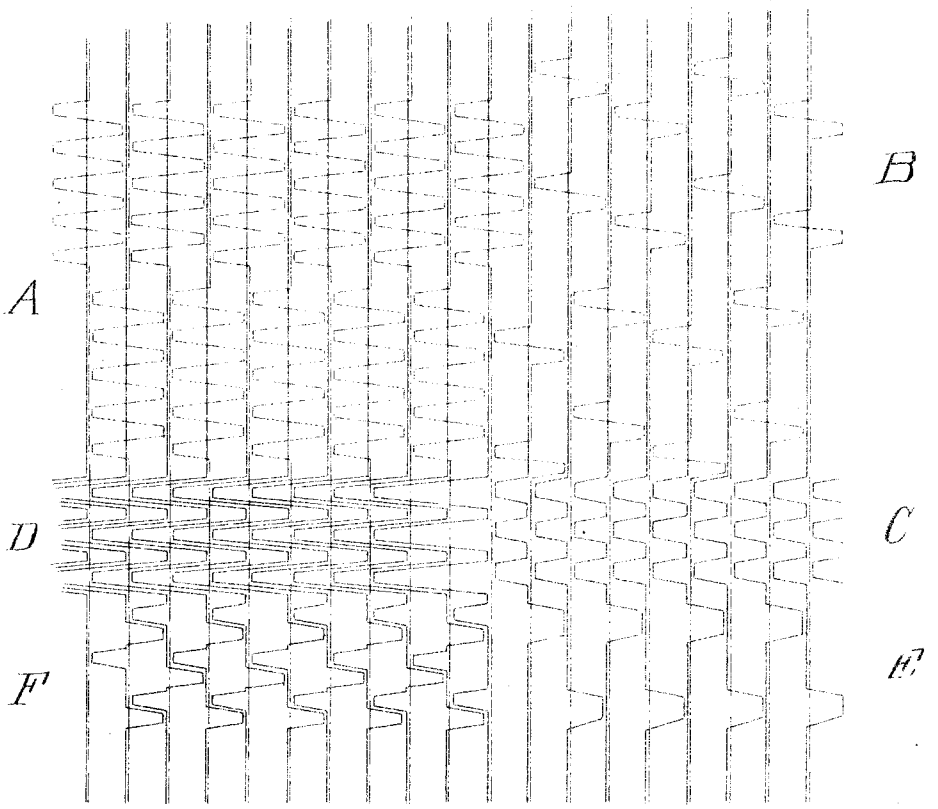


FIG. 6.

Red ——————
Green — — — —
White ——————

WITNESSES.

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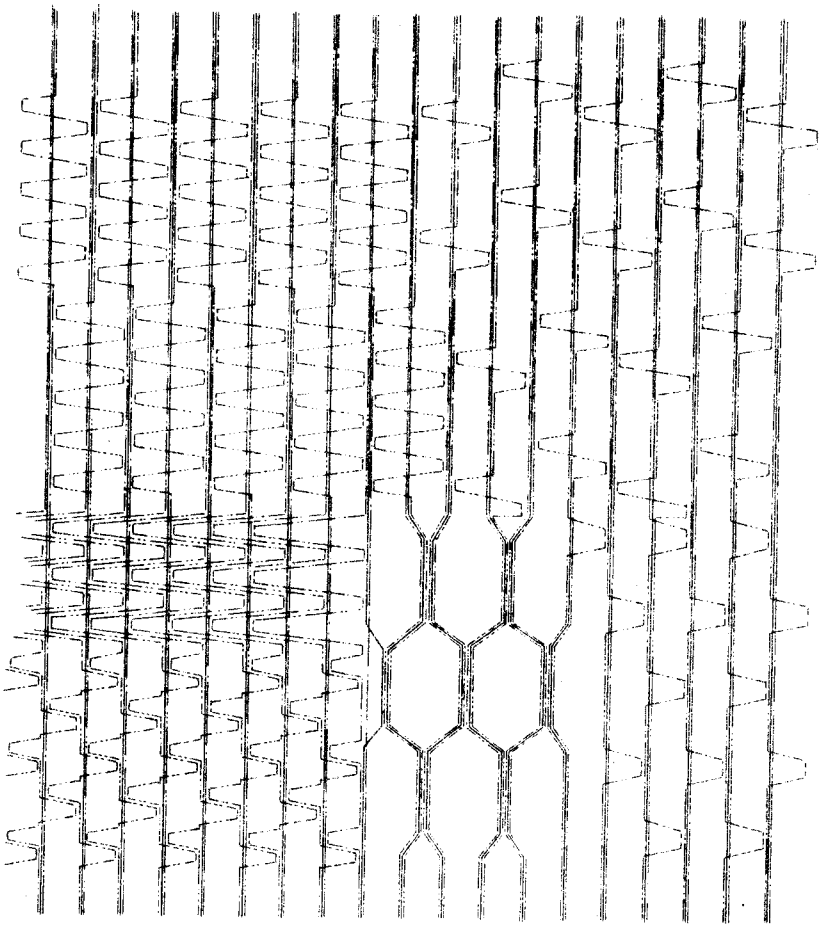
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4 SHEETS—SHEET 4.



G

FIG. 3.

Red

Green

Brown

White

WITNESSES.

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UNITED STATES PATENT OFFICE.

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MANUFACTURE OF LACES.

1,067,324. Specification of Letters Patent. Patented July 15, 1913.

Application filed June 3, 1912. Serial No. 701,125.

To all whom it may concern:

Be it known that I, JOHN E. DUDSON, a subject of the King of Great Britain, residing at River Point, in the county of Kent and State of Rhode Island, have invented certain new and useful Improvements in the Manufacture of Laces, of which the following is a specification.

This invention relates to improvements in colored lace; in the method of making the same; and in the mechanism used in connection therewith.

In the manufacture of lace curtains, particularly those known as English lace curtains, in which the weaving is effected in conjunction with jacquards, it has hitherto been impossible to weave colored longitudinal strips in which more than two colors in spool yarn have been employed; thereby making it possible to produce only a two colored fabric, and even then without raised objects and Cluny effects.

The primary object of this invention is to enable the weaving of such articles as lace curtains, embroidery, braids, window shades, lace-edgings and insertions, Cluny laces, bedspreads, panels, parasol covers, scarfs, dress goods, collarettes, shawls, table covers, fichus, lambrequins, vitrages and the like with any desired colored pattern of three or more interchangeable colors in each longitudinal strip: to produce at will any desired pattern or combination of three, or more colors at any desired place, including also raised objects and ornamental open lace effects.

In the present and preferred embodiment of my invention the machine is provided with three full threaded guide bars; the front bar carrying the warp threads, the middle one carrying spool threads of two different colors, entered alternately in every other guide, while in the back bar the thick spool threads for the patterning effects are entered. Each of the jacks in the machine is connected to two double lift jacquards, but the number of jacquards employed may be varied, and these are worked in such a way, that the first one lifts at the front motion of the machine and the second jacquard at the back motion. During the aforesaid two jacquard motions the guide bars are enabled to have 4 movements: before and after the jacks have entered the threads at the front and the back motion of the machine. As regards the colored threads the jacks are actuated in a double way, part of them stop the threads of one color and cause same to form ties, while the remainder of the jacks are held clear of the threads of the other color to enable same to follow the movement of the guide bar and to be twisted to their own warp threads.

The work of the machine is started with the carriages in the back combs. The front bar rises one gait, the middle and back bar two gaits each. The jacks, selected by the first jacquard then enter the threads, upon which the middle bar falls one gait and the back bar rises two more gaits. The carriages then pass into the front combs. At the beginning of the next motion the front bar falls one gait, the middle bar two gaits, and the back bar three gaits, after which the jacks enter again, this time selected by the second jacquard. While the needles of the second jacquard are lifted, those of the first jacquard have fallen. After the entering of the jacks, the middle guide bar rises one gait, the back bar falls one gait, upon which the carriages pass back to the back combs.

To produce a fabric having three interchangeable colors with raised objects and ornamental open effects, two of the colored spool threads are threaded alternately into one of the three guide-bars employed, while the remaining thick threads employed are for the production of the raised objects and are threaded in a second guide-bar from a single spool. The warp, which may or may not be of colored material, is attached to the third guide-bar and fulfils its usual functions of either strengthening the fabric or forming a combination of ornamental open lacy effects.

To produce a fabric having four interchangeable colors in spool yarn, or other material, two of the colored spool threads are threaded alternately into one of the three guide bars employed, and the other two colored spool threads are threaded into a second of the guide bars alternately, and the warp, which may or may not, be of colored material, occupies the third guide bar follows its usual functions as in the previous case where only three colors in spool yarn are used.

Heavily raised objects, known as Cluny spots can be obtained at great cost by the

"lever," or "lever go-through" type of lace machine, but the latter would require fully twenty guide bars as compared with a single guide bar of the present invention.

In the accompanying drawings which form a part of this specification and wherein like reference characters indicate like parts throughout the views.—Figure 1 is a diagrammatic representation partially in section of a curtain lace machine, Fig. 2, an elevation of a cam, Figs. 3, 4, 5 and 6 detailed views of various cams adapted for use in the present invention, Fig. 7, a diagrammatic representation of my machine wherein four spools are used, and Figs. 8 and 9, pieces of lace made according to my invention.

While one or more jacquards may be employed two are shown in the illustration.

In the drawings 1, 2 and 3 represent the guide bars of a curtain machine from back to front; 4, the jack separators; and 5, the stop needles or jacks supported by the jack lever 7 operated by its cam 8.

10 are the combs in which work the carriages 11 bearing the bobbins 12; and 14 are the catch bars by which the carriages are traversed back and forth.

16 is the bobbin thread or twist thread. Adjacent the face plate 17 are the usual point bars 18 by which the twists are taken up.

20 is the porcupine roller which draws the work away from the points and regulates the quantity; and 21, the work roll; 23 is the warp beam; 24, the thread slay; and 25 and 26, the spool thread slays.

The numerals 28 to 31 inclusive indicate the actuating cams adapted to reciprocate the bar 1. Cam 32 is the form of cam particularly adapted to and for the actuating bars 2 and 3.

The warp threads 33 which may or may not be of colored material are carried by the guide bar 3. Guide bar 2 carries the threads 35 of two different colors from the spools 36. The spool 37 carries the thick threads 38 for patterning effects, which may or may not be colored.

The jacks or stop needles 5 are of the ordinary shape, and move at each half motion of the machine before entering the threads in such a manner that they rise one gait at the front half motion, and fall one gait at the back half motion of the machine. Each jack 5 is connected to an upright needle 40 of one or more double lift jacquards; in the present instance, two, 43. From the needles 40 pass cords 45 through slays 46 to one jack or stop needle 5 which operates at four positions *a*, *b*, *c* and *d*. By these jacquards the jacks can be held clear of all the threads, or between the thick spool threads, or may pass through all the threads. The multiple operation of the jacks corresponds with the movement of the upright needles controlled by the jacquard cards employed.

It will be understood that the bars operate independently. Bar 1 supplies the yarn for the raised objects or Cluny effects; bar 2, alternately draws in or produces two interchangeable colors; and bar 3, forms open lacy effects, in accordance with the design or draft from which the pattern cards operating the jacquards have been stamped. In producing Cluny or raised effects the jack or stop needle 5 is by one of the jacquards brought back to the position *a*, the filament being supplied by the bar 1 which is operated by its cam 28 which regulates the thickness of the raised objects. For example, cam 28 collects eight layers; cam 29, ten layers; and cam 30, twelve layers; and cam 31, six layers of filament or yarn at each motion of the machine for each longitudinal strip, or for each bobbin thread, which strips or threads vary in number according to the gage of the machine. When it is desired that the two colored threads 35, threaded alternately in guide bar 2, shall be produced in the pattern, each alternate stop needle 5, by means of the jacquard operating on the back motion, is drawn back to position *b*, while each adjacent stop needle or jack by means of the jacquard operating on the front motion is also drawn back to position *b*. When it is desired that the two colors shall be reversed, the respective position described in connection with both back and front motions are reversed; the stop needle or jack now taking position *c*. The positions of the stop needles, however, are reversed at each motion, that is to say, if a stop needle 5 on a back motion should take position *b*, the same on a front motion following will take position *c*, and vice versa.

When it is desired that a combination of open lacy effects shall be produced by means of the warp threads 33 operating in guide bar 3, the stop needle 5 will take position *d* in accordance with the jacquard card on the jacquard employed for that position. Since the jacquard card controls any and all of the positions of the stop needles, the card controls all four of the positions of the needle 5. One stop needle is employed in connection with each longitudinal strip, and the thread 16 of the bobbin 12 is wound around the threads and then elevated to final position by the point bars 18, thus the desired pattern is produced.

As shown in Fig. 7 a fourth spool color may be added. The yarn 48 passes from the spool 49, through the slay 25 and is threaded alternately in guide bar 1. The four color spool and one color warp effects are thus secured. Each stop needle 5 is drawn back to the position, *a*, when the jacquard operated on the back motion of the machine. When the jacquard operates

on the front motion the adjacent stop needle also takes the position *a* on the front motion of the machine. Two colors are reversed or interchanged by the reversal of the needle from the position *a*, to position, *b*, on both back and front motions. In other words, if the needle should assume, on either back or front motions, the position, *a*, the needle will reverse its position on the following motions to position *b*, and vice versa. It is therefore possible to weave five distinct interchangeable colors into each longitudinal strip in any desired pattern, with a combination of open lacy effects, or of four or more interchangeable colors with any desired pattern with raised objects. The multiple operation of any individual stop needle in producing five distinct colors with open effects by occupying the various positions in connection with the guiding bars is in detail as follows: Guide bar 1 supplies two colors, say, red and green; guide bar 2, black and gold; while guide bar 3 supplies one color, brown. A stop needle occupying in the first instance position *a* on a back motion, and *b* on the following front motion would produce a red loop; and by occupying position *b* on a back motion and *a* on a front motion would produce green; and by occupying position *c* on a back motion, and *b* on a front motion would produce a black; and *b* on a back motion, and *c* on a front motion, would produce a gold; while by occupying position *d* on two consecutive motions, would produce a brown; and by position *b* or *c* on any two consecutive motions an open effect, or hole will be produced.

Colored loops known as Swiss effects, cloth A and open work B in two different colors, as shown in Fig. 8, are made, as already described, by stopping the threads of the color wanted by means of selectors or stop needles and at the same time allowing the threads of the other color to pass, which by the movement of the carriage thread will get twisted to their warp threads.

Two gait clothing and open work effects C, E. and F are made by the thick spool threads in the back guide bar by keeping the stop needles clear of all the threads. It is possible to make all effects appearing in ordinary double action goods because my machine forms both a single loop and a double loop F. Thick gait clothing effects D, as shown in Fig. 8, are also made by the thick spool threads. By taking jacks clear of all the threads to position, *a*, the thick threads are allowed to follow the movement of their guide bar in traversing 4 gaits. 5 and 6 gait clothing effects are not herein illustrated, since they will be readily understood from the description and from the cams 29 and 30.

G, Fig. 9, shows open lacy effects, which are caused by the warp threads, 33, when the jacks 5 take position *d*. This caused two adjacent warp threads to be bound by the bobbin thread. Another adjacent jack, in order to form the hole, takes either position *b* or *c*.

I claim,—

1. As a new article of manufacture, a lace comprising weavings of three or more colors in a single longitudinal strip.

2. As a new article of manufacture, a lace comprising multi-colored weavings interspersed with raised objects.

3. As a new article of manufacture, a lace comprising multi-colored weavings combined with open work and raised effects.

4. The process of making lace of three or more colored spool yarns, which consists in reciprocating the threads alternately in multiple distinct colors and giving double motions thereto and interweaving the multi-colored threads and producing a fabric having three or four more colors at any desired place.

5. The process of making multi-colored lace which consists in employing three or more colored spool yarns and warp yarns, reciprocating the threads, giving double motions to the colored threads, inserting the bobbin thread transversely of the spool threads, and pattern-controlling the movement of the spool threads.

6. The process of making lace of three or more colored spool yarns, which consists in threading alternately two of the colored spool threads, threading a thicker thread singly and reciprocating said threads, inserting a bobbin thread transversely of the spool threads and pattern-controlling the movement of the spool threads and producing a fabric having raised objects and ornamental open effects.

7. The process of making multi-colored lace, which consists in the employment of multiple lift jacquards, reciprocating the threads alternately in multiple distinct colors and giving double motions thereto, causing part to form ties with one color and causing the threads of another color to traverse the same and to be twisted thereto, thus forming an even colored fabric with colored effects produced at will.

In testimony whereof I have affixed my signature in presence of two witnesses.

JOHN E. DUDSON.

Witnesses:

HORATIO E. BELLOWS,

FRED W. PERKINS.