2 Sheets—Sheet 1.

(Specimens.)

A. & J. MORTON.

FIGURED WOVEN FABRIC.

No. 483,078. Patented Sept. 20, 1892.

Fig. 1.

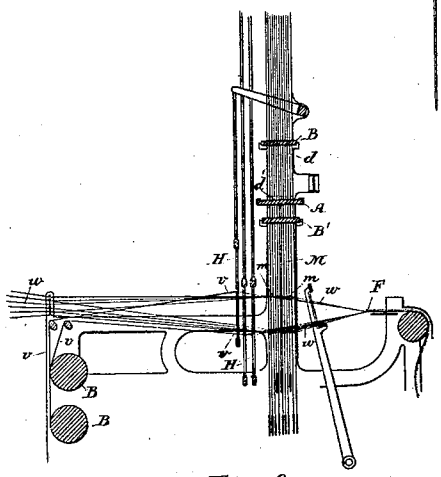


Fig. 8.

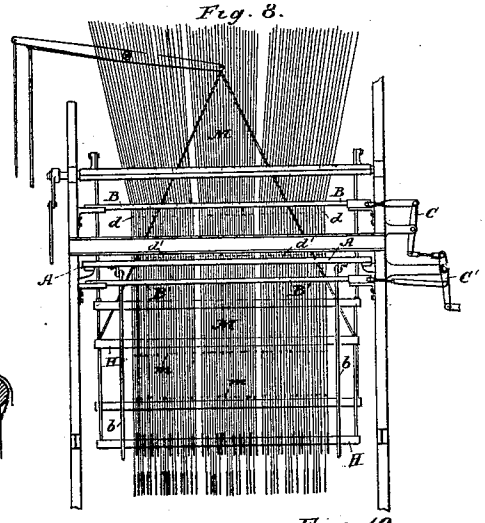


Fig. 9.

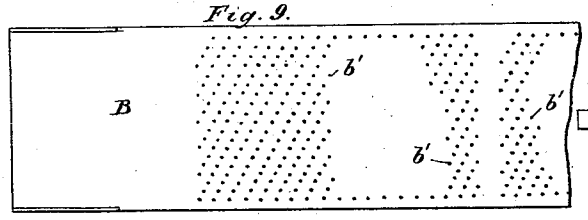


Fig. 10.

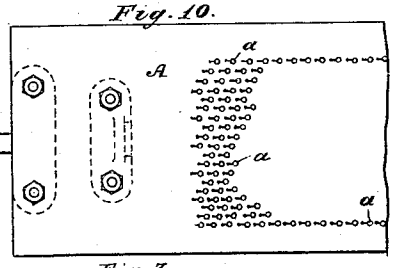


Fig. 2.

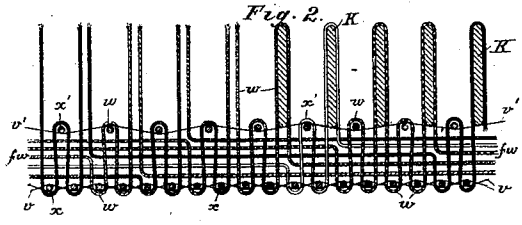


Fig. 3.

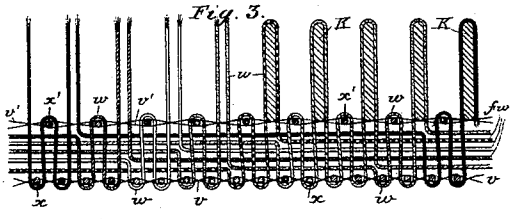


Fig. 4.

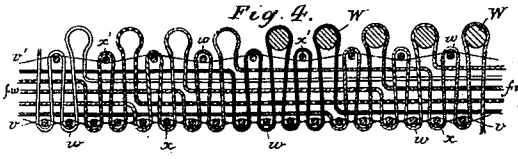


Fig. 5.

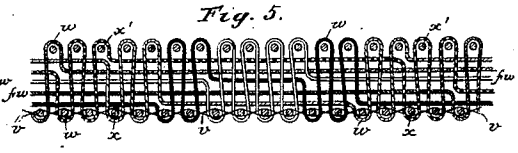


Fig. 6.

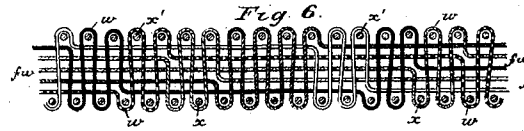
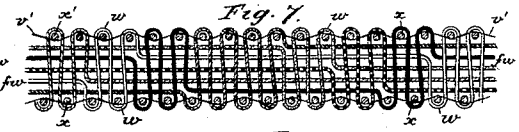


Fig. 7.



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(Specimens.)

2 Sheets—Sheet 2.

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FIGURED WOVEN FABRIC.

No. 483,078. Patented Sept. 20, 1892.

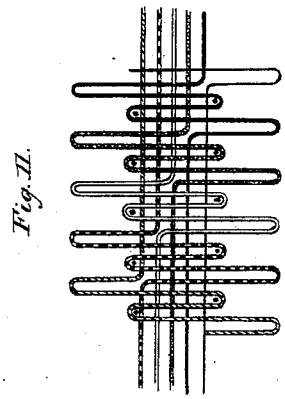

Fig. II.

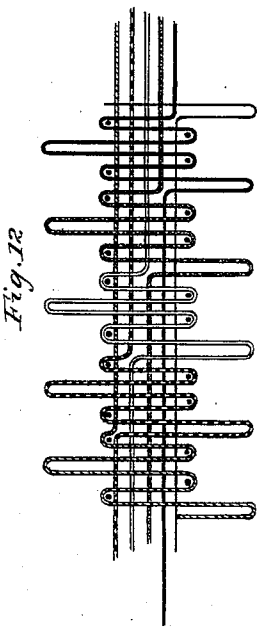

Fig. I2.

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UNITED STATES PATENT OFFICE.

ALEXANDER MORTON AND JAMES MORTON, OF DARVEL, SCOTLAND.

FIGURED WOVEN FABRIC.

SPECIFICATION forming part of Letters Patent No. 483,078, dated September 20, 1892.

Application filed August 28, 1890. Serial No. 363,307. (Specimens.) Patented in England March 19, 1889, No. 4,777.

To all whom it may concern:

Be it known that we, ALEXANDER MORTON and JAMES MORTON, residing at Darvel, Ayrshire, Scotland, have invented new and useful Improvements in Tapestry, Brussels, Plush, or Pile and Similar Figured Woven Fabrics, (which has not been patented in any country except Great Britain by Letters Patent dated March 19, 1889, No. 4,777;) and we do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the manufacture or art to which it relates to make and use the same.

This invention relates to the manufacture of tapestry, Brussels, plush, or pile and similar fabrics for carpets, curtains, and the like; and it has for its object the production in a weaving-loom of the same pattern and coloring on coincident portions of both sides or surfaces of the fabric, and whereby in the case of pile carpets and rugs in particular an imitation of hand-made Axminster fabrics is obtained, firmness equal to that secured by hand-knotting being given to the individual piles of cloth.

In the manufacture of such carpets and rugs in looms as heretofore attempted the pattern of the back of the fabric has been marred and the coloring mixed, owing to the binding-warps employed to secure the pile and form cloth being carried from back to front over the weft and floating colored or pattern warps and pressing the latter through between the warps forming the pattern at the back. According to our invention, however, we overcome this defect by forming practically two weft-planes of cloth in the fabric, the binding or twilling warps which may be introduced to bind the pattern-warps in either or both weft-planes being in no case carried from one weft-plane to the other or allowed to pass through the floating colored warp.

In carrying out the invention we employ an ordinary Brussels-carpet or similar loom, and, as represented in the diagram Figure 1 of the accompanying drawings, we carry the colored warps *w*, by which the pattern is formed from the fell F, to a bank or banks of bobbins at the rear of the loom through mails *m* in cords M, which are operated on by means of Jacquard mechanism, while the binding-warp *v* is carried in like manner to a beam or beams B and passes through heddles H or other shedding mechanism operated in the usual way to form one or two weft-planes of cloth when the shuttle is thrown. The Jacquard mechanism is operated to raise to the upper surface such of the colored warps *w* as are to form the pattern, then to depress the same warps to produce the same pattern on the coincident portion of the under side, the unselected warps being floated between the plies of the fabric, as indicated in the sectional diagrams, Figs. 2, 3, 4, 5, 6, and 7. The pattern-warps *w* are thus alternately raised and depressed at each throw of the shuttle—that is, raised at one throw and depressed at the next throw—while the binding-warps *v* are similarly but independently acted on by the heddles to form cloth, with the weft *x* or *x'* either in the back weft-plane alone to bind the pattern-warp in the case of cut pile fabrics or both in the front and back weft-plane.

In forming cut pile fabrics, as shown by Figs. 2 and 3, each selected warp *w* is carried down to the back of the under weft-plane under the shuttle-thread *x*, then up to the front over the next shuttle-thread *x'*, then down again for the next shot, and then up to the front, the pile-cutting blade or knife K being inserted at each alternate raising of the pattern-warp *w*, and the pile-thread being thus secured by two weft-shots *x x* over it, but under the floating warps *f w*, and one intermediate weft-shot *x'* under it, but over the floating warps, as well as by the binding-warps *v* or *v'*, when such are used in either the back or front weft-plane.

In weaving Brussels carpets, as indicated at Fig. 4, the usual pile-forming wires W are used instead of the cutting blades or knives. The wire or knife may be used for one of the sides only, in which case a raised or plush pattern would appear on one surface, while the coincident portion of the other surface would contain an equally distinct and similar pattern of plain tapestry, or, as in fabrics where a raised or plush surface is required on both sides, the wire or knife may be thrown over the colored warps *w* which are depressed to form the pattern on the under side of the

fabric, as well as under the colored warps *w* when raised to form the pattern on the upper side of the fabric.

The fabric may be woven with two or more shots instead of a single shot being thrown between the raised or cut pattern-warps on each side to insure greater firmness in tying on both sides, as shown in Figs. 11 and 12, the former figure showing the fabric as woven with one shot between the raised warp and the latter showing it with two shots between. Fig. 2 shows a single binding-thread interlaced with the weft-threads in the upper weft-plane and two binding-threads interlaced with the weft-threads in the lower weft-plane. Fig. 3 shows two binding-threads interlaced with the weft-threads in both the upper and lower weft-planes. Fig. 4 is a view similar to Fig. 1. In Fig. 5 two binding-threads are used in the lower weft-planes. In Fig. 6 no binding-threads are used. Fig. 7 shows one binding-thread interlaced with the weft-thread in the upper weft-plane and one interlaced with the weft-thread in the lower weft-plane. Fig. 8 is an elevation of apparatus we find it convenient to employ in conjunction with the Jacquard mechanism to facilitate the alternate raising and depressing of the selected warps, as hereinbefore described, and Figs. 9 and 10 are views of details of such apparatus.

This apparatus comprises a comber-board A, which has a rising-and-falling motion communicated to it by rods *b* from cams on any convenient shaft of the loom, (not shown,) and upper and lower hole-boards B B′, which have a simultaneous horizontally-reciprocating motion imparted to them by levers C C′, operated, also, from one of the loom-shafts. (Not shown.)

The knotted cords M of the Jacquard apparatus, by which the warps are selected, pass through perforations *b′* in the hole-boards and through holes *a*, having side slits, as shown, in the comber-board.

In the operation of this device when the Jacquard apparatus raises the selected warps *w* the knots on the cords M which are lifted are brought up to about the point *d*, while the knots on those for the unselected warps are left just over the comber-board at *d′*. The hole-boards B B′ are at the same time moved laterally, so that the knots are all over the narrow slits of the holes *a* in the comber-board, and a weft-shot is thrown. Then the comber-board is raised, engaging and carrying with it the cords acting on the unselected warps to float them, while the hole-boards are moved back, so that the knots on the cords for the selected warps are free to pass through the holes *a* in the comber-board, and these warps drop to the under side of the fabric when the next weft-shot is thrown.

The loom is or may be arranged to make two revolutions for each shifting of the Jacquard cords, so that the selected warps are raised and dropped twice in succession (or oftener, if desired) before a fresh selection is made.

Having now described the invention, what we desire to secure by Letters Patent is—

1. A tapestry, Brussels, plush, pile, or similar fabric having the pattern-warps arranged so as to produce the same pattern on coincident portions of both sides of the fabric, while the colored warps where not used for the pattern are floated between the plies, as set forth.

2. A tapestry, Brussels, plush, pile, or similar fabric composed, as described, of two distinct weft-planes bound together by warps which produce the same pattern on coincident portions of both sides, each weft-plane being bound by binding-warps which do not cross from weft-plane to weft-plane.

In witness whereof we have hereunto set our hands and seals this 2d day of July, 1890.

ALEXANDER MORTON. [L. S.]
JAMES MORTON. [L. S.]

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