(No Model.) 3 Sheets—Sheet 1.

T. I. SHUTTLEWORTH.

LOOM FOR WEAVING FIGURED DOUBLE PILE FABRICS.

No. 354,358. Patented Dec. 14, 1886.

FIG. 1.

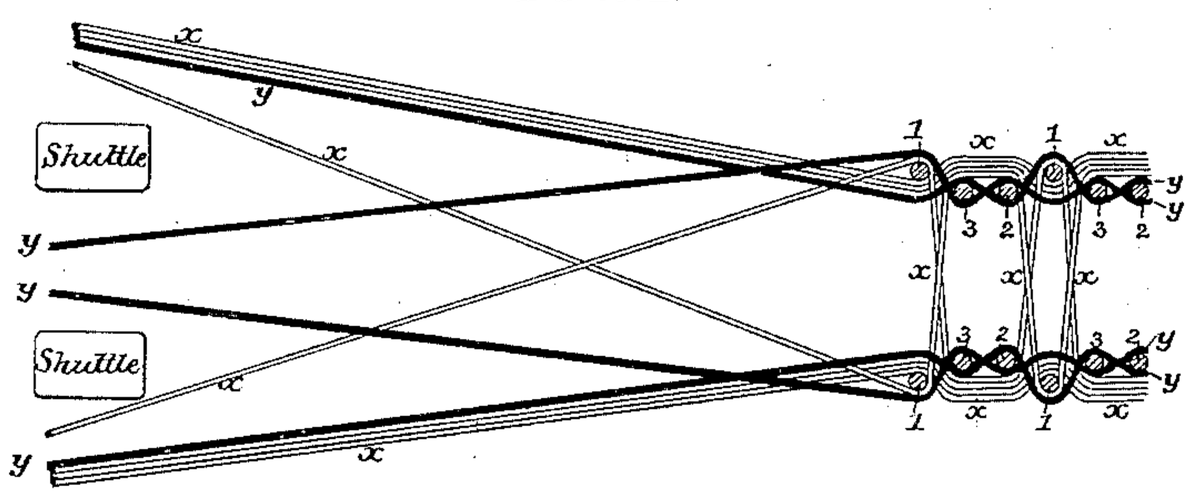

FIG. 2.

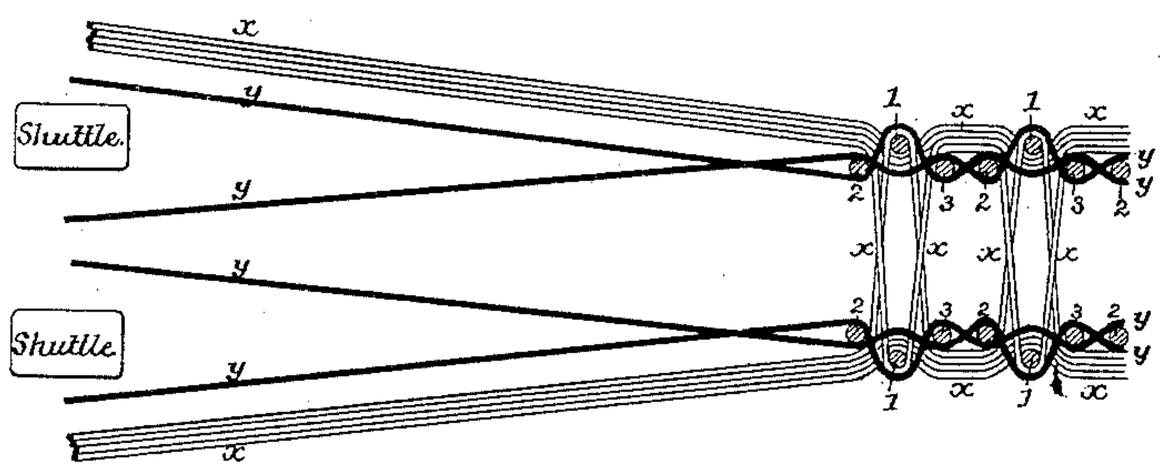

FIG. 3.

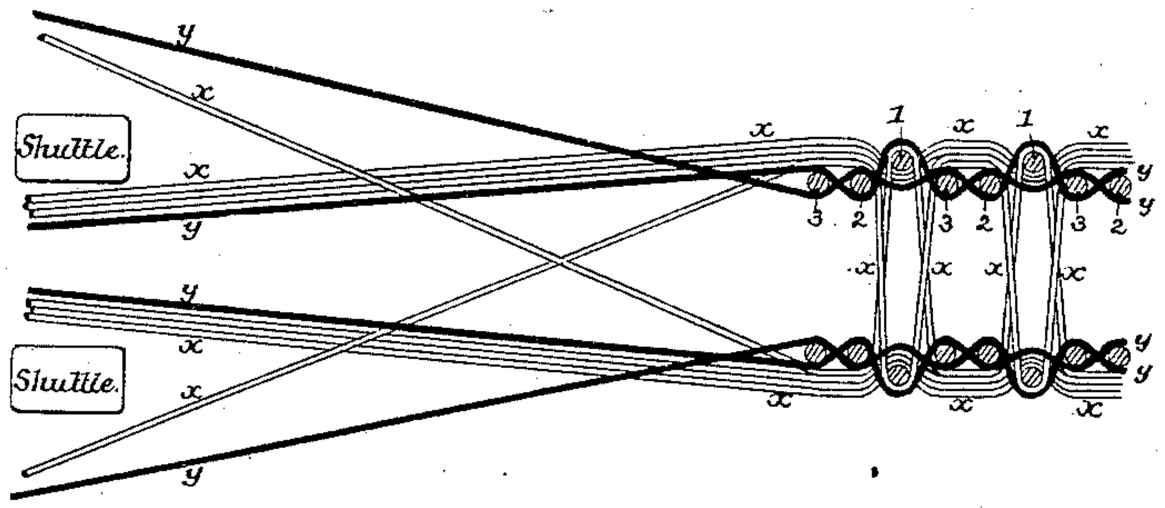

FIG. 10.

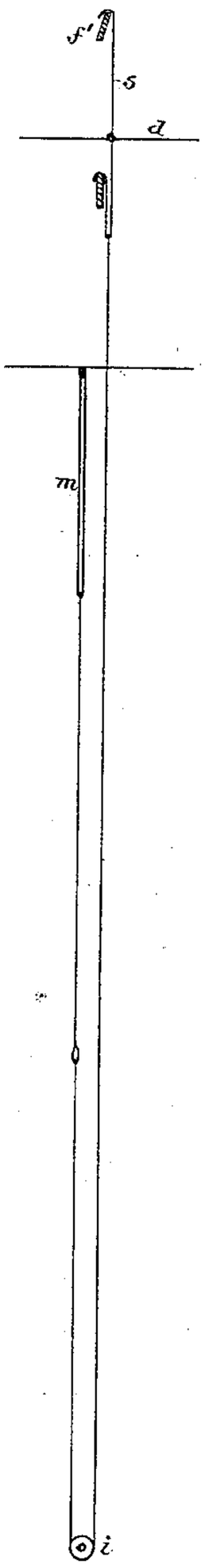

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FIG. 5.

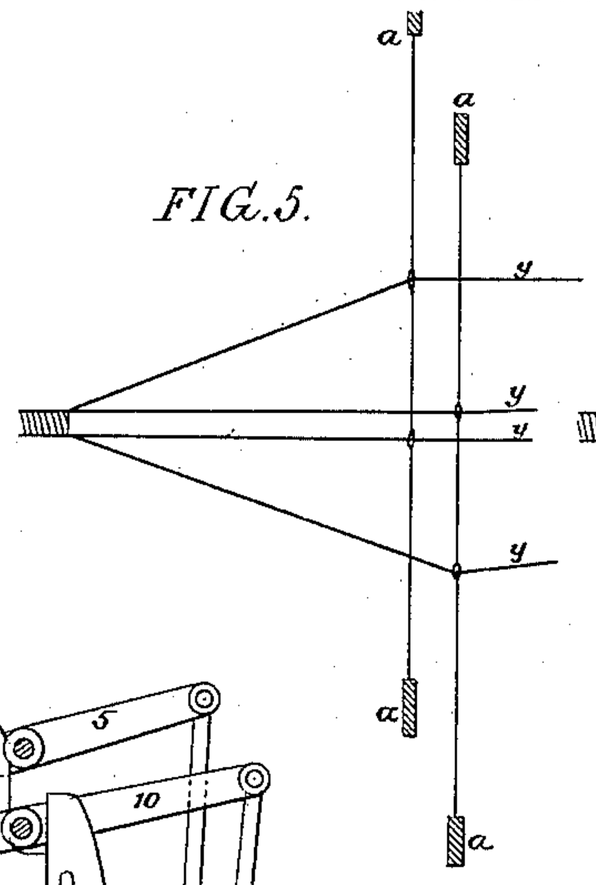

FIG. 6.

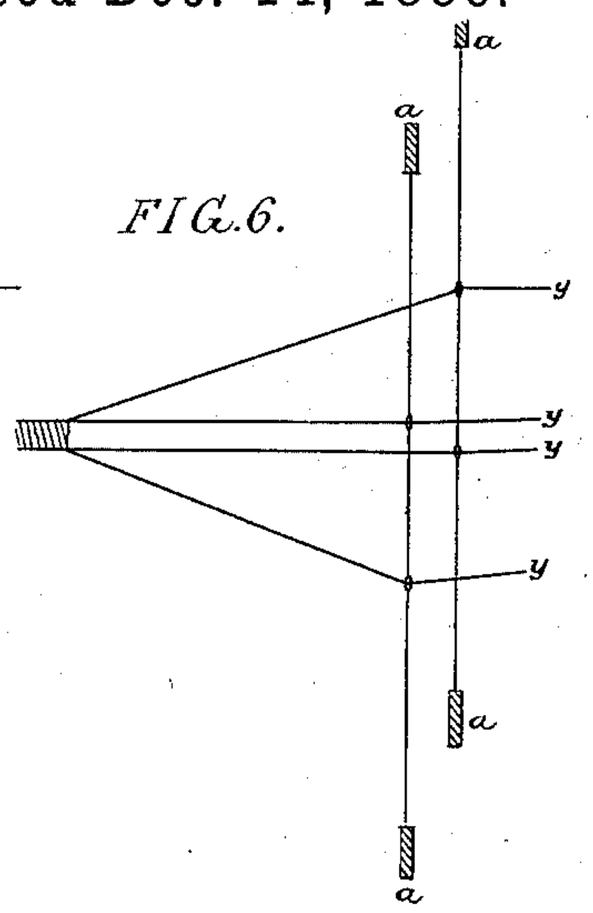

FIG. 4.

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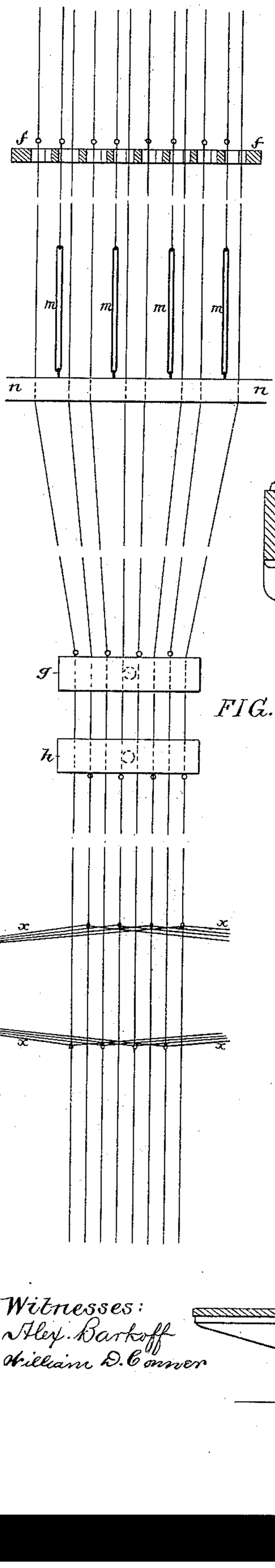

FIG. 7.

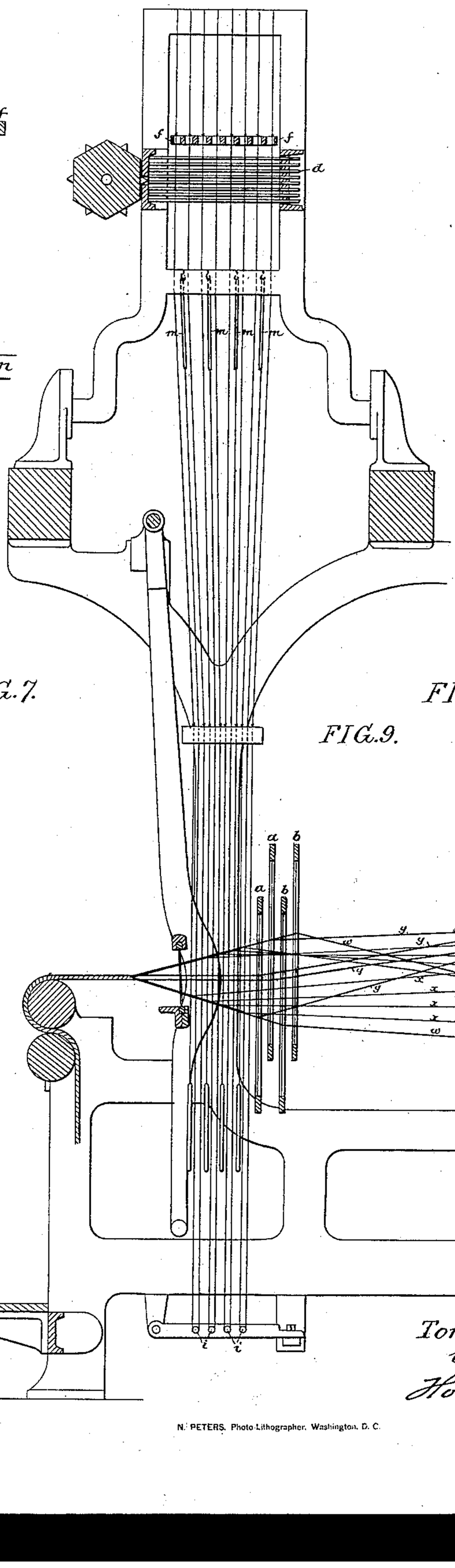

FIG. 9.

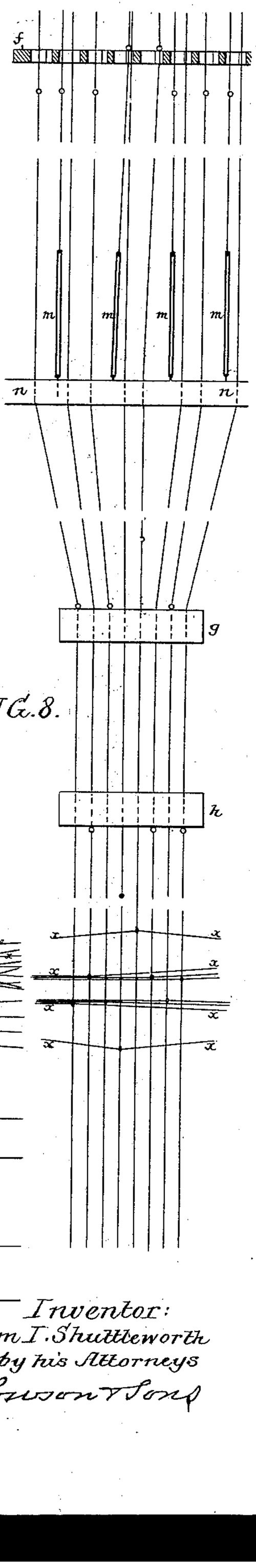

FIG. 8.

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UNITED STATES PATENT OFFICE.

TOM I. SHUTTLEWORTH, OF AMSTERDAM, NEW YORK, ASSIGNOR OF ONE-HALF TO JOHN BURT, OF PHILADELPHIA, PENNSYLVANIA.

LOOM FOR WEAVING FIGURED DOUBLE PILE FABRICS.

SPECIFICATION forming part of Letters Patent No. 354,358, dated December 14, 1886.

Application filed May 27, 1886. Serial No. 203,412. (No model.)

To all whom it may concern:

Be it known that I, TOM I. SHUTTLEWORTH, a citizen of the United States, residing in Amsterdam, Montgomery county, New York, have invented certain Improvements in Looms for Weaving Figured Double Pile Fabrics, of which the following is a specification.

My invention relates to looms for weaving figured double pile fabrics, my invention consisting in certain novel means for operating the pile-threads, whereby on the rise of the Jacquard lifter-board any desired pile-thread may be drawn down from the upper warp into the lower fabric or drawn up from the lower warp into the upper fabric, so as to produce two fabrics having a corresponding figure.

In the accompanying drawings, Figures 1, 2, and 3 are diagrams illustrating the method of weaving the fabric in accordance with my invention; Fig. 4, a diagram showing sufficient of a loom to give a proper understanding of my invention; Figs. 5 and 6, diagrams illustrating the operation of the heddles controlling the ground-warp threads; Figs. 7 and 8, diagrams illustrating the operation of the harness controlling the pile-warp threads, and Figs. 9 and 10 are views illustrating modifications of my invention.

Each of the fabrics has a number of pile-warps, *x*, and two ground or backing threads, *y*, the number of pile-warps depending upon the number of colors in the pattern to be produced.

The operation of weaving the fabric will be understood upon reference to Figs. 1, 2, and 3. In Fig. 1 the threads are represented as they appear after the figuring pile-warps have been drawn from the upper to the lower and the lower to the upper fabric and bound in by the filling-shots 1, all of the upper pile-warps being then elevated and the lower pile-warps depressed and the ground or backing warps of each fabric crossed, so as to form upper and lower sheds for the insertion of the binding-shots 2, which are thrown in and beaten up and the ground-warps of each fabric then again crossed, as shown in Fig. 2, to form sheds for the binding-shots 3, and after throwing in these shots the ground-warps of each fabric are again crossed to form upper and lower sheds, all of the upper pile-warps except those for the figure being lowered to the level of the bottom of the upper shed, and all of the lower pile-warps except those for the figure being raised to the level of the top of the lower shed, as shown in Fig. 3. Such of the upper pile-warps as are necessary to form the figure are drawn down into the lower shed, and such of the lower pile-warps as the figure demands are lifted into the upper shed, as shown in Fig. 3, preparatory to throwing in the binding-shots 1, which confine said figuring pile-threads on the backs of the fabric, the operations being then repeated.

As shown in the drawings, such of the pile-warps as are necessary to form the figure are drawn across from one fabric to the other on every third shot; but, if desired, only one binding-shot may be put in on the face of the fabric between successive tufts of the pile.

The mechanism for effecting the movements of the threads which I have described is shown in Fig. 4, in which *x'* represents the reels from which the pile-warps *x* are drawn, *y'* the beams which supply the upper and lower ground-warps, *a a* the heddles for operating said ground-warps, and *b b* heddles for operating thick filling or stuffing warps *w*, which are drawn from beams *w'*. These stuffing-warps alternate with the sets of pile-warps *x*, the latter and the stuffing-warp preferably passing through alternate dents in the reed.

The heddles *a a* have double eyes, as shown in Figs. 5 and 6, the threads *y* of the upper fabric passing through the upper eyes of the heddles and the threads *y* of the lower fabric through the lower eyes, these eyes being so related and the lift of the heddles being such as to effect the proper formation of the upper and lower sheds.

Each of the pile-warps *x* is controlled by a harness-thread connected to one of the needles *d* of the jacquard and passing through the usual notched eye in a lifter-board, *f*, above said jacquard-needles, each harness-thread having a knot above the lifter-board, so that when the thread is adjusted by the needle so as to bring this knot over a notch of the board said knot and that portion of the thread in

which it is formed will be lifted by the board as it rises, there being no lift of those threads the knots of which remain in line with the eyes of the lifter-board.

The movement of the entire body of warps, except those necessary to form the figure, is effected by comber-boards *g h*, the upper of which, in the present instance, acts upon knots upon the harness-threads of the pile-warps of the lower fabric, while the lower board acts upon knots upon the harness-threads of the pile-warps of the upper fabric, and these boards are caused to move toward and apart from each other, so that on the rise of the upper board, *g*, all of the pile-warps of the lower fabric, except the figure-warps, will be lifted from the position shown in Figs. 1 and 2 to that shown in Fig. 3, the descent of the lower board, *h*, causing the corresponding pile-warps of the upper fabric to drop to the same extent. The comber-boards remain separated while the binding-shots 1 are being thrown in, after which they are drawn together, so as to restore the warps under their control to the positions shown in Figs. 1 and 2.

Such of the pile-warps as are desired to form the figure are by means of the jacquard brought under control of the lifter-board, which has a movement in excess of that imparted to the comber-boards, so that said figuring pile-warps will be carried up or down into the opposite fabric, as set forth in the beginning of the specification.

The figuring-threads of the lower pile-warp are simply elevated by the action of the lifter-board as the latter rises in the usual manner; but it is necessary to transform this rising movement of the lifter-board into a downward movement of the figuring-threads of the upper pile-warp; hence in accordance with one plan of carrying out my invention I pass each of the harness-threads of said upper pile-warps around a pulley, *i*, or other bearing, double it back upon itself, pass it again through the eye of the lifter-board, and connect it at the lower end to a strip, *m*, of rubber or other elastic material, secured to the guide-board *n* below the Jacquard apparatus, or to any other available point of connection. The lifter-board acts upon a knot on this returned portion of the harness-thread, so that the lift of the board serves to stretch the spring and permit the drop of the weighted portion of the harness-thread which controls the warp-thread, said warp-thread being lifted on the descent of the board by reason of the contraction of the spring *m*, which exerts a force considerably in excess of the weight. These operations will be understood on reference to Figs. 7 and 8.

The lifter-board of the jacquard is operated by a cam, 1, on a shaft, 2, the cam acting on a slide, 3, which is connected by a rod, 4, to a lever, 5, connected to the lifter-board by a rod, 6.

The comber-boards are operated by a cam, 7, on the shaft 2, this cam acting on a slide, 8, which is connected by a rod, 9, to a lever, 10, and by a rod, 11, to an arm, 12, the lever 10 being connected by a rod, 13, to the upper comber-board, *g*, and the arm 12 by a rod, 14, to the lower comber-board, *h*, so that the desired movements of said boards toward and from each other are effected.

The Jacquard cylinder, heddles, lathe, take-up rolls, cam-shaft, and other parts of the loom may be operated by mechanism, which need not be described, as it forms no part of my invention. I may say, however, that the patent of Bigelow, No. 16,370, January 13, 1857, shows mechanism which is available for the purpose.

In the modification of my invention shown in Fig. 9 the harness-threads which control the pile-warps of the upper fabric are doubled at the lower end instead of at the upper end, and pass round rollers *i*, carried by a bar secured to the frame of the loom. In this case the knot is on the main portion of the harness-thread, above the lifter-board, and the eye for the warp-thread is on the returned portion of said harness-thread, the upper end of which is connected to the elastic cord *m*, so that on the rise of the knot under the action of the lifter-board the harness-eye will be depressed and the spring *m* stretched. But one comber-board is used in this case, said board having eyes for both portions of the doubled harness-threads.

It will be evident that a weight may take the place of a spring as a means of maintaining the returned portion of the harness-thread in its normal position; but the spring is preferred. It will be evident, also, that my invention can be used in connection with Jacquard apparatus of that class in which lifter-bars *f'* are used in place of an eyed and notched lifter-board, and lifter-hooks *s* are used instead of knots in the harness. (See Fig. 10.)

I claim as my invention—

1. As a means of drawing a pile-thread from the upper to the lower fabric in weaving figured double pile fabrics, the combination of a lifter board or bar and operating mechanism therefor with a harness-thread having a doubled or turned-back portion with elastic or weighted end, that part of said thread on one side of the turn having the knot or equivalent device for the action of the lifter board or bar, while that portion of the thread on the other side of the turn has the eye for the passage of the warp-thread, all substantially as specified.

2. The combination, in a loom for weaving figured double pile fabrics, of the Jacquard lifter-board, its operating devices, and the straight harness-threads controlling the pile-warps of the lower fabric, with harness-threads controlling the pile-warps of the upper fabric, and each having a doubled or turned-back portion with elastic or weighted end, all substantially as specified.

3. The combination, in a loom for weaving

figured double pile fabrics, of the Jacquard lifter-board, straight harness-threads for the pile-warps of the lower fabric, doubled harness-threads with elastic or weighted ends for the pile-warps of the upper fabric, one or more comber-boards for operating the harness-threads independently of the Jacquard lifter-board, and devices for operating said Jacquard lifter-board and the comber board or boards, all substantially as specified.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

TOM I. SHUTTLEWORTH.

Witnesses:
WILLIAM F. DAVIS,
HARRY SMITH.