(No Model.) 5 Sheets—Sheet 1.

S. C. LISTER & J. REIXACH.

DOUBLE PILE FABRIC.

No. 355,772. Patented Jan. 11, 1887.

FIG. 2.

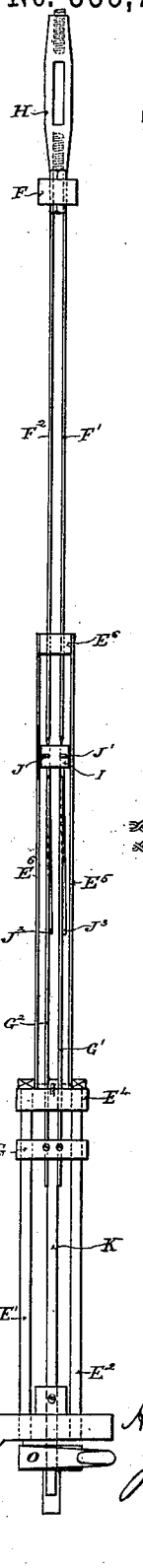
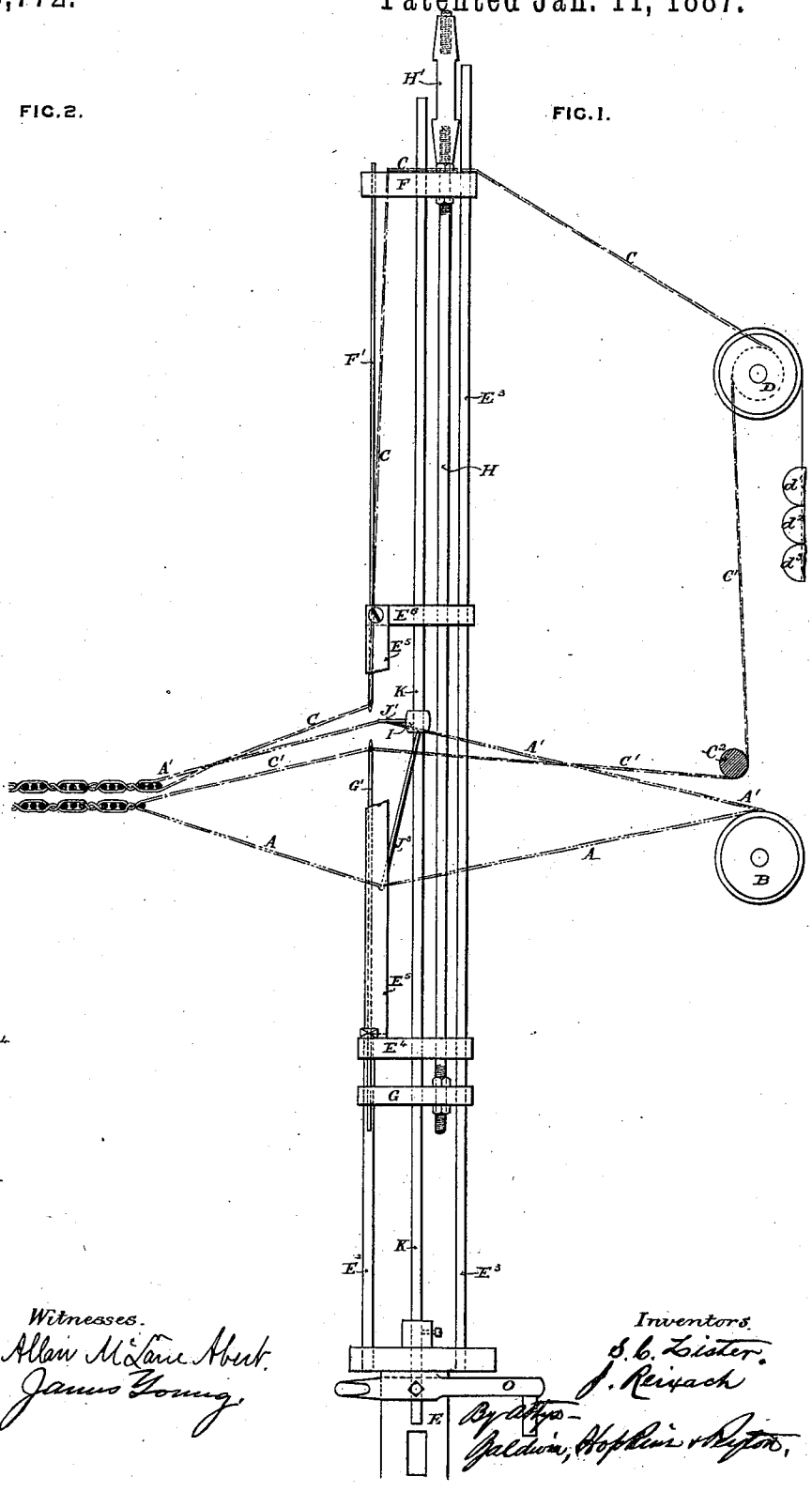


FIG. 1.



Witnesses.
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(No Model.) 5 Sheets—Sheet 2.

S. C. LISTER & J. REIXACH.

DOUBLE PILE FABRIC.

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FIG. 4.

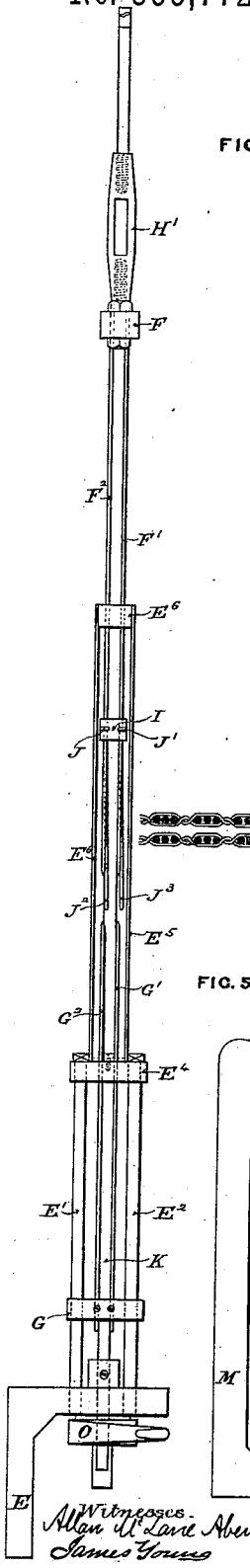


FIG. 3.

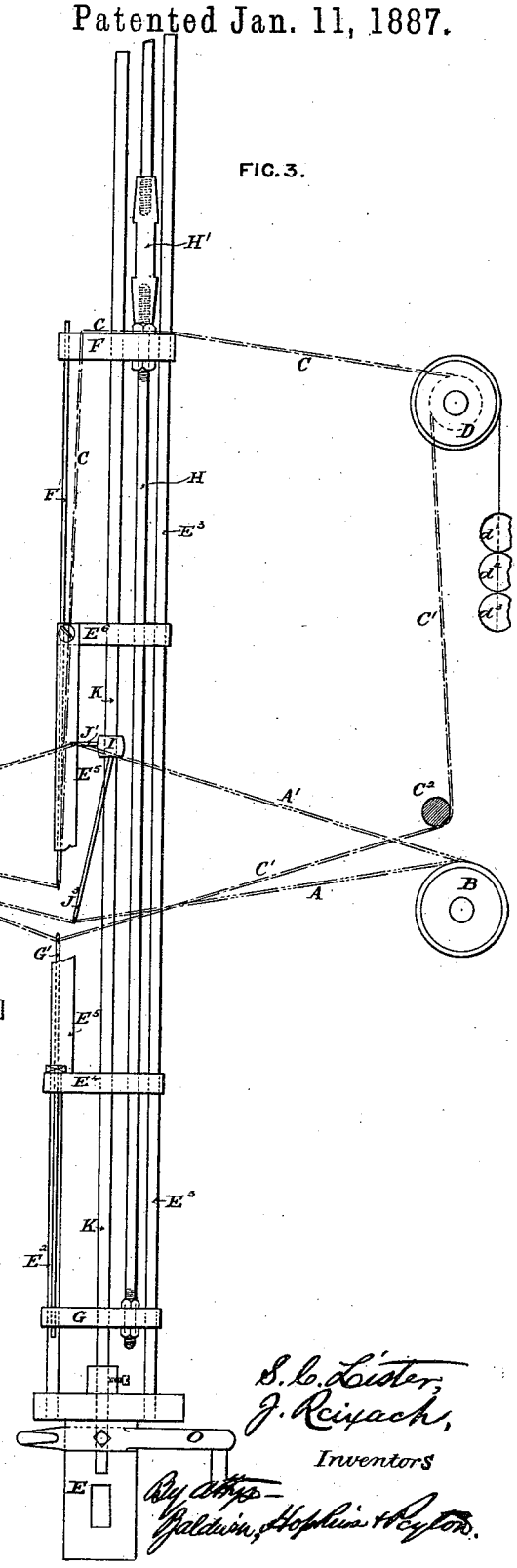
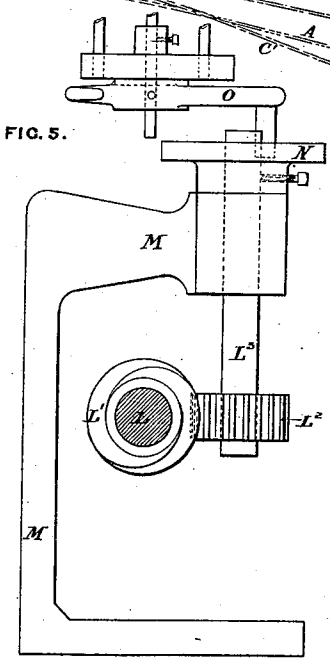


FIG. 5.



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S. C. LISTER & J. REIXACH.

DOUBLE PILE FABRIC.

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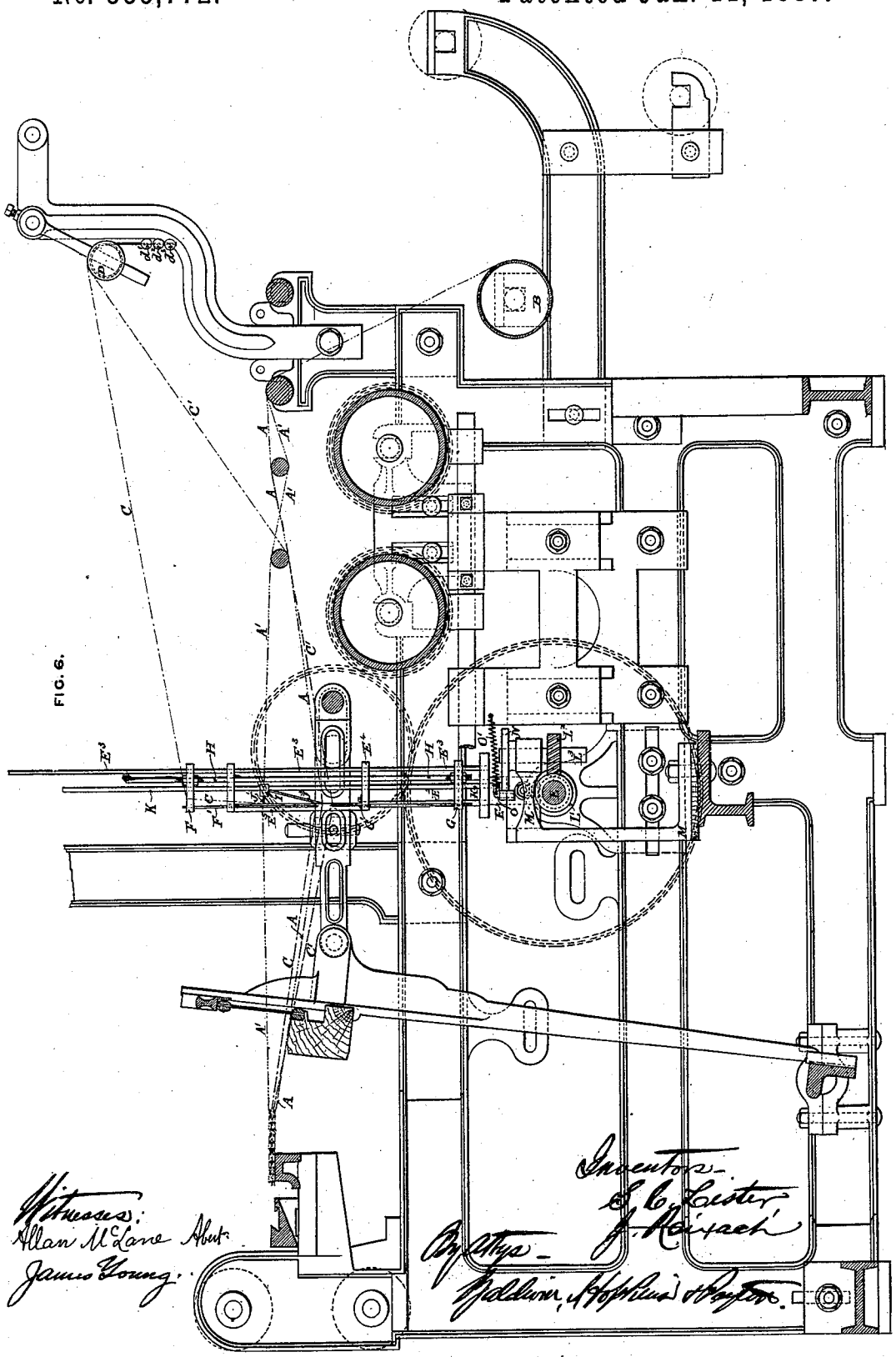

FIG. 6.

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(No Model.) 5 Sheets—Sheet 4.

S. C. LISTER & J. REIXACH.

DOUBLE PILE FABRIC.

No. 355,772. Patented Jan. 11, 1887.

FIG. 8.

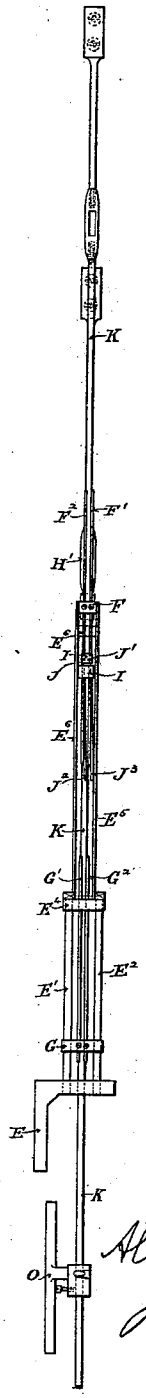
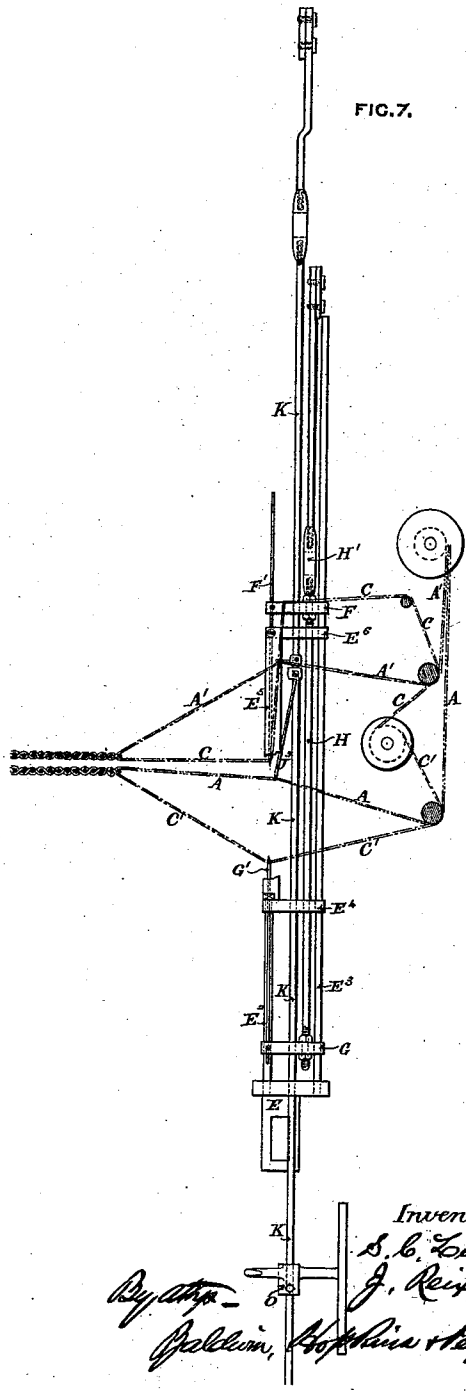


FIG. 7.



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S. C. LISTER & J. REIXACH.

DOUBLE PILE FABRIC.

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DIAGRAM A.

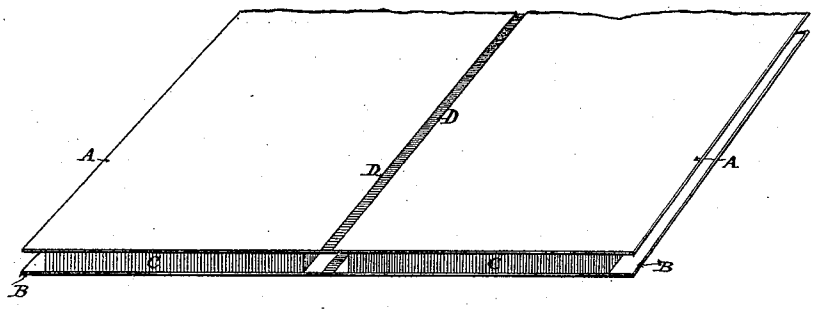


DIAGRAM B.

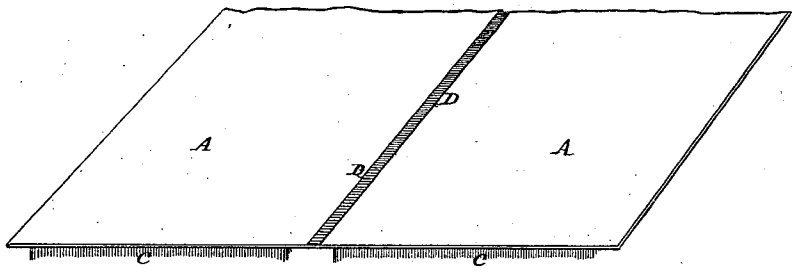
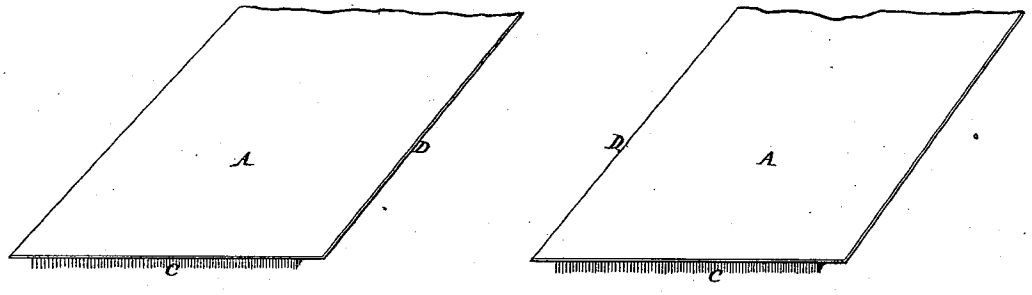


DIAGRAM C.



Witnesses.
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UNITED STATES PATENT OFFICE.

SAMUEL CUNLIFFE LISTER AND JOSÉ REIXACH, OF BRADFORD, COUNTY OF YORK, ENGLAND.

DOUBLE PILE FABRIC.

SPECIFICATION forming part of Letters Patent No. 355,772, dated January 11, 1887.

Application filed August 12, 1884. Serial No. 140,374. (No model.) Patented in England November 28, 1883, No. 5,561.

To all whom it may concern:

Be it known that we, SAMUEL CUNLIFFE LISTER and JOSÉ REIXACH, subjects of the Queen of Great Britain, residing at Bradford, in the county of York, England, have invented certain new and useful Improvements in Double Pile Fabrics, (for which we have received Letters Patent in Great Britain, No. 5,561, dated November 28, 1883,) of which the following is a specification.

This invention relates to double pile fabrics woven face to face in a power-loom.

The object of the invention is to admit of two or more narrow widths or pieces of double pile fabrics being woven side by side in a broad loom, and to admit of their being afterward divided the one from the other to produce two or more narrow widths, each with fast selvages. For this purpose we form two adjacent selvages with fast edges at any desired part of the width both of the upper and lower cloths of the double pile fabric, and we form the selvages in the upper cloth immediately above the selvages in the lower cloth. To form a fast edge to each inner selvage, we employ a warp binding-thread to cross with the outermost warp of the selvage and become knit together therewith. Any desired number of fast inner selvages may be formed in this way in the width, so that the fabric may be divided into widths of any required size by cutting both the upper and lower cloths lengthwise in between the pairs of fast selvage edges which have been made in these cloths.

To form two adjacent fast inner selvages both in the upper and lower cloth of a double pile fabric, and to form the fast selvage edges in the upper cloth immediately above the fast selvage edges in the lower cloth, we employ two sets of needles of two needles each. The needles in the upper set we place in a line with the needles in the lower set, and make them to point downward, while those in the lower set we make to point upward. Both sets of needles we fix in slides, which can be simultaneously moved either upward or downward in a fixed frame, and to give motion to the slide, we connect them by a rod to a heald-lever. The needles, near to their points, have eyes formed through them, and through the eyes of the upper pair we thread the binding-threads which are to form the fast selvages in the upper cloth, and through the eyes of the lower pair we thread the binding-threads which are to form the fast selvages in the lower cloth. With these needles we also employ two pairs of thread-eyes, to which a lateral movement can be given from the low shaft. Through the upper pair we pass two selvage-warps for the upper cloth, and through the lower pair two selvage-warps for the lower cloth. These two pairs of eyes are set one above the other at such a distance apart as to leave space enough for a shuttle to pass to and fro between the warps threaded through them. The points of the upper pair of needles we likewise set at a distance from the points of the lower pair of needles. In the upward and downward movement of the needles their points are brought alternately above and below the selvage warp-threads with which the binding-threads threaded through the needles are to be crossed, and when the needles are at one or the other end of their stroke the thread-eyes are made to shog sidewise, so that the warp binding-threads, which receive an up-and-down motion, may, as hereinafter more fully described, be first brought to one side and then to the opposite side of the warps, which receive a sidewise movement, and the binding-threads and warps are so twisted together with a false twist, which, in conjunction with the weft-threads, link them together and form a fast selvage edge.

In the drawings hereunto annexed we have shown two constructions of mechanism for forming fast inner selvages in the two cloths of a double pile fabric in the manner above described. One construction is adapted for forming the fast inner selvages in the two cloths when the fabric is being woven in a single-shuttle loom, and the other for forming these selvages when the fabric is being woven in a loom in which two shuttles are thrown simultaneously.

Figures 1 to 5 show the mechanism to be used with a single-shuttle loom. Fig. 6 shows a longitudinal section of some of the main parts of a single-shuttle loom and the mechanism for forming the fast inner selvages fitted to it, in order to show clearly the way in which this mechanism is controlled from the low or pick-

ing shaft of the loom. Figs. 7 and 8 show the mechanism to be used with the two-shuttle loom. Fig. 1 is a side elevation of mechanism to be used with a single-shuttle loom for forming the fast inner selvages in the two cloths of a double-pile fabric, showing the binding and warp threads in position while weaving the bottom piece. Fig. 2 is a front view of the same. Fig. 3 is a side elevation similar to Fig. 1, except that the binding and warp threads are shown in position while weaving the top piece, and Fig. 4 is a front view of the same. Fig. 5 is a side elevation of the lower part of the mechanism, showing the way in which a sidewise movement is given to the selvage-warps from a cam driven from the low shaft. Fig. 7 is a side elevation, and Fig. 8 a front view, of the selvage-forming mechanism for a two-shuttle loom.

It will be seen that in Figs. 1, 3, and 7 part of the frame-work is cut away in order to show the position of the needles more clearly.

Diagram A shows a perspective view of a short length of a double pile fabric woven face to face, with fast inner selvages down the center of the upper and lower cloths of the fabric. Diagram B shows a perspective view of one-half of this fabric when the pile has been severed and the upper cloth separated from the lower cloth. Diagram C shows two separate pieces obtained by dividing the fabric shown at Diagram B longitudinally between the fast selvages which are formed in it. In these diagrams, A is the upper cloth, B the lower cloth, and C the pile. The two parallel lines D D, which run lengthwise of each cloth, represent the fast edges of inner selvages.

In Figs. 1 to 6, A A′ are selvage-warps, which are drawn from a reel or bobbin, B; but they might, if desired, be taken from the same beam as that upon which the other selvage-warps are carried, or from the main warp-beam.

C C′ are the binding-threads, which are drawn from a reel or bobbin, D.

The warps A A′ are threaded through the thread-eyes J J′ J^2 J^3, to which a sidewise shogging movement is imparted. The binding-threads C C′ are threaded through the eyes of the needles F′ F^2 G′ G^2, to which an up-and-down movement is imparted. The binding-threads C, for the upper pair of needles, are led downward to the eyes of the needles through eyes in the bar F, to which the stems of the upper needles are secured. The binding-threads for the lower pair of needles are passed under the guide-rods C^2. A uniform tension is maintained upon the binding-threads C C′ during the alternation of shed by means of a cord, which carries weights d' d^2 d^3. As the bobbin empties itself the cord is wound up and the weights raised until they pass over the top of the pulley and overbalance. They then drop down on the opposite side of the pulley and again tighten the binding-threads, and so on continuously.

E is a bracket or base, which is bolted to a cross-bar of the frame-work of the loom. E′ E^2 E^3 are upright rods fixed into it. Upon the top of the rods E′ E^2 is fixed a plate, E^4. Two guard-plates, E^5, rise up from the top of the front end of this plate. The needles F′ F^2 G′ G^2 and thread-eyes J J′ J^2 J^3 are between these two plates, which keep the other warps from interfering with their action. To the top of the guard-plates E^5 is secured another plate, E^6. The rod E^3 is prolonged upward through the plates E^4 E^6, as shown in Figs. 1 and 3, and is secured to both these plates.

F is a bar to which the upper needles, F′ F^2, are secured. G is a similar bar, to which the lower needles are secured.

H is a connecting-rod, which passes through vertical holes in the plates E^4 E^6, and connects the bars F and G together. This connecting-rod receives an up-and-down motion from one of the heald-levers. H′ is a union for coupling the connecting-rod H to a rod, H^2, which passes downward from the lever. The upper pair of needles, F′ F^2, pass through holes in the guide-plate E^6, whereby they are guided in their up-and-down motion. The lower pair of needles, E′ E^2, similarly pass through holes in the guide-plate E^4. The bar G, to which the lower needles are secured, is guided in its up-and-down movement by the rods E′ E^2 E^3. The bar F, to which the upper needles are secured, is guided in its up-and-down motion by the rod E^3 and also by another rod, K, which passes through it.

J J′ J^2 J^3 are guide-fingers having eyes at their extremities, through which the warp-threads A A′ are threaded. These guide-fingers extend from a collar, I, which is fixed upon the rod K. A rocking motion is imparted to the rod K, so as to give a sidewise to-and-fro movement to the guide-fingers. To effect this the rod K, at its lower end, is made to pass through the base-plate E, and a collar is secured to the rod to rest upon the top of the plate, while a lever, O, is secured to it just below this plate. The lever is (by a spring, O′, Fig. 6, hooked onto it) pressed constantly toward a tappet or cam, N, so that a pin which descends from the end of the lever-arm rests always against the surface of this tappet or cam. The tappet or cam N is carried by a short upright shaft, L^3, which, by a worm, L′, and worm-wheel L^2, is driven from the ordinary low or picking shaft, L, of the loom. The upright shaft L^3 is mounted in bearings in a bracket, M, which is attached to the frame-work of the loom.

The operation is as follows: When the parts are in the position shown in Fig. 1, three picks of weft are put into the bottom cloth, and the thread-eyes are during this time shogged sidewise a distance equal to the distance between the needles of each pair. Afterward the needles descend and three picks of weft are put into the upper cloth. After this the needles rise and three picks of weft are put into the bottom cloth, and during this time the thread-eyes are shogged back into their for-

mer position, and so on continuously. In this way the fast selvage edges are formed in each cloth at a short distance apart from one another, and each cloth can be severed along the small space in between these two selvage edges.

The drawing Fig. 6 shows the mechanism erected in its place in a single-shuttle loom for weaving double pile fabrics. In the main feature of its construction this loom is similar to the loom described in the specification of a former British patent granted to George Davies, No. 2,429, in the year 1858, so that it will be unnecessary to give any description of it. The parts of the loom are only shown in order that the way in which the fast-selvage mechanism is to be applied to it may be clearly seen.

In the mechanism shown at Figs. 7 and 8 for a two-shuttle loom the same parts are marked with the same letters of reference as in the preceding figures. The mechanism necessarily differs somewhat from that above described, because when two shuttles are thrown simultaneously it is necessary to open two sheds for the shuttles to be passed through. To do this we not only give an up-and-down movement to the needles, as in the mechanism just described, but also give an up-and-down motion to the bar K, such up-and-down movement being in an opposite direction to that of the connecting-rod H—that is, that when the rocking bar K is being drawn down the connecting-rod H is drawn up. The rod H is raised and lowered by being connected at its upper end to one of the heald-levers, as in the mechanism shown at Figs. 1, 2, 3, and 4, and the bar K is connected to another of the heald-levers, that goes up when the heald-lever to which the rod H is connected goes down, and goes down when the heald-lever to which the rod H is connected goes up. When the rocking bar K is at the top and the connecting-rod H at the bottom, or it might be vice versa, a lateral movement is given to the thread-eyes and by the rocking bar K, thus carrying the warp-threads A A′ to the opposite side of the needles F' F^2 G' G^2. After the weft has been thrown the connecting-rod H and rocking bar K are caused to reverse their positions by the connecting-rod H being drawn from bottom to top and the rocking bar K from top to bottom, so causing the warp-threads A A′ and the binding-threads C C′ to again cross as ordinary warp-threads and again form two sheds for the two shuttles to pass through. The connecting-rod H and rocking bar K are then again caused to reverse their position up and down, and lateral movement is again given to the thread-eyes, and so on continuously.

In order that the lever O may always remain bearing against the cam or tappet N, notwithstanding that the bar K is moved upward and downward, the pin which is carried at the end of the lever, and which rests against the cam or tappet, is made longer than the length of upward and downward movement given to the bar K.

Having thus described the nature of our said invention and the manner of performing the same, we would state that we are aware that mechanism has before been employed for forming fast inner selvages in cloths or fabrics which are being woven singly in power-looms. Our invention does not in any way apply to the weaving of single cloths with fast inner selvages, but relates only to double pile fabrics woven face to face.

What we claim is—

A double pile fabric woven face to face and with fast inner selvages both in the upper and lower cloths of the fabric, and with the fast selvages in the upper cloth of the fabric formed immediately above the fast selvages in the lower cloth, substantially as hereinbefore described.

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