(No Model.) 3 Sheets—Sheet 1.

J. COLEY.

LOOM FOR WEAVING DOUBLE FACED PILE FABRICS.

No. 489,731. Patented Jan. 10, 1893.

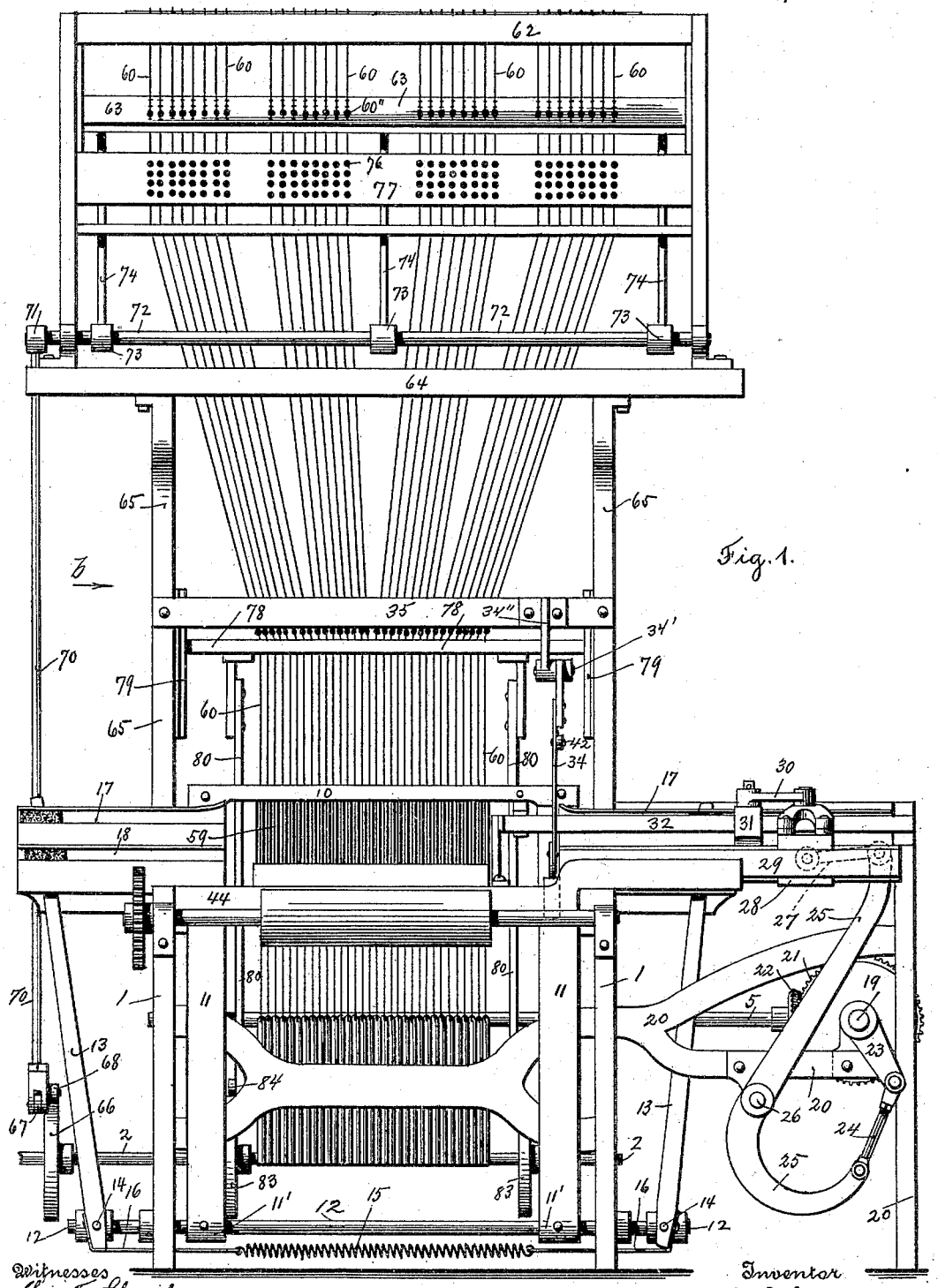

Fig. 1.

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(No Model.) 3 Sheets—Sheet 2.

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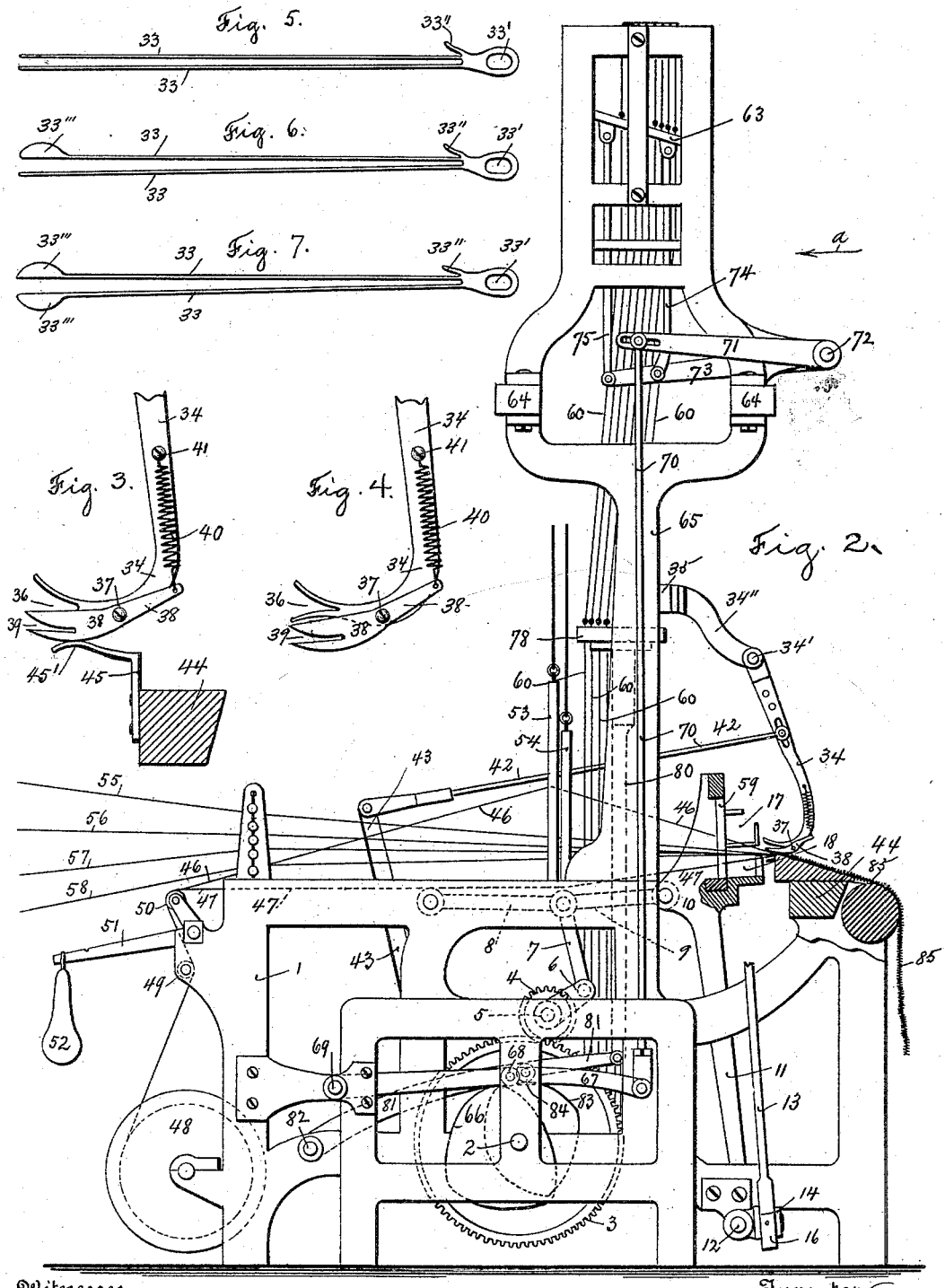

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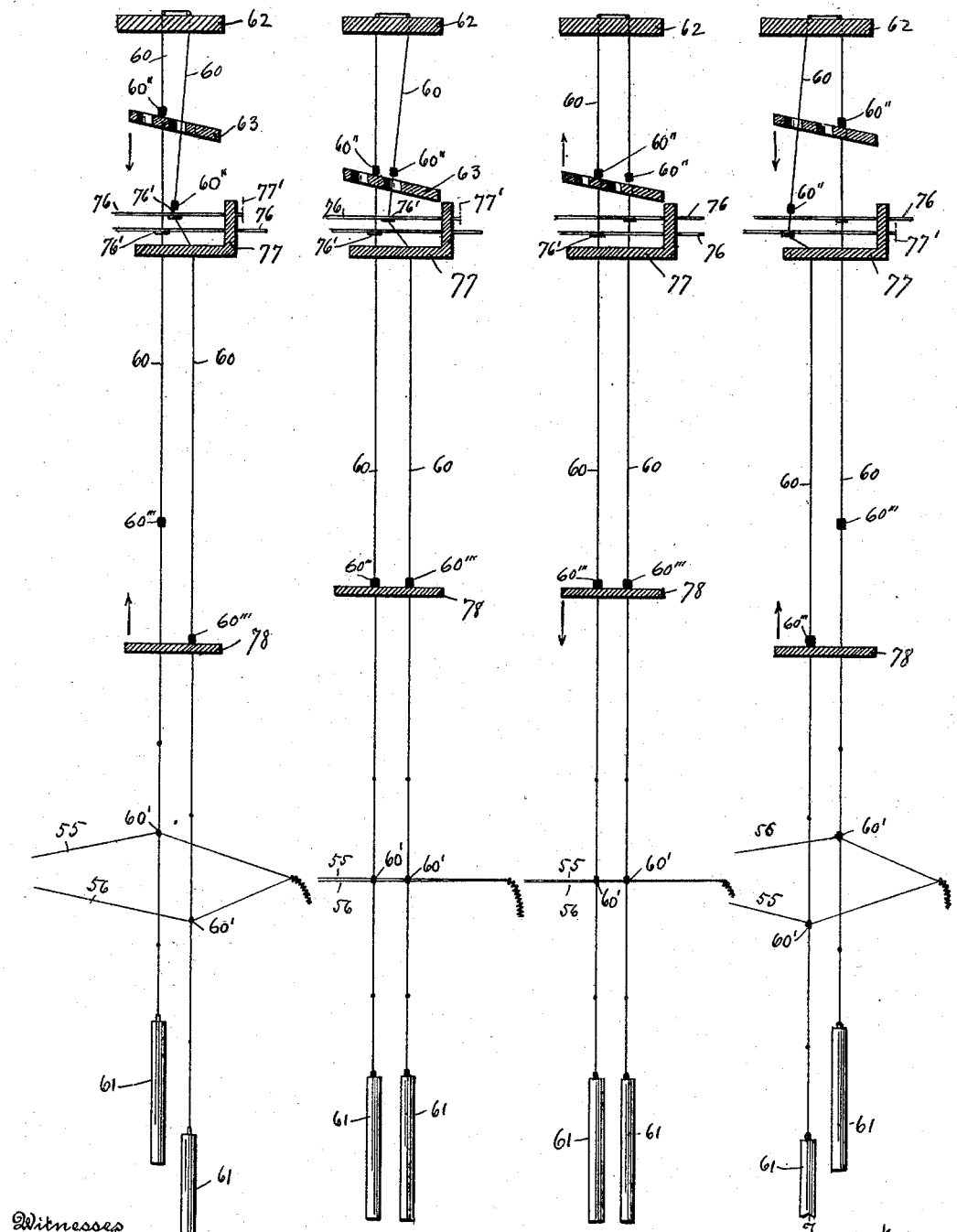
Fig. 8 Fig. 9. Fig. 10. Fig. 11.



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UNITED STATES PATENT OFFICE.

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LOOM FOR WEAVING DOUBLE-FACED PILE FABRICS.

SPECIFICATION forming part of Letters Patent No. 489,731, dated January 10, 1893.

Application filed July 25, 1892. Serial No. 441,116. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH COLEY, a subject of the Queen of Great Britain, residing at Worcester, in the county of Worcester and State of Massachusetts, have invented certain new and useful Improvements in Looms for Weaving Double-Faced Pile Fabrics; and I do hereby declare that the following is a full, clear, and exact description thereof, which, in connection with the drawings making a part of this specification, will enable others skilled in the art to which my invention belongs to make and use the same.

My invention relates to pile fabric looms, and more particularly to looms for weaving the double faced, or reversible pile fabric shown and described in the Letters Patent of the United States, No. 483,977, dated October 4, 1892, to which reference is hereby made for a detail description of the fabric itself.

The object of my invention is to provide an automatic power loom for manufacturing the double faced or reversible pile fabric referred to, and my invention consists in certain novel features of construction and operation of the loom, as will be hereinafter fully described, and the nature thereof indicated by the claims.

I have shown in the drawings my improvements applied to the ordinary Brussels loom, the construction and operation of which are somewhat changed and modified, to allow the application of my improvements thereto.

Referring to the drawings, Figure 1 is a front elevation of sufficient portions of a loom, looking in the direction of arrow *a*, Fig. 2, to illustrate the nature of my invention which is applied thereto. Fig. 2 is an end elevation, and a partial section through the lay, breast beam, and take-up roll, looking in the direction of arrow *b*, Fig. 1. Fig. 3 is a detail of the pile wire guiding and spreading mechanism. Fig. 4 corresponds to Fig. 3, but shows the open position of the jaws. Fig. 5 shows the double pile wire, used in the manufacture of a double faced Brussels carpet with loops on each side thereof. Fig. 6 corresponds with Fig. 5, but shows a knife on the end of one of the wires, which are used in the manufacture of the double faced fabric with a looped surface on one side and a cut pile surface on the other. Fig. 7 corresponds with Fig. 6, but shows a knife on the end of each of the wires which are used to manufacture the double faced fabric with a cut pile surface on both sides. Figs. 8, 9, 10 and 11 are diagrammatic representations of different sheds of the pile forming warps, and positions of the jacquard cords, and operating mechanism, as will be hereinafter fully described.

I have shown in the drawings only such parts of an ordinary Brussels loom as are required to understand the construction and operation of the loom, with my improvements applied thereto.

In the accompanying drawings, 1 is the loom side, 2 the cam shaft carrying gear 3, which meshes with and is driven by a gear 4 on the main shaft 5 driven in any ordinary manner, and on which is fast a crank 6, which through toggle arms 8 and 9 and crank connector 7, oscillates the lay 10 in the ordinary manner, see Fig. 2. The lay swords 11 are fast at their lower ends 11′ on the lay rock shaft 12, which extends across the loom and is journaled in bearings on the loom sides in the ordinary way. The picker sticks 13, one at each side of the loom, which drive the shuttles, are of the ordinary construction, and are pivoted at their lower ends on arms 14, fast on the ends of the shaft 12, and are operated by the ordinary picking mechanism, not shown. A spiral spring 15 is connected with the lower ends of the picker sticks 13, through the straps 16, and serves to return the picker sticks to their normal position, all in the usual way. The lay 10 is provided with two stationary shuttle boxes 17 and 18, one above the other, at each end of the lay, see Fig. 2. In the operation of the loom two shuttles are used, one of which travels on the lay, and the other on the warp, and the shuttles are shot simultaneously from opposite sides of the loom, so as to pass each other in the sheds.

I will now describe the wire mechanism, by means of which the wires are thrust into, and withdrawn from the sheds, to form the looped or pile surface in the fabric.

The construction and operation of the wire mechanism shown in the drawings are substantially the same as the construction and operation of the wire mechanism in the ordinary Brussels loom, but has some additional fea-

tures, as I employ two pile wires, or a double wire. The shaft 19 of the wire mechanism is supported in bearings in the extension 20 of the loom frame, and is geared to the main shaft 5 by beveled gears 21 and 22, fast on shafts 19 and 5 respectively. A crank 23 is fast on the forward end of the shaft 19, and is pivoted at its outer end to one end of the connector 24, the other end of which is pivoted to the lower end of the arm 25, which is pivoted at 26 on the extension frame 20; to the upper end of the arm 25 is attached one end of the connector 27; the other end of the connector 27 is secured to the wire mechanism slide 28, which is fitted to slide freely on the guide 29; a link 30 connects the slide 28 with the slide 31, which moves freely on a guide bar 32, to guide the pile wires all in the usual manner. A double wire, or two pile wires 33, see Fig. 5, are used to form the loop surface on both sides of the fabric. The pile wires 33 are united at their inner ends, and provided with an opening 33′, for engagement with the wire operating mechanism, in the usual way, and with a projection 33″. In Fig. 6 a knife 33‴, is shown on one of the wires, and in Fig. 7, on both of the wires, to cut the loops and form a cut pile surface.

In the operation of the wire mechanism, as the wires are thrust into the sheds, the upper wire into the upper shed opening, above the body of the fabric, and the lower wire into the lower shed opening, below the body of the fabric, it is necessary that the free ends of the wires should be spread apart, so that they will freely pass into the sheds. The mechanism for spreading apart the free ends of the wires 33 as they are thrust into the upper and lower shed openings, consists in this instance of the ordinary guide arm 34, pivoted at its upper end at 34′, on the arm 34″ on the cross bar 35, see Figs. 1 and 2; the lower end of the arm 34 is curved inwardly, and cut out to form an open-end triangular slot 36 therein, see Fig. 4. On the lower end of the arm 34 is pivoted, on a screw or pin 37, a lever 38, which is provided at its lower end with an open end slot 39; the lever 38 forms the movable jaw, working on and in connection with the stationary jaw, formed by the lower slotted end of the arm 34. A spring 40 is attached at one end, by a screw or pin 41, to the arm 34, and at the other end to the lever 38, and serves to open the jaws and hold them apart, as shown in Fig. 4. The arm 34 is swung out and in, to guide the wires as they are thrust into the shed openings, by the ordinary mechanism, consisting of the connector 42 adjustably attached at one end to the arm 34, and at the other end to a lever 43 pivoted at its lower end, and operated by a cam, not shown, on the cam shaft 2, in the ordinary way.

Upon the inner side of the breast beam 44 is secured a projecting bracket 45, see Fig. 3, the free end 45′ of which extends in the path of the lever 38, as the arm 34 is moved toward the loom to the position shown in Fig. 2 to cause the free end of the lever 38 to be raised, against the action of the spring 40, as shown in Fig. 3. It will thus be seen, that when the arm 34 is moved toward the loom, preparatory to the wires being inserted into the shed openings by the wire mechanism, the free ends of the jaws will be closed or moved together, as shown in Fig. 3, and the free ends of the wires are then placed within the slotted ends 36 and 39. The continued movement of the arm 34 toward the loom releases the movable jaw 38 from contact with the bracket 45, and allows the spring 40 to act to open the jaws and separate the two ends of the wires to allow them to be readily thrust into the shed openings, one into the upper shed opening, and the other into the lower shed opening.

I will now describe the Jacquard and harness mechanism. The binding or cotton warps 46 and 47, are drawn from the beam 48, at the rear of the loom, and pass over the two tension rolls 49 and 50, (the tension of which is controlled by the lever 51, and weight 52 in the ordinary way,) to the cotton warp harnesses 53 and 54, two in number, which are raised and lowered to form the shed, of the binding or cotton warps and are operated in the usual way by levers from the cam shaft, not shown. The four worsted pile warps 55, 56, 57, and 58, are drawn from spools hung in four creels or frames at the back of the loom, not shown, in the usual manner. The fabric 85 illustrated as being woven in the loom shown in the drawings, is a four frame carpet, with worsted pile warps of four different colors to form the pattern or pile surface. No stuffer is used. The four worsted warps 55, 56, 57, and 58 extend through a single space in the reed 59, and each worsted warp is threaded through the eye 60′ of the cords 60, leading to the Jacquard mechanism. Lingoes 61 are attached to the lower ends of the cords 60 in the usual way. The cords 60, into which are threaded the worsted pile warps which form the pattern or pile surface, are arranged in pairs, with their upper ends connected, as shown in Figs. 8, 9, 10, and 11, and so suspended from the stationary board 62 of the Jacquard mechanism, that each cord of a pair may be raised and lowered to form the loop over the wire in the upper side of the fabric, and may also be lowered and raised to form the loop under the wire in the underside of the fabric; the upward motion of one cord of a pair, by the movement of the lifter board 63, to form the loop in the upper side of the fabric, causing the downward motion of the other cord of said pair to form the corresponding loop in the underside of the fabric, see Figs. 8, 9, 10, and 11 of the drawings.

The Jacquard mechanism shown in the drawings is of the ordinary construction and operation, except in regard to the suspension of the cords 60 in pairs from the stationary board 62, as above described. The Jacquard

mechanism is supported on overhead timbers 64, stayed by posts 65, extending up from the loom side.

The lifter board 63 of the Jacquard mechanism is provided with the ordinary holes and contracted slots leading out therefrom, for engagement with the knots 60″ in the cords 60 in the usual way.

The lifter board 63 is operated in the usual manner by a cam 66, fast on the cam shaft 2, through lever 67 carrying a roll 68, and pivoted at 69 on the loom side, and connector 70 pivoted at its lower end to the end of the cam lever 67, and at its upper end to arm 71 fast on the Jacquard shaft 72, arms 73 fast thereon, and connectors 74 and 75, see Figs. 1 and 2.

The Jacquard needles 76 are provided with eyes 76′, through which are threaded the cords 60, and are supported in the needle board 77, and operated by the cards, as indicated at 77′, Figs. 8, 9, 10, and 11, in the usual manner.

The comber board 78 is fitted to move up and down in guides on the posts 65, and is moved up and down in proper time by connectors 80, one at each end thereof, and cam levers 81 pivoted at 82 on the loom side and bearing on cams 83 fast on the cam shaft 2 through rolls 84, all in the usual manner. The comber board 78 is provided with holes therein through which the cords 60 extend, and by means of the knots 60‴ in said cords, the comber board raises the cords, in the usual manner. The cams 66 and 83 are so constructed and secured on the cam shaft 2, relatively to each other, as to cause the comber board to be raised when the lifter board is lowered, and the comber board to be lowered when the lifter board is raised.

I will now describe briefly, the operation of weaving my double faced, or reversible pile fabric, on the loom shown in the drawings, and above described. When the loom is in operation, and in position for the wire pick, the binding or cotton warps are together in the middle of the fabric, and one worsted thread of the worsted warps from each dent in the reed, is raised by the lifter board into the upper line of the shed, and the other worsted thread of the pair from each dent in the reed is thereby simultaneously lowered into the lower line of the shed, as shown in Fig. 8. The wires are now inserted in the open sheds, one in the upper shed above the body of the fabric, and the other in the lower shed below the body of the fabric. The lay now beats up and the comber board is lifted to the top of its travel during the beating up of the lay, taking all the worsted warps to the center line of the shed, as shown in Fig. 9, and the binding warp harnesses change their position, carrying the cotton or binding warps one above and the other below the body of the fabric, to form the sheds for the two shuttles, one shed above and the other shed below the body of the fabric, the two shuttles are now sent across from opposite sides of the loom, one on the lay and the other on the warp, inserting the filling wefts in the upper and lower shed openings; the lay then beats up again to close up the filling wefts, and the operation of the Jacquard mechanism is repeated, as above described. It will be understood that the worsted warps which are not called by the jacquard are carried in the body of the fabric between the filling wefts. By the arrangement of the cords 60 in pairs, connected at their upper ends and so suspended from the stationary board of the Jacquard mechanism that when one of a pair of cords is raised, the other will be simultaneously lowered, it will be seen that the worsted warps when called to form the pile surface are carried simultaneously above and below the body of the fabric, prior to the insertion of the pile wires, and are then simultaneously moved in the opposite direction to the center line of the fabric to form the loops, prior to the insertion of the filling wefts or shots, and the beating up of the lay.

It will be understood that the details of construction of the loom shown in the drawings may be varied somewhat if desired.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent is:

1. In a loom of the class described, the combination with the cotton warp harnesses, the lay, filling, and wire mechanisms, of the Jacquard mechanism, in which the cords for the worsted warps are suspended in pairs from the stationary board, with their upper ends connected, for the purpose stated, substantially as set forth.

2. In a loom of the class described, the combination with the lifter board of the Jacquard mechanism, and the stationary board, from which the cords for the worsted warps are suspended in pairs with their upper ends connected, for the purpose stated, of a movable comber board, and means for operating the same, to cause the comber board to be raised when the lifter board is lowered, and the comber board to be lowered when the lifter board is raised, for the purpose stated, substantially as set forth.

3. In a loom of the class described, the combination with the cotton warp harnesses, the lay, and filling mechanisms, and the Jacquard mechanism in which the cords for the worsted warps are arranged in pairs with their upper ends connected, for the purpose stated, of the wire mechanism, provided with a double pile wire, or two pile wires united at their inner ends, for the purpose stated, substantially as set forth.

4. In a loom of the class described, the combination with two pile wires, connected at their inner ends, of mechanism for spreading and guiding the wires, consisting of two jaws provided with open slotted ends, one of the jaws supported on the other, and movable thereon, and means for operating said jaws, substantially as set forth.

5. In a loom of the class described, the com-

bination with two pile wires, connected at their inner ends, of means for spreading the free ends of said wires, consisting of a swinging arm provided with an open slotted end, and means for operating said arm, and an arm pivoted on the lower end of said swinging arm, and provided with an open slotted end, and a spring for separating the ends of said arms, and a bracket secured to the breast beam, and extending in the path of the arm pivoted on the swinging arm, for the purpose of bringing the ends of said arms together, substantially as set forth.

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