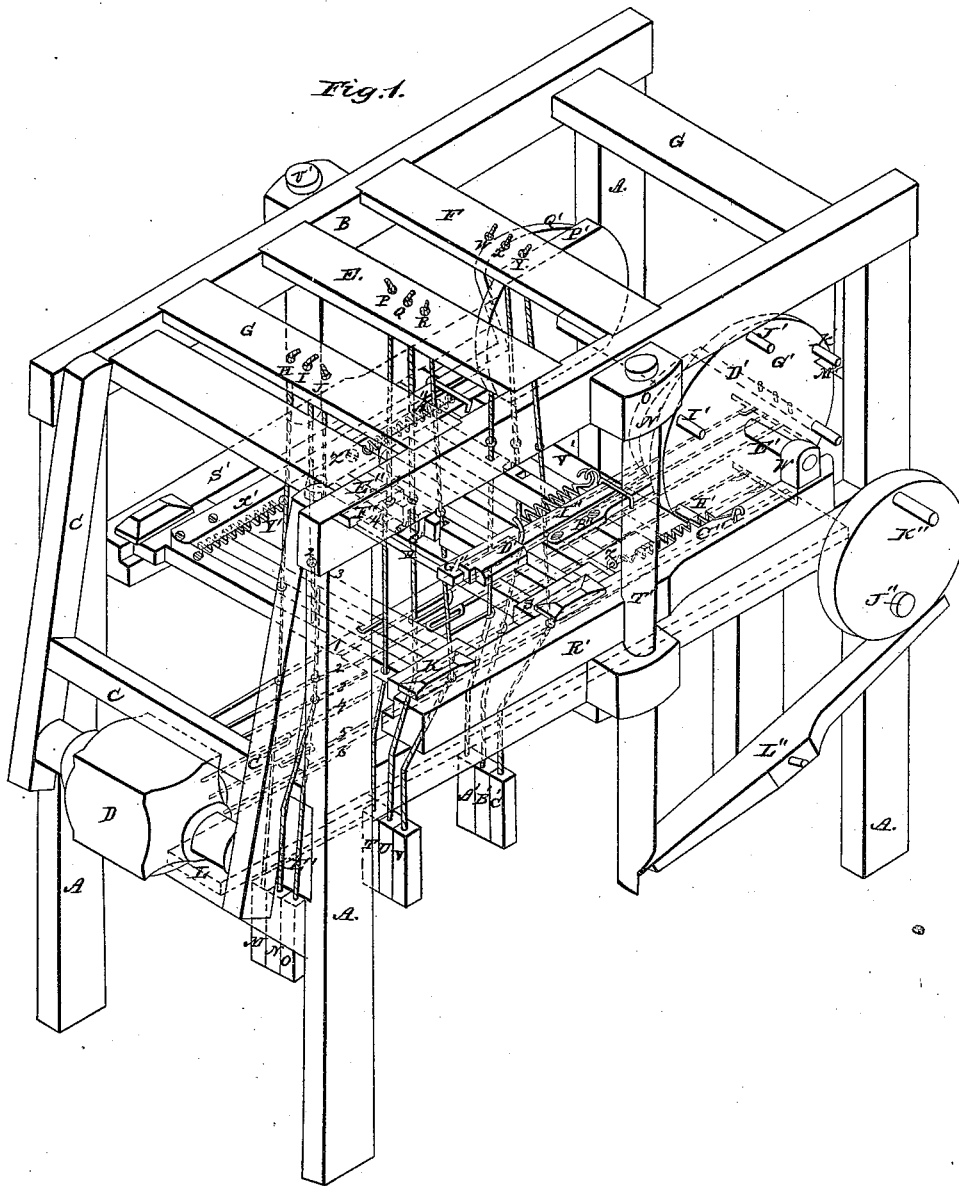


*J. S. Ferguson*  
*Jacquard Motion for Loom.*

*No. 6,892.*

*Patented Mar. 21, 1885.*

*Fig. 1.*



*Witnesses.*  
*C. McEllion*  
*A. B. H. H.*

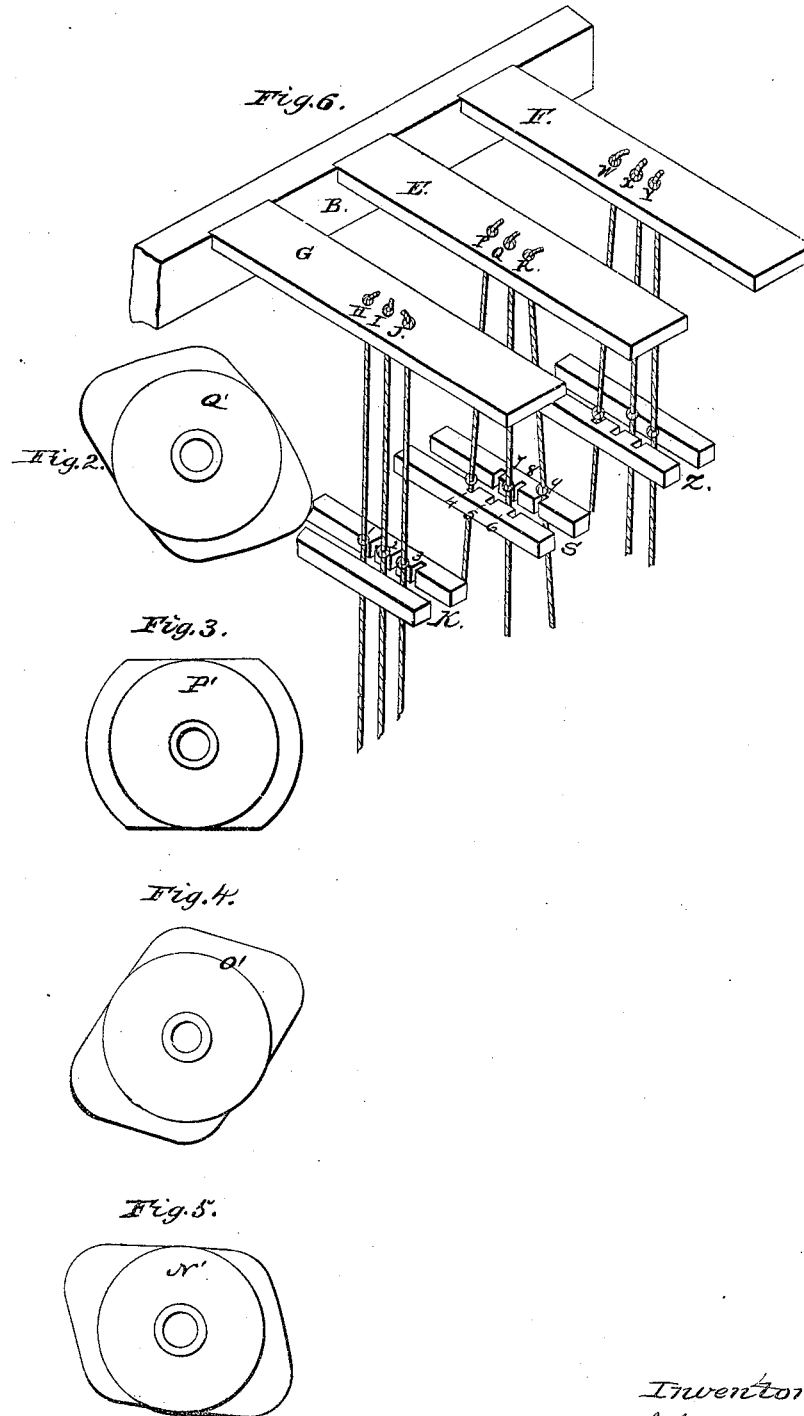
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*Jacquard Motion for Loom.*

*Sheet 2-2 Sheets.*

*N<sup>o</sup> 46,892*

*Patented Mar. 21, 1865.*



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# UNITED STATES PATENT OFFICE.

JOHN S. FERGUSON, OF POUGHKEEPSIE, NEW YORK.

IMPROVEMENT IN THE JACQUARD FOR WEAVING THREE-PLY FABRICS.

Specification forming part of Letters Patent No. 46,392, dated March 21, 1865.

*To all whom it may concern:*

Be it known that I, JOHN S. FERGUSON, of the city of Poughkeepsie, in Dutchess county and State of New York, have invented a new and Improved Jacquard Machine; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

The peculiarities of this improved machine may be found, first, in the mode of operating the knotted cords, in giving to each, by the combined action of the pattern-cards and needles upon it, three positions—outward, middle, and inward—for the purpose of enabling the trap-board to make the proper selection of cords during the process of weaving; second, the mode of constructing the middle trap-board by the use of two sets of combs for each row of tail-cords, the saw-cuts so arranged as to face the rows on both sides, and the employment of one rod for each row of tail-cords placed above said trap-board for the purpose of untrapping some of the cords at every third pick; third, giving to the front and rear trap-boards two horizontal movements forward and one backward, in three consecutive picks for the purpose of properly trapping and untrapping the knotted cords in said trap-boards. But it is not the use of all or any of these motions or devices that constitute the essence of my invention, as other devices and motions may be made and substituted therefor that will perform the same functions in the process of weaving, but the essence and the nature of my invention consist in so constructing the three-ply Jacquard machine as to be able to divide the harness thereof into three equal and uniform parts each, (for the same width and quality of goods,) equal to one of the sections of the two-ply now in use, and having the same tie-up without increasing either the surface or number of cards to a greater extent than the increased number of sections due to the three-ply above the two—that is to say, the two-ply requires half a card to one pick, or one card to two picks, which is the same. My three-ply requires two cards to three picks, or two-thirds of a card to one pick of the same superficial contents, other things being equal.

Now, in order to produce three-ply cloth, such as carpeting, so as to have the figures

woven thereon perfect on both sides, it is necessary at every pick that one or more of the warp-threads in two of the plies be raised while the filling-thread is being put into the other. To accomplish this various methods have been resorted to. One consists in connecting two two-ply machines, thus making use of as many again knot-cords and adding three times as many harness cords, and also using three times the quantity of card-paper as that required for the two-ply machine. Another method adopted by some is the use of one machine of sufficient capacity having twice the number of tail-cords, three times the number of harness-cords, and twice as much card-paper as that used by the two-ply machine. There are various other modes of constructing the three-ply harness, but none without some, if not all, of the objections to those above mentioned. The methods above described are those now most in common use. Besides the advantage derived from lessening the amount of material used in the manufacture of the harness, tail-cords, and cards, each of which is a very considerable item in the manufacture of carpets, or, in fact, any goods where the Jacquard machine is used to produce figures, it entirely does away with what is called by weavers the "double neck," consequently lessening the friction produced by working the harness, doing away with all crossing and interweaving of the harness-cords, and leaving the same perfectly free and open. Lessening the friction so materially greatly increases the durability, and its simplicity greatly facilitates the repairing when it becomes necessary. The cost of making the double-neck harness and of cutting the great number of cards required by the best of the old machines is a very considerable item of expense above what would be required by this.

To enable others skilled in the art to make and use my invention, I will proceed to describe its construction and mode of operation.

The same letters refer to corresponding parts in all the figures.

Figure 1 is a perspective view of the machine. Figs. 2, 3, 4, and 5 are the profiles of the cams for giving motion to the trap-boards. Fig. 6 is a perspective view of the suspension-boards, trap-boards, or combs, and the tail-cords, showing their relation to each other.

A A A A are the four posts supporting the several parts. B B are the plates. C C C is the frame holding the prism D, and is jointed at the top to the two plates B B. E F G are the three suspension-boards. From the top of the suspension-board G are three tail-cords, H I J, represented by red lines extending down through the trap-board K, and thence through the round eyes in the needles 1 2 3, and thence through the long eyes in the needles 4 5 6, and from thence through the tail-board L, (shown in red dotted lines,) having each a weight, M N O, attached thereto. The suspension-board E has also three tail-cords, P Q R, represented in red lines extending down through the trap-board S and through the long eyes in the needles 1 2 3, and through the round eyes in the needles 4 5 6; thence through the tail-board L, to each of which tail cords is attached a weight, T U V. Also, from the suspension-board F are three tail-cords, W X Y, shown in red lines extending down through the trap-board Z and through long eyes in the needles 1 2 3, and down through the round eyes in the needles 4 5 6, thence through the tail-board L, to each of which tail cords is attached a weight, A' B' C'. The needles 1 2 3 4 5 6 are supported at the end opposite the prism by the back needle-board, D', (shown partly in red dotted lines,) and at the other end by the front needle-board, E, through which they extend into or against the prism D. The cam-shaft F' has on it one pin-wheel, G'. Projecting from the side of said wheel are six pins, H' I' J' K' L' M'. On the said shaft are four cams, N' O' P' Q'.

Figs. 2, 3, 4, and 5 are profiles of the above cams. The cams in Fig. 1 are marked with the same letters as those in Figs. 2, 3, 4, and 5, the letters indicating the relative position each should occupy on the shaft F'.

In Figs. 2, 3, 4, 5 will be noticed a short mark just above the several letters on each. Now, when these marks are placed in line on one side of the shaft F' and parallel to the shaft, then will the cams occupy their true relation to each other.

The two side pieces, R' and S', of the frame supporting and carrying the trap-boards are secured firmly to the vertical slides T' and U' and secured to each other by means of the cross-bar V'. The journals of the cam-shaft F' are inserted into boxes, one of which is shown at W' resting upon and supported by the two side pieces, R' and S', on the trap-board K', and firmly secured thereto is a bar, X', extending toward the cam Q' and working against it.

The spiral spring Y' (partly shown in dotted lines, from the fact of its being under the trap-board) has one end secured to the side piece S' and the other to the trap-board, and has the effect to keep the end of the bar X' in contact with the face of the cam Q', thus giving the requisite motion to the trap-board when the cam is caused to rotate.

The trap-board S has a bar, Z', (partly shown in dotted lines,) firmly fixed thereto. This bar extends to the periphery of the cam P', and is held in contact therewith by means of the spiral spring A'', (shown partly in dotted lines,) having one end thereof secured to the side piece S' and the other to the trap-board S. So with the trap-board Z, it has a bar, B'', firmly secured thereto and extending toward the cam N', and is held against the periphery thereof by means of the spiral spring C''. Above the trap-board S, and secured to the top thereof, are two guides, D and E''. Between these two guides, and held in their proper place by them, are two slides, F'' and G'', connected by means of the rod H''. The rod or bar G'' extends backward toward and comes in contact with the periphery of the cam O', and is held thus in contact therewith by means of the spiral spring I'', one end of which is fastened to the cross-bar V' and the other to the bar G''.

The object obtained by the device last described is to untrap all the knotted cords passing through the trap-board S at every third pick by its combined action with the trap-board S, on which it rests. On the shaft J'' is an eccentric, K'', working onto a lever, L''. On the other end of the shaft J'' is another eccentric of the same kind working onto a lever in the same manner, both levers having the opposite end from the eccentric under the vertical slides T' and U'. It will now be seen that as these vertical slides are connected with the two side pieces, R' and S', as above described, that all their connections—such as the three trap boards, cam-shaft F', &c.—must be raised and depressed when the shaft J'' is rotated. Jointed to the inside of the frame at the top and suspended therefrom is a swinging lever, on which is a hook, M'', represented in the drawings as being hooked under the pin K', projecting from the face of the pin-wheel G'. When the trap-board is raised, carrying with it the cam shaft and pin-wheel, the pin L', in rising, acts upon the incline on M'' and forces it outward until the pin passes the hook, when the lever is again free to swing inward, and thus bring the hook under the pin L', and when the trap-board descends the cam-shaft will, in consequence of this pin being forced against the hook, preventing its descent, be turned one-sixth of a full revolution.

I have said that in order to produce three-ply cloth—such as carpeting—so as to have the figures woven thereon perfect on both sides, it was necessary at every pick that one or more of the warp-threads in two of the plies should be raised while the weft-thread was being put into the other. This is to be borne in mind as we proceed.

I have above described the trap-boards as being held against the periphery of certain cams by certain attachments, which, when these cams are turned one-sixth of a revolution each pick, have the effect to change the relative po-

sition of the trap-board to the tail-cords, and by this means the tail-cords are trapped or untrapped as the trap-boards approach or recede from them. When the cams are placed in the position indicated in Fig. 1, the trap-boards bear the same relation to the tail-cords as therein indicated. Now, it will be noticed that the tail-cords H I J, as they pass down through the trap-board K, are neither of them in the saw-cuts 1' 2' 3' in the said trap-board. The tail-cords P Q R, extending down through the middle trap-board S, are two of them trapped—that is, the cord P and the cord R—and the cord Q is untrapped—that is, not in either of the saw-cuts 4' 5' 6' or 7 8 9.

It should be remarked here that the trap-board S has twice the number of combs as either of the others.

A cord is said to be trapped when it is in one of the saw cuts.

The tail-cords W X Y extend down through the trap-board Z, and the tail-cord W is the only one trapped. It is worthy of remark here that each of the three trap-boards are connected with and produce the flowering on each of the three plies in one sense independently of all the others. If we now raise the trap-boards we shall take up the tail-cords P and R on the trap-board S, the tail-cord W on the trap-board Z, and put the filling into the ply connected with the first trap-board. As the trap-boards descend the cam-shaft is turned, by means of the hook M'' catching under the pin L', one-sixth of a revolution, which causes the trap-boards to change their relative position to the tail-cords in such a manner as that the tail-cords I J in the trap-board K and the tail cord R in the trap-board S will be trapped, and all of them untrapped in the trap-board Z. If, now, we lift the trap-board frame, we shall raise those cords trapped on the boards K and S and put the filling into the ply connected with the trap-board Z. As the trap-boards descend the hook M'' catches under another pin in the pin-wheel G', and

the cam-shaft is caused to turn one sixth of a revolution more, and a new relation of the trap boards and tail-cords takes place in such a manner as to trap the tail-cords W and X in the trap-board Z and the tail-cord I in the trap board K and leave all of them untrapped in the trap-board S. Two of them have been thrown off by the action of the rod H'', placed there for that purpose. We may now lift the trap-board frame, carrying up the cords trapped in the trap-boards K and Z, and put the filling into the middle ply.

I have now described the modes of operating the machine to put in three picks. As the prism is partly bored, it has the same effect on the needles as a card, and hence a description of more picks would be but a repetition of the last, varying only as the cutting of one card varies from another, the form and manipulation being the same. The same is also true of the numbers of tail-cords and needles. I have in this machine used the least number possible, and yet have enough to show the principle.

Having now described the construction and mode of operation of my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The mode herein described of arranging the needles and inserting the cords through them for the purpose of giving to the cords the three positions above described.

2. The mode herein described of constructing the middle trap-board, and the use and motions of the rods or bars placed above them, for the purposes substantially as set forth.

3. Giving to the front and rear trap-boards the motions herein described, for the purposes specified above.

4. Tying the harness in three equal and uniform parts in looms for weaving three-ply goods, as above specified.

JOHN S. FERGUSON.

Witnesses:

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THOS. WILLIAMSON.