(No Model.) 2 Sheets—Sheet 1.

G. W. STAFFORD.

JACQUARD MECHANISM FOR LOOMS.

No. 476,428. Patented June 7, 1892.

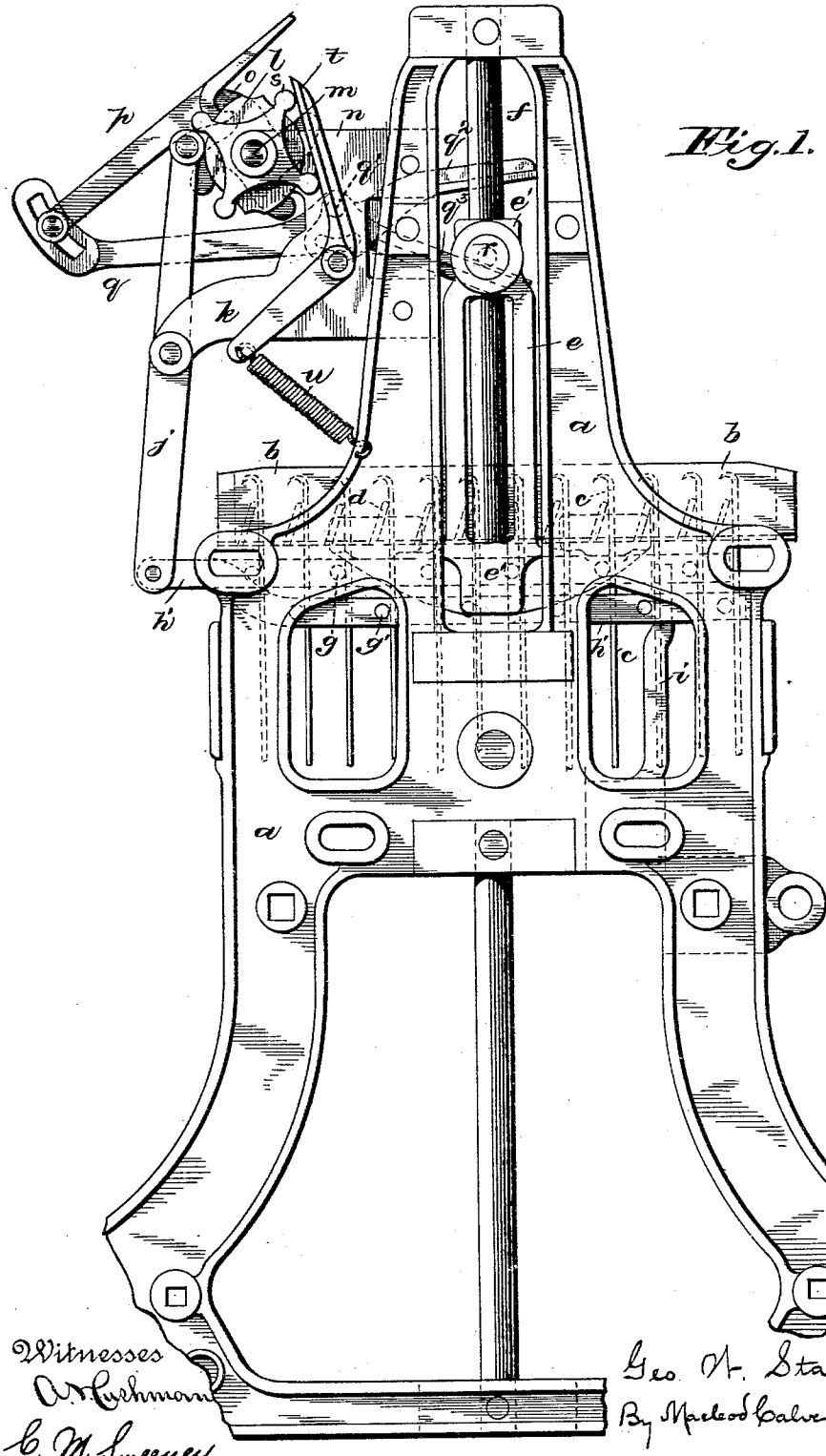

Fig. 1.

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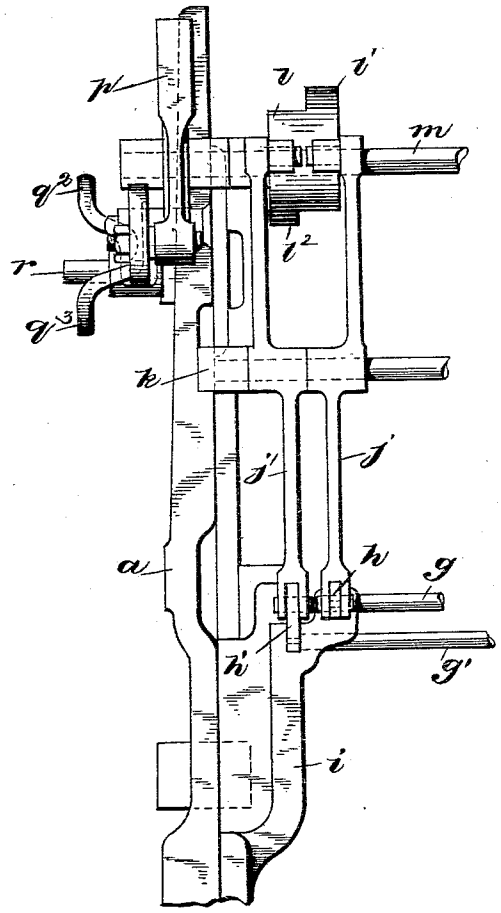
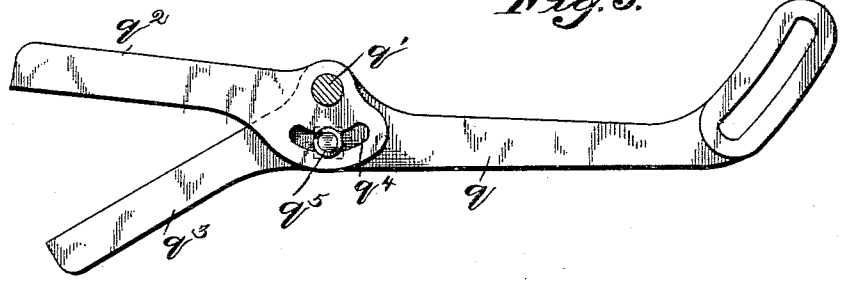


Fig. 2.

Fig. 3.



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UNITED STATES PATENT OFFICE.

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JACQUARD MECHANISM FOR LOOMS.

SPECIFICATION forming part of Letters Patent No. 476,428, dated June 7, 1892.

Application filed December 14, 1891. Serial No. 414,992. (No model.)

To all whom it may concern:

Be it known that I, GEORGE W. STAFFORD, a citizen of the United States, residing at Providence, in the county of Providence and State of Rhode Island, have invented certain new and useful Improvements in Jacquard Mechanisms for Looms, of which the following is a specification, reference being had therein to the accompanying drawings.

My invention relates to Jacquard mechanisms of the class of such mechanisms which are especially designed for use in weaving Marseilles quilts and similar fabrics. Looms for weaving this class of fabrics are equipped with a Jacquard mechanism and with two or more ordinary harness-frames. The fine warp-threads used in forming the face of the fabric pass through the eyes of the said harness-frames and the harness-frames are raised alternately at the successive picks of the loom, they being operated, for example, one up and one down. The coarse pattern-threads, which lie normally at the back of the fabric and are raised, as required, to produce the pattern, are controlled by the Jacquard harness. The Jacquard mechanism is caused to lift at regular intervals, in order thereby to produce the pattern and unite the coarse back and the fine face together, its griff remaining raised as long as may be required. In weaving the finest grades of fabrics of the class mentioned the Jacquard mechanism is caused thus to lift for the production of the pattern at a predetermined time once in every four picks, while in weaving other grades thereof it is caused thus to lift for the production of the pattern once in eight, twelve, or sixteen picks. The Jacquard mechanism also, in addition to making a lift which serves for the production of the pattern once in every series of picks, is caused to make an additional lift in every series of picks for the purpose of separating the coarse threads for the reception of the weft-thread, which is necessary to be introduced among the same to bind them into cloth. Ordinarily in weaving these fabrics the cylinder or prism of the Jacquard mechanism is caused to make two beats during each series of picks—that is, one beat prior to each lift—one beat being for the purpose of presenting to the needles that control the vertical hooks the pattern-card which determines the lifting of the coarse threads, as required, in the production of the pattern, and the second beat being for the purpose of presenting to the needles a plain perforated card having the holes therein arranged so as to produce simply the separation or shedding of the coarse threads, which is necessary for the reception of the weft-thread which binds them into cloth. Therefore ordinarily two cards are required for each series of picks. In view of the fact that for the weaving of most patterns of fabrics of the class hereinbefore mentioned a great number of pattern-cards is required it follows that a large portion of the expense incurred in the production of such fabrics is in consequence of the necessary cost of the material of such cards and of the preparation of the cards.

It is the object of my invention to render possible the weaving of such fabrics in any desired pattern or design with a smaller number of cards than heretofore has been required. To this end I provide the Jacquard mechanism with certain novel parts, whereby I am enabled to dispense altogether with the cards which heretofore have been employed for effecting the separation of the coarse warp-threads for the reception of the weft-threads which bind them into cloth. Thereby I reduce by one-half the number of cards required to be used, in the majority of cases dispensing with twenty-five hundred cards, which with ordinary mechanisms will have to be employed

In consequence of dispensing with the cards which have been employed heretofore for effecting the separation of the coarse warp-threads for the reception of the weft-threads which bind them into cloth, I am enabled to so modify, if desired, the mechanism for moving the pattern-cylinder toward and from the ends of the horizontal needles as that the same shall operate to move the said pattern-cylinder inward toward the needles during each series or sequence of picks only when required for the selection of the warp-threads for the figure.

With my improved mechanism I employ only the cards which are actually required for the production of the pattern and the binding together of the fine face and the coarse back.

My invention will first be described in con-

nection with the accompanying drawings, and will then be particularly pointed out and distinctly defined in the claims at the close of this specification.

In the drawings, Figure 1 is a view in side elevation of a Jacquard mechanism having my invention applied thereto, only such parts of the ordinary structure being represented as will suffice to disclose the character, relations, and mode of operation of the improved devices which I have added. Fig. 2 is a view of certain parts embodying my invention, the view being taken from the left in Fig. 1. Fig. 3 is a view in detail of certain parts hereinafter referred to.

In the drawings I have shown only so much of one known form of Jacquard mechanism as is necessary to be shown for the purpose of illustrating the manner of reducing the invention to practice.

The invention may be applied to a variety of different known forms and makes of Jacquard mechanisms without necessitating any material change in the construction or mode of operation of the usual parts of such mechanisms, and when it is applied thereto the devices which I add to the usual parts of such mechanism will act in alternation with the perforated cards, which are required for the production of the pattern and in a manner to provide for shedding the coarse warp-threads by raising successively given portions of the said warp-threads, as in plain weaving or otherwise, as required, for the reception of the weft-thread which binds them into cloth.

The side frames of a Jacquard mechanism are shown at *a a*, the upper griff at *b*, and at *c* are shown the vertical hooks or hooked wires, with the upper hooked ends of which the knives *d d* of the said griff *b* engage for the purpose of raising the same. Only the upper portions of the said hooks or hooked wires are shown in Fig. 1. One of the brackets by which the upper griff *b* is supported is shown at *e* in Fig. 1, the said bracket being formed with bosses *e' e'*, which are perforated to fit upon and slide vertically upon the vertical guide-rod *f*, which is fixed in the side frame *a*. (Shown in the said Fig. 1.) The said griff *b* is or may be actuated by the usual cam and connections, so as to cause it to rise and fall at the desired intervals.

In practice the vertical hooks or hooked wires will have combined therewith the usual horizontal wires or needles, (not shown,) and these latter will be acted upon in the customary manner by perforated pattern-cards, which are presented in turn against the ends of said needles to determine the engagement of the hooks *c* by the knives *d* of the griff *b*, the said pattern-cards passing around a cylinder or prism, which is swung toward and from the ends of the needles, all as usual in Jacquard mechanisms now in use.

With the foregoing and the other usual parts of a Jacquard mechanism I combine devices such as I will now proceed to describe and whereby at predetermined intervals in the weaving given portions or divisions of the vertical hooks *c* successively shall be pressed simultaneously either over or away from certain of the knives of the griff in a manner to occasion the lifting of given portions of the coarse warp-threads successively, as in plain weaving or otherwise as required for the reception of the weft-thread which binds them into cloth, this being effected without the use of a perforated card. Thus in the drawings *g g'* are rods or wires extending lengthwise of the machine between the side frames and between the upper ends of the hooks of adjacent rows, there being one of such rods or wires arranged adjacent to each transverse row of the hooks *c*. These rods *g g'* are fixed in bars *h h'*, arranged to slide crosswise of the machine in guides *i*, Fig. 2, carried by the frame of the mechanism. The rods or wires *g g'* are divided into two or more series, the rods of the different series alternating with one another, as shown in Fig. 1.

In the drawings the rods or wires are shown divided into two series. Each series of rods or wires *g g'* and the bars *h h'* pertaining thereto constitute a frame capable of sliding crosswise of the mechanism, and when a frame is thus slid the rod or wires thereof act to press the hooks upon which they act either over or away from over knives *d* of the griff *b*, this depending on the side of the series of the hooks upon which the rods or wires are placed.

In the drawings I have shown the rods or wires *g g'* arranged in position to press the hooks away from over the knives *d* of the griff *b*, when the said rods or wires are moved toward the right-hand side in Fig. 1, and this is the arrangement which I prefer in practice. The different series of rods or wires *g g'* must be moved in alternate succession, the movements thereof occurring at predetermined intervals during the weaving, and for the purpose of thus moving the same any desired form of automatically-operating shifting devices may be employed.

In the most perfect and preferred embodiment of my invention I employ levers *j j'*, which are connected with the respective bars *h h'* or otherwise with the respective frames, these levers *j j'* being pivoted upon brackets *k*, supported by the frame-work of the Jacquard mechanism and being acted upon by cams *l*, fixed upon a shaft *m*, mounted in bearings in brackets *n n*, fixed to the frame-work. The shaft *m* also has fixed thereto a ratchet-wheel *o*, with which engages a pawl *p*, that is pivoted to the outer end of a lever *q*, which turns on a pivot at *q'* on one of the side frames *a*, the inner end of the said lever *q* being forked, as shown in Figs. 1 and 3. Between the arms q^2 q^3 of the forked inner end of the lever *q* plays a pin or bowl *r*, moving with the griff, and thereby the lever *q* and pawl *p* derive the movement which enables the pawl to rotate the shaft *m* and the cams

carried thereby. In order to regulate the throw of the pawl, one of the arms of the inner end of the lever—as, for instance, the arm q^2—is formed (see Fig. 3) as a separate piece having a hole therethrough, to fit upon the pivot-pin q' and also having a slot q^4 formed concentric with the said hole and through which passes a bolt q^5, whereby the said arm q^2 is secured to the lever q in the desired position relatively to arm q^3. For the purpose of preventing the shaft m from overrunning when actuated by the devices which have been described and of bringing it into proper position after each movement thereof, I attach to the said shaft m a squaring-wheel s, of usual construction, and employ a lever t, which is caused to bear upon the said wheel s by a spring u, one end of the said spring being connected with the lever t and the other end thereof with the frame-work. The ratchet-wheel and the devices whereby the same is actuated are shown located at one end of shaft m, and the squaring-wheel and its spring-actuated lever at the other end of the said shaft.

In the drawings I have shown a pair of levers $j\,j'$, disposed adjacent to each side frame a, a cam l for actuating the said levers being placed at each end of the shaft m. Other levers and cams located at intermediate points may be employed, if desired, or a single cam and set of levers may be relied upon to move the said frames, if desired.

In the drawings, since there are shown but two levers $j\,j'$ in each set of levers, this number corresponding with the number of frames composed of bars $h\,h'$ and rods $g\,g'$ which I have shown, the noses $l'\,l^2$ of each cam l are diametrically opposite to each other. The number of teeth in the ratchet-wheel o and the extent of movement of the pawl p are such that one or the other of the said cam-noses comes in contact with its lever j or j' and acts to move it and the connected frame prior to every alternate ascent of the griff b, this being the lift by which the coarse warp-threads should be separated or shed for the reception of the weft-thread, which binds them into cloth. Prior to each of the remaining lifts the cams are shifted by the devices described into the position in which they are represented in Fig. 1, so as to permit the pattern-cards to act in making the selection of the hooks which are required to be raised for the production of the pattern. By preference the apex of each cam-nose is formed with a depression, as shown in Fig. 1, to receive the bowl or roller of its respective lever, inasmuch as otherwise the said apex would be so sharp the bowl could not well rest thereon.

It will be understood that in practice the devices herein described as embodying my invention will alternate in their action upon the hooks with the pattern-cylinder, and also that inasmuch as the devices described dispense with the use of the plain cards which heretofore have been employed, the pattern cylinder or prism will need to be swung inward toward the needles only once during each series of picks, instead of twice, as heretofore.

Having now described my invention and the best manner at present known to me of reducing it to practice, I claim as my invention—

1. The combination, with the griff and vertical hooks of a Jacquard mechanism, of rods disposed between the said hooks without direct connection therewith, the said rods being placed adjacent to the upper ends of the said hooks and arranged in two or more series, and means for moving successively the respective series of rods laterally to shift the hooks relatively to the knives of the griff and determine their engagement thereby, substantially as described.

2. The combination, with the griff and vertical hooks of a Jacquard mechanism, of rods disposed between the said hooks without direct connection therewith, the said rods being placed adjacent to the upper ends of the said hooks and arranged in two or more series, movable bars in which the said rods are secured, levers connected with said bars, cams acting upon the said levers, and means for rotating the said cams, substantially as described.

3. The combination, with the griff and vertical hooks of a Jacquard mechanism, of rods disposed adjacent to the said hooks and arranged in two or more series, movable bars to which the said rods are secured, levers connected with the said bars, cams acting upon said levers, a shaft carrying said cams, a ratchet-wheel on said shaft, a pawl engaging said ratchet-wheel, and a pawl-carrier actuated by the griff aforesaid, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

GEO. W. STAFFORD.

Witnesses:
DAVID S. BAKER, Jr.,
C. FRANK PARKHURST.