(No Model.)

# H. HARDWICK.

## JACQUARD MECHANISM.

No. 490,350. Patented Jan. 24, 1893.

FIG. 1.

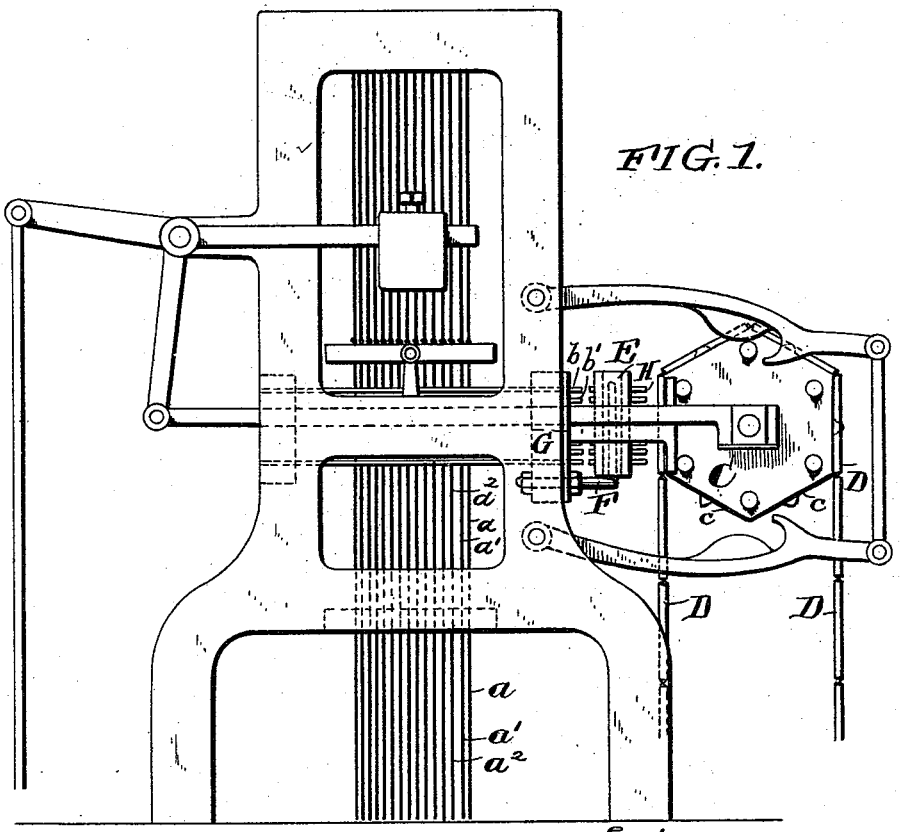



FIG. 2.

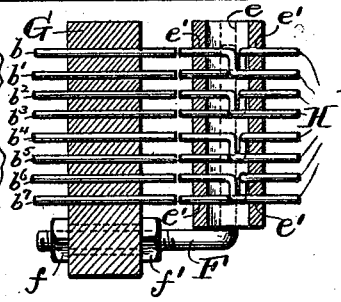



FIG. 3.

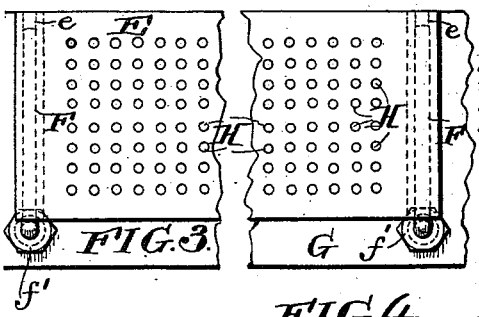



FIG. 4.

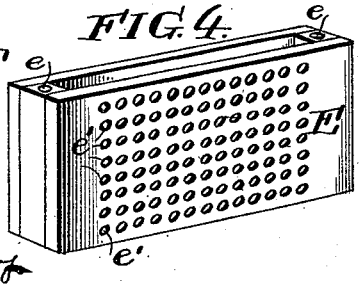



FIG. 5.

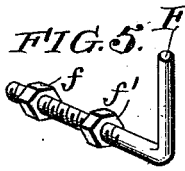
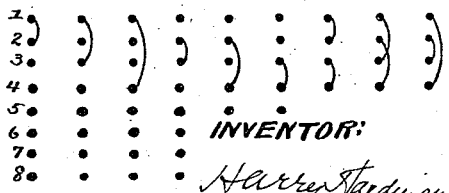



FIG. 6.

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# UNITED STATES PATENT OFFICE.

HARRY HARDWICK, OF PHILADELPHIA, PENNSYLVANIA.

## JACQUARD MECHANISM.

SPECIFICATION forming part of Letters Patent No. 490,350, dated January 24, 1893.

Application filed August 30, 1892. Serial No. 444,569. (No model.)

*To all whom it may concern:*

Be it known that I, HARRY HARDWICK, a citizen of the United States, residing at Philadelphia, county of Philadelphia, and State of Pennsylvania, have invented a new and useful Improvement in Jacquard Mechanisms, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, which form a part of this specification.

My invention has for its specific object the changing of the relation of the lift of the warp without changing the relation of the hooks or tails and warp or changing the relative pattern cards, so that with a given set of pattern cards I can at will change the relation of the needles to the rows of orifices on the card cylinder, so that with any one of the needles and its corresponding hook or tail any row of hooks may be controlled from any one of the holes of a row in the card cylinder.

In the Jacquard mechanism the warp is connected to hooks or tails which in turn are connected with needles, which needles are operated to throw the hooks or tails and their corresponding warp in or out of action, by means of a card passing over a card cylinder provided with orifices corresponding to the needles. The predetermined pattern is obtained by causing the warps to be operated in the predetermined manner, and this is accomplished by cutting or not cutting the cards opposite these orifices so that certain needles and their corresponding hooks or tails are thrown in or out of action, as the pattern dictates. In a single lift jacquard, which will be the one with which I will describe my improved mechanism, each hook or tail is connected to a single warp and each hook or tail in turn is connected and operated by a needle. These needles are arranged in rows, and the cards which travel over the card cylinder are perforated or closed opposite these needles. As may be seen from this arrangement each needle and its corresponding hook or tail, and therefore the corresponding warp thread, has a corresponding place or position upon the card cylinder, and after a set of cards have been cut it is impossible without cutting a new set of cards or changing the order of connecting the warp to the hooks or tails, to change the warp lift.

My invention has for its object to enable a change in the warp lift and thus vary the color effect without changing the order of connecting the warp to the hooks or tails, or cutting a new set of cards.

In the drawings—Figure 1 is a side elevation of a portion of the Jacquard mechanism. Fig. 2 is an enlarged section of the needles, needle guides and my improved auxiliary needle stand and needles. Fig. 3 is a face view of Fig. 2. Fig. 4 is a perspective view of auxiliary needle box. Fig. 5 is a perspective view of auxiliary needle stand. Fig. 6 is a diagrammatical view showing the operation of needles upon different orifices in the pattern cylinder.

$a$, $a'$, $a^2$ &c. are the hooks; $b$, $b'$, $b^2$, $b^3$, $b^4$, $b^5$, $b^6$, $b^7$ &c. are the needles controlling the corresponding hooks or tails. These needles are arranged in rows (as shown in the drawings $b$ to $b^7$).

C is the pattern cylinder having the faces $c$, and D is the chain of pattern cards. The card cylinder is operated in the ordinary manner to cause its rotation so as to bring a new card at the proper time in front of the needles. Interposed between the needles and the card cylinder is what I denote an auxiliary needle box E.

F is the needle box stand provided with threaded horizontal portion which passes through an orifice in the needle guide G, which orifice is slightly larger than the cross-section of horizontal portion of stand F. Upon the horizontal threaded portion of stand F are the nuts, $f$, $f'$, by which it is secured in position. The stand F has a vertical portion which passes through orifice $e$ in needle box E. There are two stands F for each box E, and there are corresponding orifices in the box E'. The horizontal portion of the stand F is threaded and has upon it the nuts $f$, $f'$, by which it is secured in position. This auxiliary needle box E has in it orifices $e'$ corresponding in number and when secured to machine, in position to the needles $b$ &c. and the orifices in the card cylinder opposite said needles. In this auxiliary box are placed what I denote as auxiliary needles H. These auxiliary needles H, instead of being straight, as are the needles $b$ &c., may be bent as desired so as to bring any one of the needles $b$ &c. of

a row into connection with any one of the holes of a row in the pattern cylinder. Thus, if we denote the holes in the row in the pattern cylinder by 1, 2, 3, 4, 5, 6, 7, 8 (which number of course may be varied) and the corresponding needles to said orifices (if the auxiliary needle box and needles were not present) would be $b$ corresponding to 1, $b'$ to 2, $b^2$ to 3, &c. Now, with the auxiliary needle box in position the needle $b$ may be brought into operation in connection with orifices 2 or with orifices 3, or with orifices 4 &c., and the same way, $b^2$ may be brought into operation with orifices 1 &c.

In Fig. 2 the first needle $b$ is shown in operation with the second orifice and the needle $b'$ in connection with the orifice 1. The diagrammatical figure, Fig. 6, shows clearly a number of the changes which may be made. The purpose of this addition is apparent in that if we suppose the eight needles $b$ to $b^7$ of a row of needles to control eight different colored warp and at a certain position in the fabric the card cylinder and cards would, without the interposition of the auxiliary needle box, dictate the raising of the warp colors $b$, $b^2$, $b^4$, $b^6$, I can by the interposition of this auxiliary needle box and without any other change to the loom mechanism or to the cards, dictate the lifting of the threads $b'$, $b^3$, $b^5$, $b^7$, as shown in Fig. 2, and by having a number of these auxiliary needle boxes and removing and replacing them at will, I can without any other change in the loom mechanism change the color effect at will and leave the pattern the same. Thus I can connect needle $b$ of any row with any one of the orifices in the corresponding row on the card cylinder, and so with the remainder of the needles in one of the rows.

Of course I do not intend that in every case the relation of all the needles of the jacquard with their normal corresponding orifices in the card cylinder shall be changed but merely that any or all of them may be changed according as a change in the lift of the warp is desired and the hooks of the auxiliary needle box are formed to produce this result.

Having now fully described my invention, what I claim and desire to protect by Letters Patent is:

1. The combination with the needles of a Jacquard machine and pattern cylinder of auxiliary bent needles interposed between the needles and the pattern cylinder one end of said bent needles in alignment with the needles and the other end in alignment with the desired orifice in the card cylinder the two ends being out of alignment with each other.

2. The combination with the needles of a Jacquard machine and pattern cylinder of an auxiliary needle box interposed between the card cylinder and needles and having orifices corresponding in position to the needles and orifices in the card cylinder, bent needles in said box, the ends of said bent needles being opposite orifices in said needle box but out of alignment with each other.

3. The combination with the needles of the Jacquard mechanism and pattern cylinder of auxiliary needles interposed between the Jacquard needles and the pattern cylinder, one end of said needles in alignment with the Jacquard needles, and the other end in alignment with the desired orifice in the card cylinder, the two ends of said auxiliary needles being out of alignment with each other.

In testimony of which invention I have hereunto set my hand.

HARRY HARDWICK.

Witnesses:
CHAS. COBB VAN RIPER,
CELESTE E. GORSLER.