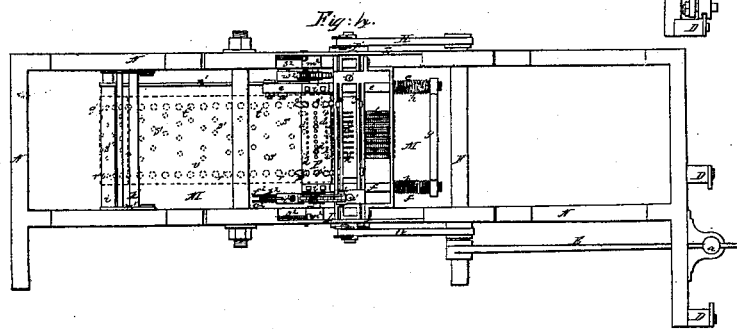
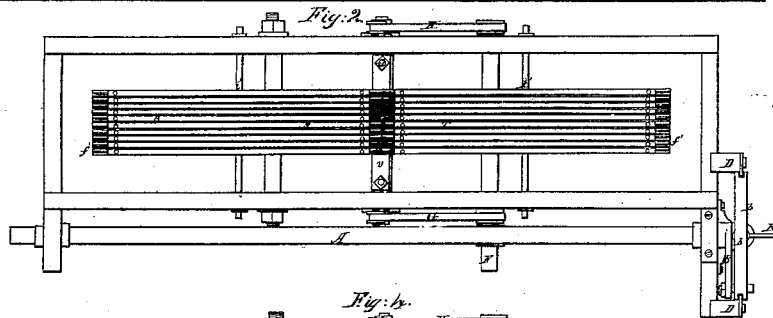
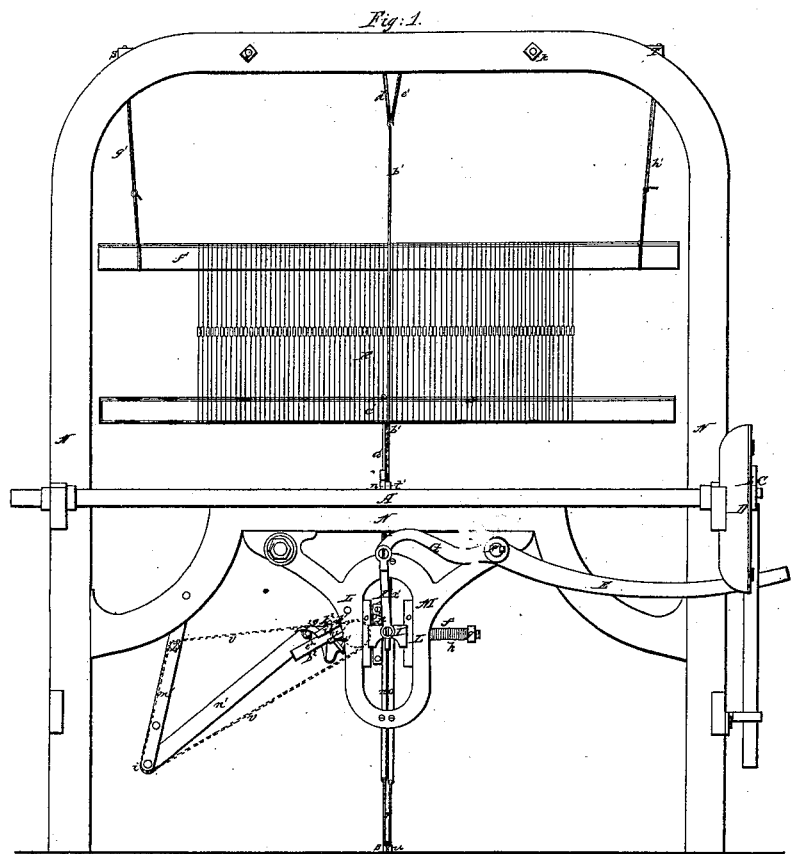


L. HOLMS.  
LOOM FOR WEAVING FANCY CLOTHS. &c.

No. 5,033.

Patented Mar. 27, 1847.





# UNITED STATES PATENT OFFICE.

LAWRENCE HOLMS, OF ANDOVER, MASSACHUSETTS.

## JACQUARD LOOM.

Specification of Letters Patent No. 5,033, dated March 27, 1847.

*To all whom it may concern:*

Be it known that I, LAWRENCE HOLMS, of Andover, in the county of Essex and State of Massachusetts, have invented a new and  
5 useful improvement in mechanism to be applied to looms for the purpose of weaving fancy cloths or fabrics having cords, ribs, twills, or figures raised on their surfaces, the said improved machinery being applicable  
10 to power-looms, such as are in general use; and I do hereby declare that the same is fully described and represented in the following specification and accompanying drawings, letters, figures, and references  
15 thereof.

Of the said drawings Figure 1 denotes a front elevation of the rear half or part of a loom frame and my apparatus applied to it. Fig. 2 a top view. Fig. 3 a vertical transverse and central section. Fig. 4 is a horizontal section, taken just beneath the lower  
20 edge of the crank shaft to be hereinafter described and exhibiting the jacquard addition to be hereinafter explained. Such  
25 other figures as may be necessary to clearly represent the various parts of my improved mechanism will be hereinafter referred to and explained.

In such of the aforesaid drawings as seen,  
30 A denotes the usual crank shaft, or shaft to which the cranks are applied for giving motion to the lay of the loom. It is from this shaft that the mechanism to be hereinafter described, receives its motion. To one end  
35 of the shaft A a crank B is attached, see Figs. 2 and 5 the latter of which denotes a side elevation of the crank and the grooved T piece (and its slides) with which it is connected and which is alternately raised  
40 and lowered by it. C denotes the said T piece, which consists of a rod *a* and a cross head *b* connected together and arranged so as to move up and down between parallel guides D, D, or other suitable contrivances.  
45 The crank enters a curved slot (*c*) made through the cross head and when the crank shaft is revolved, the crank B will impart to the T piece, a reciprocating vertical motion. One end of an arm E (projecting  
50 from a horizontal shaft F) passes through the rod of the T piece, and is raised and lowered by it. The said shaft is sustained (so as to partially revolve) in suitable bearings and has two other arms G, H, extending  
55 from it as seen in the drawings. To these arms a horizontal frame I is suspended

by two connecting rods K, K, jointed both to the arms and frame. From the above it will be seen the vertical movements of the T piece cause similar vertical movements of  
60 the frame I but in opposite directions. The frame I is supported by proper vertical parallel guides made upon or within the sides L L of a frame M secured to the main frame N of the loom. Two of these guides  
65 are seen at O, O, Fig. 1 the others at the opposite end of the frame I being similarly made upon the side L' at the back part of the loom.

P is a jacquard cylinder perforated with  
70 lines of radial holes as seen at *d*, *d*, &c., in Figs. 5 and 6 the latter figure being a vertical central and transverse section of the said cylinder the said section being continued so as to exhibit much of the mechanism both on the right and left as well as  
75 above and below the said cylinder. The said cylinder is sustained in position by two rods or bars *e*, *f*, which pass and move horizontally through the frame I and are connected together by a cross bar *g*, situated  
80 with regard to the frame I as seen in the drawing. Each of said rods has a wound spring *h* placed upon it, between the frame I and the cross bar *g*. The journals of the  
85 perforated cylinder P revolve in suitable boxes *i*, *i*, affixed to or made upon the rods *e*, *f*.

*k*, *k*, &c., are a series of punches arranged side by side in a horizontal manner  
90 and with one end of each in opposition with the jacquard cylinder or circular range of the holes thereof so as to pass into and out of said holes. A top view of one of these punches is represented in Fig. 7. They each  
95 pass and move freely through the frame I and are forced toward the jacquard cylinder by springs *l*, *l*, &c., applied to them respectively. Each of the said punches or rods, has a rectangular passage *m* made vertically through it, the said passage being in  
100 width just sufficient to receive and permit freely to slide through it two flat strips of metal or bars *n*, *o*, arranged with respect to each other as seen in Fig. 6. The length  
105 of this passage is a very little greater than three quarters of the combined width of the two bars *n*, *o*. Each bar *n*, *o*, has a rectangular space *p* or *q* cut out of it as seen in the drawings, the horizontal width of which is  
110 just half that of its bar *n* or *o*. There are two of said bars *n*, *o*, to each punch or rod

5 *k*. They extend both above and below the frame I and are connected together at their lower ends by a cord *r* which passes under one of a series of pulleys *s*, *s*, &c., which are made to revolve upon a horizontal round rod *t* extending between and fastened to two short posts or standards *u*, *u*, fixed to the floor or to the loom frame, as the case may require. The several flat bars *n*, *o*, are supported in their vertical positions by cross bars *v*, *w*, *x*, *y*, extending from one metallic side L to the other L' of the frame M. Each set of bars *n*, *o*, is kept apart from the one next adjacent to it, by pins *z*, *z*, or other similar contrivances or mechanical equivalents passing between them and from one of the bars *v* to the other *w* or *x* to *y*, and being fastened firmly to them.

10 Each flat bar *n*, *o*, has a wire *a'* or *b'* attached to and extending upward from its upper end. The wire *a'* of the flat bar *n* passes through and is affixed to the lower horizontal bar *c'* of one of the harnesses R, R, &c., while the other wire *b'* of the flat bar O extends upward through the warps and between or by the side of the harness, and is connected to the inner ends of two levers S T (whose fulcra are at their middle parts or at *i'* *k'*) by strings *d'* *e'*. The upper bars *f'* of each harness is suspended to the outer ends of two of the said levers S T by strings or cords *g'* *h'* as seen in Fig. 1.

15 From the above it will be seen that when any one of the bars *o* is forced downward, it will elevate the harness with which it is connected; at the same time the other bar *n* immediately contiguous to it, will be drawn up by the harness. I shall now proceed to describe how the depression of the bar *o* is produced.

20 V is an endless belt of leather or other proper material, made to pass around the perforated cylinder P. It is supported in position by passing over a horizontal rod K' and under a roller L' situated as seen in the drawings. The roller L' is suspended in a frame *m'* so attached to the main frame of the loom as to readily vibrate or move, from or toward the jacquard apparatus. A bar *n'* is jointed at one end to the sliding rod *c* and at the other to the lower end of the frame *m'*, the joints thereof being so made as to cause the lower part of the frame *m'*, as well as the roller L' to recede from the jacquard apparatus, sufficiently to keep the belt V tight on the jacquard cylinder. The said jacquard cylinder has two series of teeth *o'* *o'*, &c., *p'* *p'*, &c., projecting from it at its ends, as seen in the drawings; the said teeth working respectively in two lines of holes *q'* *q'* *r'* *r'* made through the endless belt. The said holes and the said teeth are made and arranged in the same manner as those of the pattern card, and polygonal ro-

25 tating block, of the common jacquard apparatus. The endless belt is perforated with holes *s'* *s'* according to the pattern to be wrought, in a similar manner to that of the pattern card of the usual jacquard apparatus, and the said holes are so disposed as that some one or more of them shall be brought directly over some one, or more of the holes of the jacquard cylinder, at each movement or partial rotation thereof. Such holes of the pattern belt as may be over or in line with any holes of the jacquard cylinder, will permit the punches, directly in front of and belonging to them to pass or be forced through them by their springs and enter the jacquard cylinder. The remainder of the punches of the series, will be prevented from entering the jacquard cylinder in consequence of the remainder of the holes of the jacquard cylinder being covered by the belt. Therefore such punches as may have entered the jacquard cylinder will be so advanced as when the frame I is depressed, to bear upon the bottom part or end of the opening *q* of their respective bars *o*, *o*, and will depress the bars and by so depressing them carry down their harnesses. The bars so depressed will be brought back again or elevated (ready for the next movement of the harnesses) when the frame I is raised up, by a transverse bar or plate V acting against a shoulder *t'*. This plate V is made like a comb, and receives the flat bars through it, and is supported on two vertical rods *u'* *u'* which respectively pass down, and slide freely through plates *w'* *w'*, and extending across and fastened to the cross bars *x*, *y*, of the frame M and plates *v'* *v'* similarly applied to the frame I. Shoulders *x'* *x'* are formed on the rods *u'* *u'*. When the frame I is raised up the plates *v'* *v'* meet the shoulders *x'* *x'* and raise the rods and plate V.

30 I shall now proceed to describe the manner in which the jacquard cylinder is pressed away from the punches, and rotated so as to bring a succeeding line of holes of the pattern belt in operation with the said punches.

35 Fig. 8 represents a side view of the jacquard cylinder together with a portion of the frame M above and below it, as well as the mechanism by which the cylinder is operated.

40 *a*<sup>2</sup> is a toothed wheel (see Fig. 9 which is a longitudinal section of it and the catch or pawl over it) which is secured upon the shaft of the jacquard cylinder, and rotated by a pawl *b*<sup>2</sup>, placed over it and turning on a fulcrum *c*<sup>2</sup> in the top of a standard *d*<sup>2</sup> projecting upward from the frame I. The said pawl is composed of two bars *e*<sup>2</sup> *f*<sup>2</sup> (arranged parallel to each other) and a catch *g*<sup>2</sup> disposed between them, so as to be moved toward or from the ends of the bars as occasion may require. The catch has lips *h*<sup>2</sup>

$h^2$  (see Fig. 10 which is a cross section of the pawl, and Fig. 11 which is a side view of it) projecting from its under side, and bearing against the under sides of the bars  $e^2 f^2$ . It also has a saddle  $i^2$  resting upon the top of the bars. A screw  $k^2$  passes down through the saddle and into the catch, and when screwed down tight, serves to confine the catch in any position on the bars of the pawl. A thumb piece  $l^2$  extends back from the catch by which the said catch may be readily moved and adjusted on the bars.

$m^2 n^2$  are two spring lever cams, a side view of one of which is represented in Fig. 12. They turn respectively on fulcras screwed into the sides of the frame M; one of said fulcras being shown at  $o^2$  in Fig. 12. The shaft of the jacquard cylinder rests and moves against them. The position of the said shaft, while the frame I is being raised up is shown at  $p^2$  in Fig. 12. Each cam has a small arm  $q^2$  extending upward from it, and resting against a pin or stud  $r^2$  inserted in and projecting from the side of the frame M. It is drawn against the pin, by a spring  $s^2$ .

When the frame I is raised upward, the journals of the jacquard cylinder, will bear against the inclined side  $t^2$  of the cams  $m^2$ ; and as the cams are made by the pins  $r^2$  to resist the pressure, they will cause the jacquard cylinder and the rods by which it is supported, to move toward the left end of the loom, until the journals reach and pass over the top  $u^2$  of the cam, when the cylinder will be drawn back by the action of the springs  $h h$  of the rods  $e f$  hereinbefore described. Such a movement of the cylinder outward and upward will cause one of the teeth of the wheels  $a^2$  to so act against the catch of the pawl over it, as to partially revolve the jacquard cylinder, to the extent required. A small toothed wheel  $v^2$  and retaining spring pawl  $w^2$  are so applied to the jacquard cylinder, and frame M as to hold the cylinder in position, after each partial rotation of it by the apparatus just described. When the frame I descends so as to carry each journal  $p^2$  of the cylinder against the side  $x^2$  of the cam, the spring  $s^2$  will permit the cam to recede until the journal passes below it, which being effected the spring will draw the cam into the position seen in Fig. 12. The curve of the slot  $c$  of the T piece C is that of an arc of a circle having a radius corresponding with the length of the crank, in order that when the T piece reaches its highest position and the crank moves through the slot, it (the crank) shall produce no vertical movement of the T piece. The object of this is to create a pause in the action of

the hereinbefore described machinery by which the harnesses are raised, during the time it takes to throw the shuttle through the shed of the warps. I would here remark that I often dispense with the use of a pattern belt. This I effect by plugging or stopping up, one or more of the holes of each line of holes of the jacquard cylinder, as the pattern may require or I make the cylinder with holes to correspond with the pattern to be wrought.

Fig. 15 denotes a view of a cylinder having its holes  $a, b, c$ , stopped with plugs the holes  $d, d$ , &c being open. In this way I make use of a different series of jacquard cylinders, having a greater or less number of lines of holes in them, and with more or less of such holes stopped up as occasion may require. In order to be able to use the cams  $m^2 n^2$  for such cylinders I make the stop  $r^2$  and apply it in such manner to the frame M as to be movable and adjustable in position, Figs. 13 and 14 exhibiting the mode of making and applying it.

Fig. 13 is a side view of the cam and stop. Fig. 14 is a top view of the same.

$L'$  denotes the side of the frame M;  $r^2$ , the stop having a shank  $a^3$  extending back from it and passing through a horizontal slot  $b^3$  made through the frame side  $L'$ . The shank  $a^3$  has a screw cut upon its rear end and a screw nut  $c^3$  fitted thereto. By means of the same and the slot  $b^3$  the stop  $r^2$  may be readily adjusted to the position required for any cylinder which would be likely to be used.

Having thus described my invention I wish it to be distinctly understood, that I lay no claim to the employment of a jacquard apparatus to operate the heddles or harnesses of a loom, as I am fully aware that this has been heretofore accomplished, but

That which I do claim as my invention is—

The hereinbefore described peculiar manner of producing by means of the jacquard apparatus a double draft upon each of the harnesses, in other words I claim the peculiar punches  $k$  and bars  $n, o$ , (connected with the harnesses as above described) as combined together and with the remainder of the jacquard apparatus and with the harness and constructed and operating therewith substantially as above specified.

In testimony whereof I have hereto set my signature this seventeenth day of October, A. D. 1846.

LAWRENCE HOLMS.

Witnesses:

WM. C. DONALD,  
H. S. ALLEN.