

(No Model.)

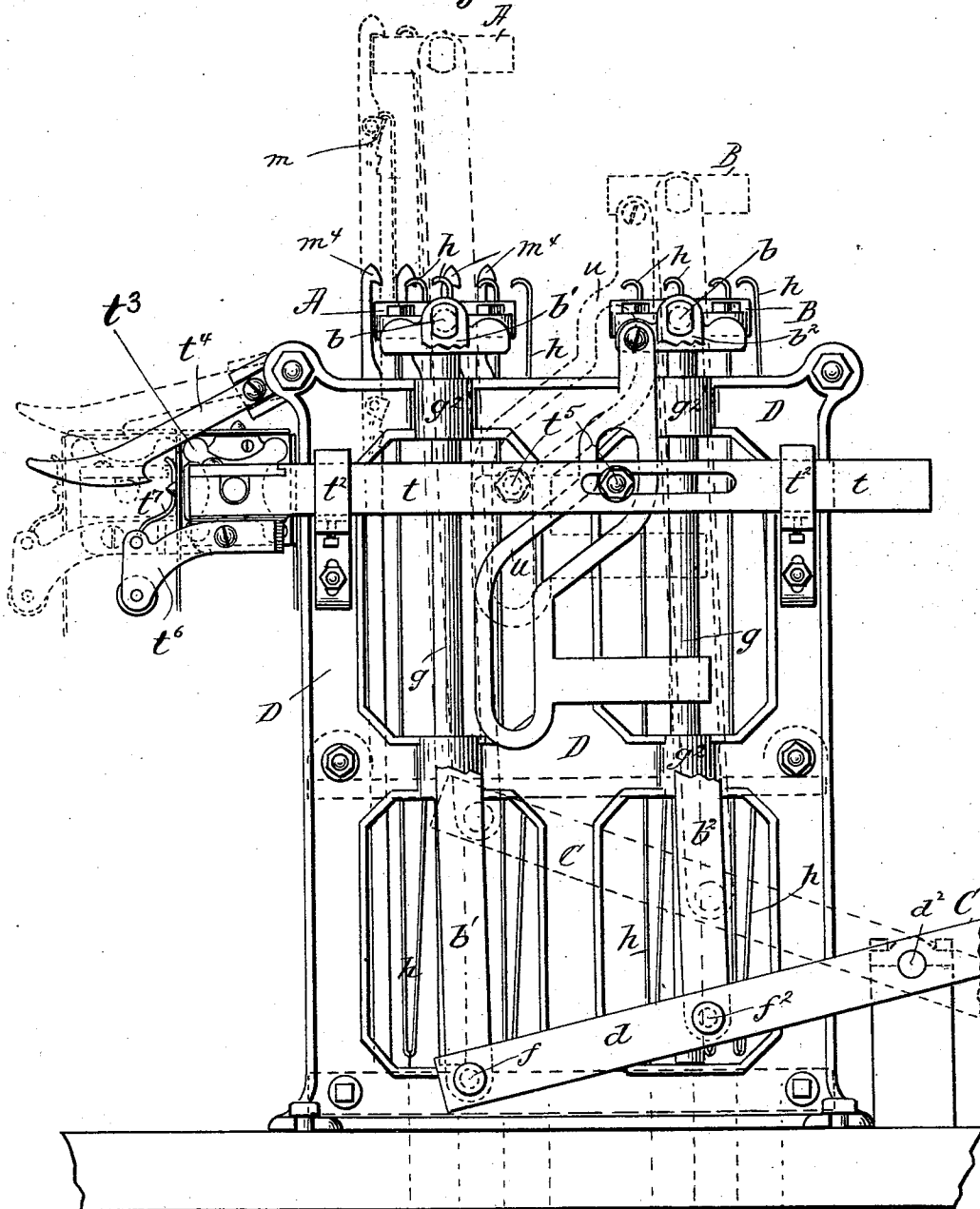
6 Sheets—Sheet 1.

J. C. LIBERTY.
JACQUARD MECHANISM FOR LOOMS.

No. 530,050.

Patented Nov. 27, 1894.

Fig. 1.



Witnesses:

J. D. Garfield
H. J. Clemons

Inventor;

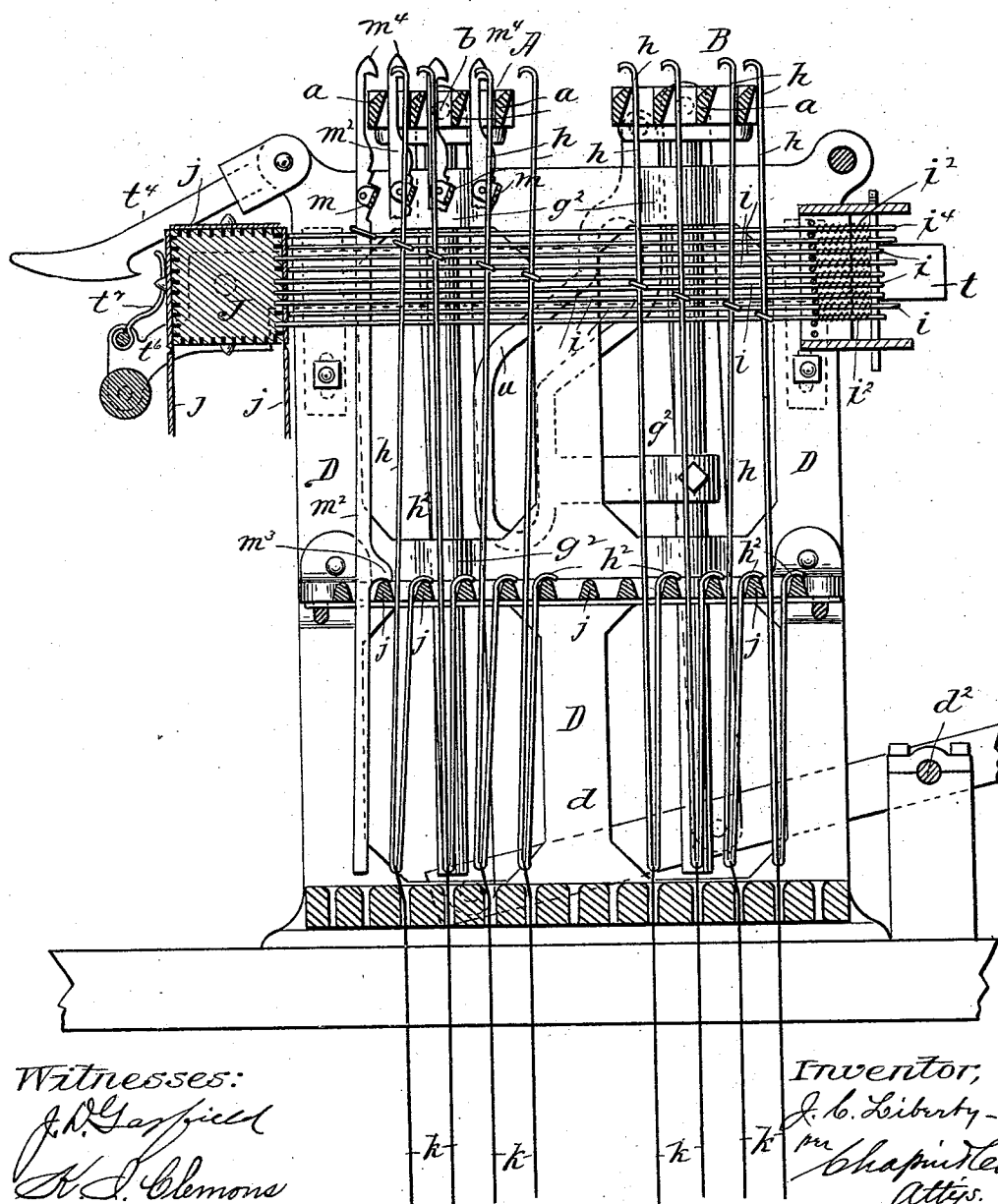
J. C. Liberty
per Chapin Ho.
Attys

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JACQUARD MECHANISM FOR LOOMS.

No. 530,050.

Patented Nov. 27, 1894.

Fig. 2.



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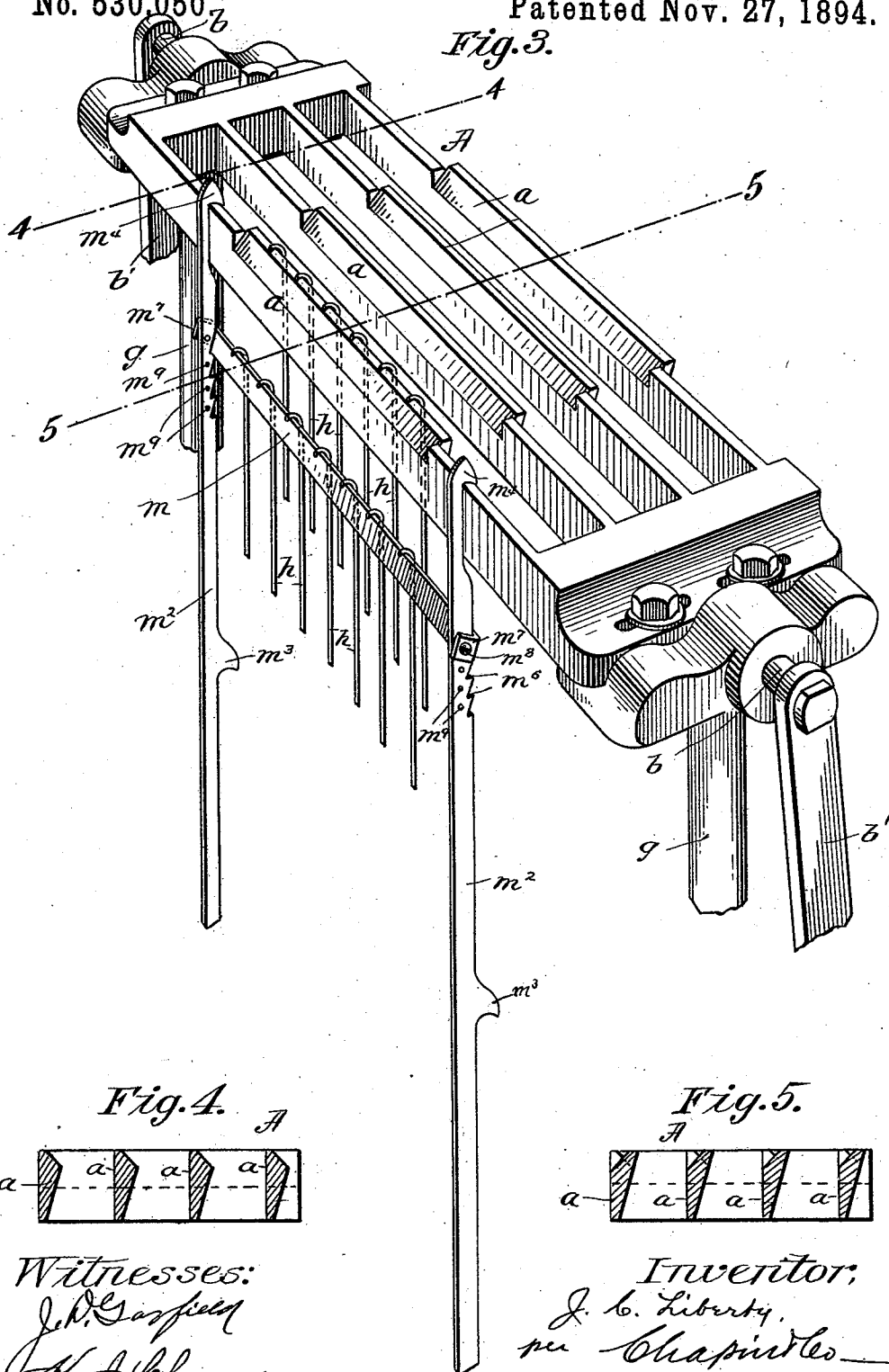
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JACQUARD MECHANISM FOR LOOMS.

No. 530,050

Patented Nov. 27, 1894.



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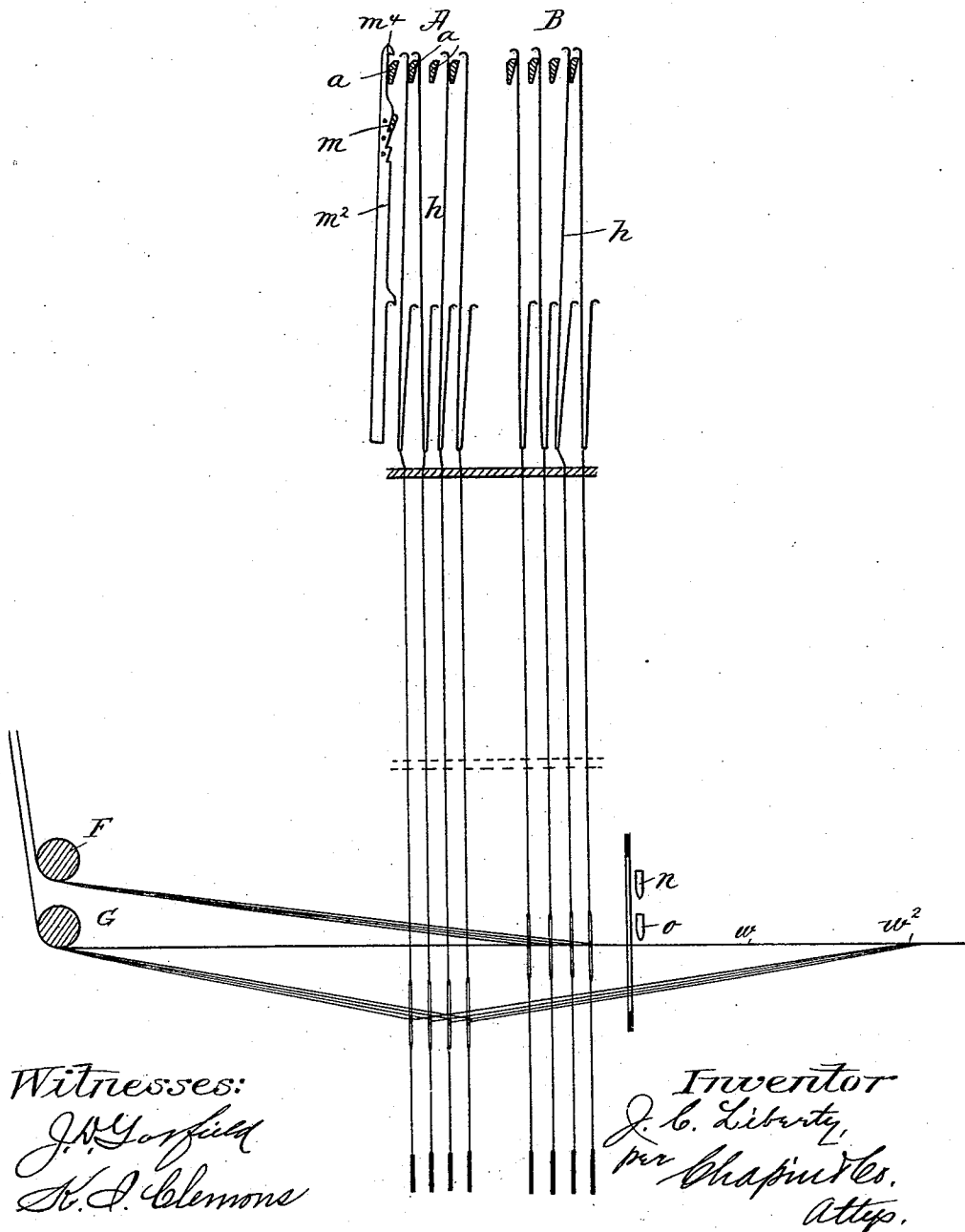
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JACQUARD MECHANISM FOR LOOMS.

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Fig. 6.



(No Model.)

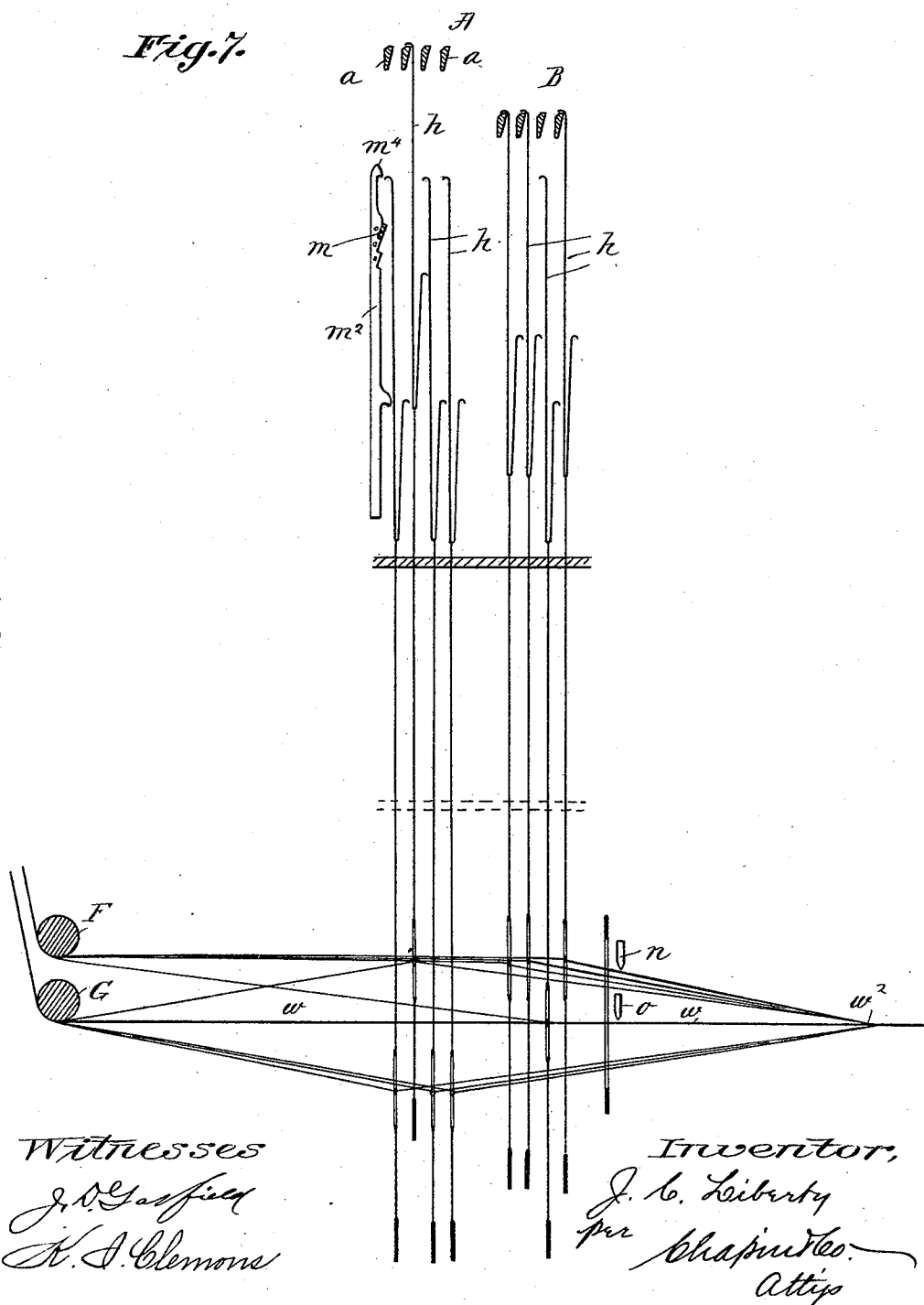
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JACQUARD MECHANISM FOR LOOMS.

No. 530,050.

Patented Nov. 27, 1894.

Fig. 7.



Witnesses
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Fig. 8.

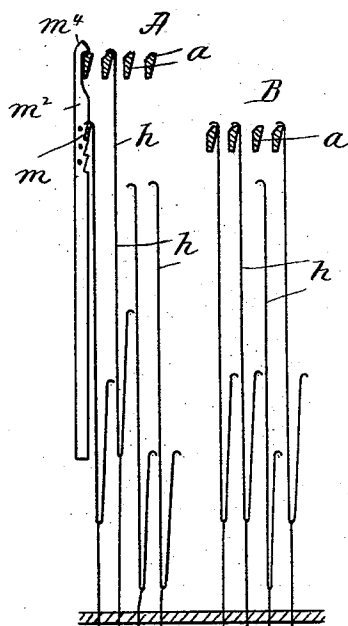
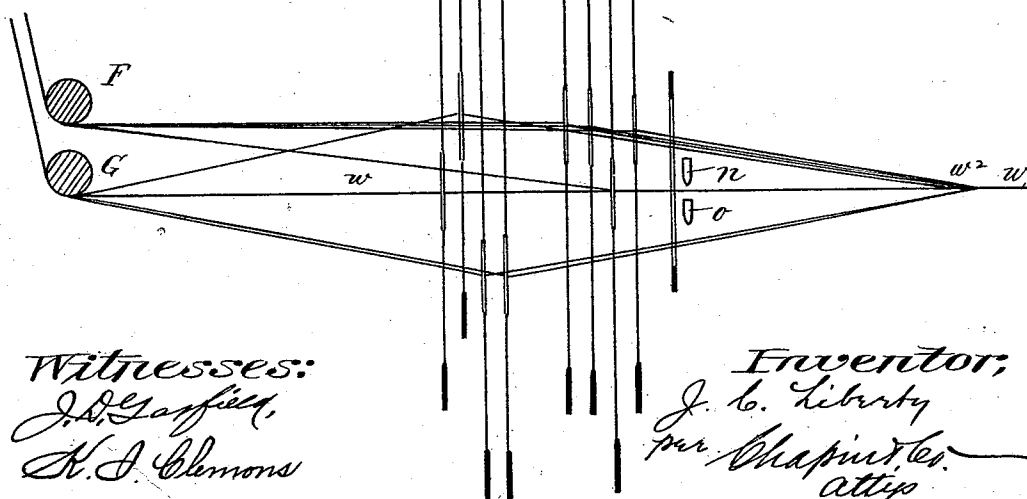
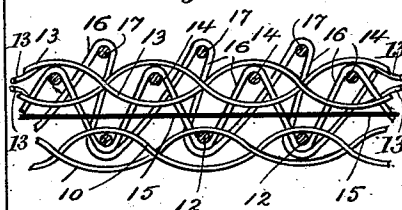


Fig. 9.



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UNITED STATES PATENT OFFICE.

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JACQUARD MECHANISM FOR LOOMS.

SPECIFICATION forming part of Letters Patent No. 530,050, dated November 27, 1894.

Application filed December 4, 1893. Serial No. 492,720. (No model.)

To all whom it may concern:

Be it known that I, JERRY C. LIBERTY, a citizen of the United States, residing at Easthampton, in the county of Hampshire and State of Massachusetts, have invented new and useful Improvements in Jacquard Mechanism for Looms, of which the following is a specification.

The object of this invention is to improve the construction of Jacquard looms to the end of increasing the producing capacity thereof in various classes of work, more especially fabrics having front and back warps, binder warps, fillings for the front and back, and a weft for forming the face or figure, such fabric being exemplified by webbings, the same often comprising elastic strands, as common for suspenders.

By the exercise of my present invention the shuttle employed in laying in the filling for the front of the fabric has its operation and then when the same shuttle has its next operation for laying in the filling for the back of the fabric, the other shuttle, often carrying silk, moves simultaneously therewith for the formation of the face, or face figure, whereby the back filling and figure are concurrently formed avoiding the necessity heretofore experienced of making the shed for the face or figure while the other shuttle is idle.

The invention is dependent upon the provision in the "jacquard" or pattern operated devices of the Jacquard loom of a set of hooks for supporting warps at a given, or normal, level, and other hooks for supporting warps at a lower level, means for simultaneously, or at one operation of the power level, moving one or more of the first hooks and warps to form a shed above the said given level, for raising one or more of the lower warps from the lower position by moving their hooks a greater distance to also form a shed above the aforesaid level, and for raising one or more other of the lower hooks and warps from the lower position only up to, or near, the said given level to form thereby a shed between the so last raised warp or warps and a warp or warps remaining in the lower position.

The invention also involves the provision in the head, or upper part of the Jacquard loom comprising the griff devices, of two sets

of griff frames arranged side by side and a griff having one or more bars, which is below and subsidiary to one of the griff frames, and means for imparting a certain movement to one of the griff frames and the hooks carried thereby, also for imparting a greater vertical movement to the other griff frame and the hooks carried thereby and also a raising of the subsidiary griff frame and the hooks carried thereby a distance fractional of that of the movement of its principal.

The invention also involves the provision of a main griff frame for raising hook-rods and a subsidiary griff-bar, or bars,—for raising hooks,—which are movable transversely as insured by the pattern-controlled needles engaging them, and which have members for engagement with, and to be lifted by, the bars of the principal griff when in proper transversely adjusted positions, whereby after the principal griff has been partially raised it will, in the completion of its movement, raise one or more of the subsidiary griff bars and hooks and warps supported thereby.

Other detailed constructions and arrangements are comprised within the scope of the present invention, all as will hereinafter fully appear and be set forth in the claims.

Reference is to be had to the accompanying drawings, in which—

Figure 1 is a side elevation of the top part of a Jacquard loom with the present improvements applied thereon. Fig. 2 is a central vertical section of the same taken from front to rear. Fig. 3 is a perspective view of one of the main griff frames and showing one of the individual griff bars, (of which there may be several) in engagement therewith. Figs. 4 and 5 are cross sectional views of the griff frame taken on the lines 4—4 and 5—5, Fig. 3. Figs 6, 7, and 8 are diagram views to be hereinafter referred to in connection with the description of the operation. Fig. 9 is a section longitudinally of the fabric such as elastic suspender webbing showing the front and back, binder, intermediate rubber strands and face weft.

In the drawings, A and B represent two similar griff frames, both horizontal and each, for instance, having four bars, or blades, *a, a*, each of these griff frames being as usual

formed of cast iron. Each griff frame, A, B, has on its ends the studs, b, b . The griff, A, will be hereinafter uniformly termed the "main griff," while the other will be referred to as "griff B." A lever frame, C, with duplicate side bars, d , is mounted on horizontal, pivotal supports, d^2 , at the rear of the top framing, D, of the loom and the side bars have pivotal connections, f , at their ends, and pivotal connections, f^2 , half way between their ends and the fulcrum points, d^2 , with the links, b' and b^2 , which have their upper extremities connected to the said griff frame studs, b .

A given swinging movement of the lever frame (acquired as common in this class of machines) will cause the simultaneous lifting of the griff frames A and B, the latter moving only half as fast and half as high as the front frame. The griff frames A and B are constrained in their vertical reciprocatory movements by the depending posts, g, g , which have guiding movements through the vertically apertured bosses, or hubs, g^2 , of the top framing D.

h, h represent the hook rods which are controlled by the needles, i , and pattern card, j , in the usual manner so that when the perforations of the card permit the needles to be moved forwardly by their springs, i^2 , before the griff frames rise, the hooks at the upper ends of the so moved rods will be in positions to be engaged and elevated by the griff-blades. The hook-rods have the return-bent and hook-ended portions, or rests, h^2 , which have their supports when the griff frames are down upon the stationary bars, j , commonly employed. The neck-cords, k, k , connected to the looped portions of the hook-rods and passing down through the perforated comber-board support, in the usual manner, the warp threads or yarns.

m, m represent the subsidiary griff bars, or blades, which may be termed sectional, or individual, griff blades, being movable transversely independently of each other. These have their positions below, and parallel with, the bars of the main griff, A, and have upright bars, or rods, m^2, m^2 , at their ends by which they are normally supported in their positions thus stated. The shoulders, m^3 , of these rods, m^2 , resting on the support bars, j , afford fulcrum supports for said rods whereby they may have transverse tilting movements, as plain, see Fig. 2, so as to move the individual griff-blades, m, m , horizontally and bodily transversely. Said upright rods, m^2 , also have hooks, m^4 , at their upper ends which stand higher than the normal level of the main griff frame, A. These pairs of upright bars, m^2 , are encircled by the eyes of certain ones, i^4 , of the horizontal needles, which needles are pressed forward,—as are the other aforesaid needles, i ,—by the springs i^2 . In the mechanism arranged as illustrated, these particular needles, i^4 ,—which engage the griff-blade uprights, m^2 ,—are held back

against the reaction of their springs and thereby carry the hooks, m^4 , of the uprights, m^2 ,—on which the individual subsidiary griff-blades, m , are supported—into line to be engaged by a rising blade of the main griff frame, A, it being perceived that the said hooks, m^4 , normally stand at a little distance above the said main griff, A, when it is at rest; and, therefore, the said main griff, A, has a portion of its rising movement before the griff-blade (or blades) m , to be elevated thereby, is given its rising movement. The relations of the hooks, m^4 , and blades, m , are such that when the hooks are in engagement with a bar, a , of the main griff, A, the individual griff-blades, m , are in planes coincident with the vertical planes of movement of the bars of said main griff A. The hook-rods m , have their positions, whereby they may, or not, be engaged by such blades, controlled by the card and needles, as well as are the positions of the blades, m , controlled by the cards and needles whereby they may, or not, be elevated by the main griff, A.

When the needles, i^4 , which control the transverse movements of the upright rods, m^2 , are permitted to enter perforations of the pattern card or board, the blade, or blades, m , controlled by such needles will, of course, not be elevated by the griff-blades above.

Referring now to the diagram views, Figs. 6, 7, and 8, and to the longitudinal sectional view, Fig. 9, wherein the arrangement of the threads of the fabric to be produced is shown, the operation of the said described mechanism will be now set forth.

In Fig. 9,—10, 10 represent the warps for the back of the fabric, 12, 12, being the filling therefor interwoven with the warps, as usual. 13, 13, represent the warps for the front of the fabric,—14, 14, being the filling interwoven therewith. 15 shows the longitudinal strand of rubber intermediate between front and back. 16 represents some of the warp-threads interwoven with the filling of both the front and back, and with the face weft, constituting the "binder," and 17, 17, represent the weft which makes the face or figure. Such a fabric is commonly employed for elastic suspender webbing, the warps and filling for the front and back being, for instance, of cotton, while the face weft may be silk.

In the loom comprising these improvements are employed two shuttles,—one for carrying cotton for alternately laying in the filling for the front and back, while the other carries the silk, or whatever may be chosen, and works at every other pick for making the face or figure.

In Figs. 6 to 8 but a single individual griff-blade, m , is shown, and it is furthermore in the present illustration sufficient to show four hook-rods for the griff, B, and four hook-rods for the combined main and individual griff, A, m , at the front, it being understood that these hook rods are reduplicated, or multi-

plied, a sufficient number of times to correspond to the desired width of the fabric to be produced.

In preparing the loom, the warps are run off from two beams, or rolls, F, G, through the eyes, or heddles, carried by the neck-cords, and through the reed alongside of which the shuttles, *n*, *o*, have their traverse.

The horizontal line, *w*, herein termed the "median" line is that on which the rubber strands, when employed, are stretched, said strands having no movements in shedding. The rubber strands are indicated by the heavy black horizontal line at the level, *w*. When the griffs are all in their normal positions, as seen in Fig. 6, the heddles supported by hook-rods, coacting with griff, B, are at said level, *w*; and the warps controlled by said griff B, and the hook-rods and heddles corresponding thereto are the face warps, and they normally run from the heddles, rearwardly, on said level, *w*. The warps running from the other beam, G, are employed for constituting the back and binders and they run through the heddles which are supported by the left-hand set of hook-rods, coacting with the main griff, A, and the individual griff, *m*. The left-hand heddles, when the griffs are in their normal positions, hold the warps running from the beam, G, depressed below said level, *w*, they running from the heddles thence to the said level, meeting it at the battening point, *w*². Now it is understood that the shed to form the back is constituted by elevating one or more of the individual griff-blades, *m*, to carry one or more of the lower set of warps up to, or near, the level, *w*, the warps which remain down forming the lower part of the shed; and it is also to be understood that to constitute one of the lower warps a binder it is to be carried from its extreme lower position to a position above the level, *w*, whereby it may be interwoven with the upper filling or face weft, and such a warp is thus elevated by means of a blade, *a*, of the main griff, A, having a movement double that of the griff, B, and substantially double that of the individual griff-blade *m*.

The changes from the position of the warps seen in Fig. 6 to those seen in Fig. 7 whereupon the front filling is interwoven with the face warps, as well, also, as with one of the under warps to act as the binder, are insured by the operations of the machine, as follows: Three of the needles in this example,—as the griffs, A, B, ascend,—permitted to move forwardly by the pattern, cause three of the right-hand set of hook-rods to be moved into position and engaged by the griff, B, while one of the hook-rods of the other set is, by a pattern-controlled needle, moved into position to be elevated twice as high by the main griff, A. In this instance perforated portions of the pattern card, moving rearwardly to contact with the needles, *i*⁴, prevent the uprights, *m*², from assuming positions of engagement relative to the bars of the main griff, A. Hence

at this operation no warp-hook is raised by the subsidiary griff. Thus is seen a shed formed by three elevated face warps and one of the elevated warps of the lower set,—one of the face warps remaining at the level *w*,—through which shed the shuttle, *o*, is shot for the front filling. The parts resume their normal positions (seen in Fig. 6) and then the changes take place to establish the positions seen in Fig. 8, whereupon the back filling is interwoven with the back warps, the face weft is interwoven with the face warps as is also a binder of the lower set interwoven with the face-weft. Three of the needles in this example,—as the griffs, A, B, ascend,—permitted to move forwardly by the pattern, cause three of the right-hand set of hook-rods to be moved into position and engaged by the griff, B, while one of the hook-rods of the front set is by a pattern-controlled needle moved into position to be elevated twice as high by a bar of the main griff, A. In this instance, also, imperforate parts of the pattern card cause the needles, *i*⁴, to have their longitudinal movements just about the time the top of the main griff, A, is level with the hooks, *m*⁴, the uprights, *m*², moving to their positions of engagement so that the blade, *m*, will move upwardly with the said main griff. Another one of the needles, *i*, having its end entering a perforation of the pattern-card carries one of the hook-rods, *h*, forwardly to its position to be engaged by said blade, *m*, when it reaches the height of the hook at the top of this particular hook-rod, and, therefore, one of the lower set of warps is moved from its normal low position to the level, *w*. Thus we see the lower shed formed by two lower warps remaining down and one lower warp at level, *w*, and an upper shed formed by a level face warp, three elevated face warps, and one of the lower set of warps which has been elevated to form the binder, and at this time both shuttles, *n*, *o*, which have been properly lowered, from their positions seen in Fig. 7 to that seen in Fig. 8 are shot, laying in the back filling and face weft. The vertical shifting movements of the shuttles are attained by the usual well known means at present practiced for this purpose. Of course by properly arranging the pattern-card the raising of a lower warp thread to form a binder above the median level, may be omitted at certain of the operations.

Heretofore the operations generally necessary to produce a fabric substantially as described by employment of the mechanisms in vogue have been to form a shed of diamond form with no level median warps and lay in one of the fillings using one shuttle; next forming another diamond shaped shed suitably changing the warps and laying in the other of the body fillings by the same shuttle and finally forming another diamond shed using face warps and binder, and while the shuttle which had operated twice remains idle putting in the face weft by the upper

shuttle. In this mode it has been necessary to raise and lower alternately the rubber strands so that they may lie along with the warps forming the upper or lower parts of the shed, a disadvantageous operation, appearing doubly so in the light of the method herein described. Each of the paired uprights, m^2, m^2 , have the griff-blades, m , vertically adjustable thereon so that the blades may be at just the proper distance below the normal level of the top hooks of the hook-rods to cause by the raising of the blades a lifting of the warps controlled thereby, the desired distance proportionate to the rising movement of the other loom warps elevated by the main griff, A. The uprights are therefore formed with the ratchet-like notches, m^6 , in their edges in one or another of which rest the lower edge of the blade, m . The blade has its ends turned to form the ears, m^7 , which lie against the sides of the upright rods, m^2 , set screws, m^8 , passing through the ears, m^7 , and the perforations, m^9 , in the upright rods.

The cylinder, J, for the pattern-card has its usual overturning or rotational movement for bringing the next leaf of the pattern-card to the needle ends by novel means, as follows: The cylinder is journaled on the forward extremities of the paired horizontal bars, t , which have guiding movements through the rigid slide straps, t^2 , of the top frame, D. The cylinder has at its one end the teeth, t^3 , and there is a hooked arm, t^4 , pivoted on the end of the top frame for engagement with the teeth as the cylinder has a bodily forward horizontal movement. This movement is imparted by the cam-slotted plate, u , which is rigidly fixed to, and depends below, one of the griff-frames (here the one, B), and which receives within its slot the studs, t^5 , of the aforesaid duplicated horizontal sliding bars, t . As the griffs and cam-slotted plates, u , are raised, the bars and cylinder are forced forward and in the engagement of the teeth, t^3 , of the cylinder with the hook, the cylinder is turned around about one-eighth of a rotation and stands with its corners vertically and horizontally. The bracket, t^6 , on the bar, t , having the spring, t^7 , bearing on the front facet of the square "cylinder" causes the turning of the latter the other eighth of a turn to bring the face of the pattern at right angles to the needles.

It will be observed on reference to the drawings that the blades, m , when elevated, are in same plane as the blades, a , and that at the time the griffs start up the hook-rods, h , not taken by an upper main griff, A, are out of said plane of movement. Shortly after the commencement of the upward movement of the griffs, A, m , the pattern cylinder has its forward movement so that the hook-rods held back and not taken by the upper griff are, by reason of their forwardly spring pressed needles, brought to the plane of engagement by the blade, m . The carrying up of lower warps, as binders, may, of course, be omitted

at intervals according to the weave predetermined by the arrangement of the pattern.

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

1. In a Jacquard loom, the combination with the main griff, A, and means for imparting thereto a vertically reciprocatory movement, of the vertical bars, m^2 , supporting a horizontal individual blade, m , below, and parallel with, the main griff, and having hooked upper ends which stand higher than the blades of the main griff, pattern-controlled needles which engage the said upright bars to place them free from, or by their hooked ends across the paths of the blades of the main griff, vertical rods having hooks at their upper ends which rods are supported for lateral swinging movements and with their upper hooked ends above the blades of the main griff, and pattern-controlled needles which govern the lateral positions of said hook-rods whereby the latter may be either taken up by the blades of the main griff, or, after such main griff has had part of its upward movement, taken up by the lower individually operated blade only partially as far, substantially as described.

2. In a Jacquard loom, a main griff, A, and means for imparting vertically reciprocatory movements thereto, an individual griff blade below the main griff, a movable pattern-controlled device for coupling the main and individual griffs whereby the latter may partake of the movement of the main griff, vertical rods, having hooks at their upper ends, which are supported for lateral swinging movements, and with their hooked ends above the blades of the main griff, and pattern-controlled needles which govern the lateral positions of said hook-rods whereby the latter may be either taken up by the blades of the main griff, or after such main griff has had part of its upward movement taken up by the lower pattern and needle operated individual blade, substantially as described.

3. In a Jacquard loom a main griff, A, and means for imparting vertically reciprocatory movements thereto, individual griff-blades below the main griff and movable pattern-controlled devices for coupling the main with one or more of the individual griffs, whereby the latter may partake of the vertical movements of the main griff, vertical rods having hooks at their upper ends which are supported for lateral swinging movements and with their hooked ends above the blades of the main griffs, and pattern-controlled needles which govern the lateral positions of said hook-rods whereby they may be taken up by the main or individual griffs, or by neither, thereof, the griff, B, and pattern-controlled hook-rods which carry devices for supporting warps normally at a higher point than the warp supporting devices which are carried by the hook-rods operating in conjunction with the griff, A, and means for imparting verti-

cal movements to said griff, B, half as high as those imparted to the griff, A, substantially as described.

5 4. The combination with the main griff frame, of one or more individual griff-blades, m , having the angularly turned end ear-pieces, m^7 , the upright-rods, m^2 , m^2 , having hooks at their upper ends which are adapted to engage the blades of the main griff frame, and

having the notches, m^6 , in which rest the 10 edges of said blades, m , and the set screws, m^8 , passing through the ear-pieces and upright-rods for confining the blade immovably upon the rods, substantially as described.

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Witnesses:

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