

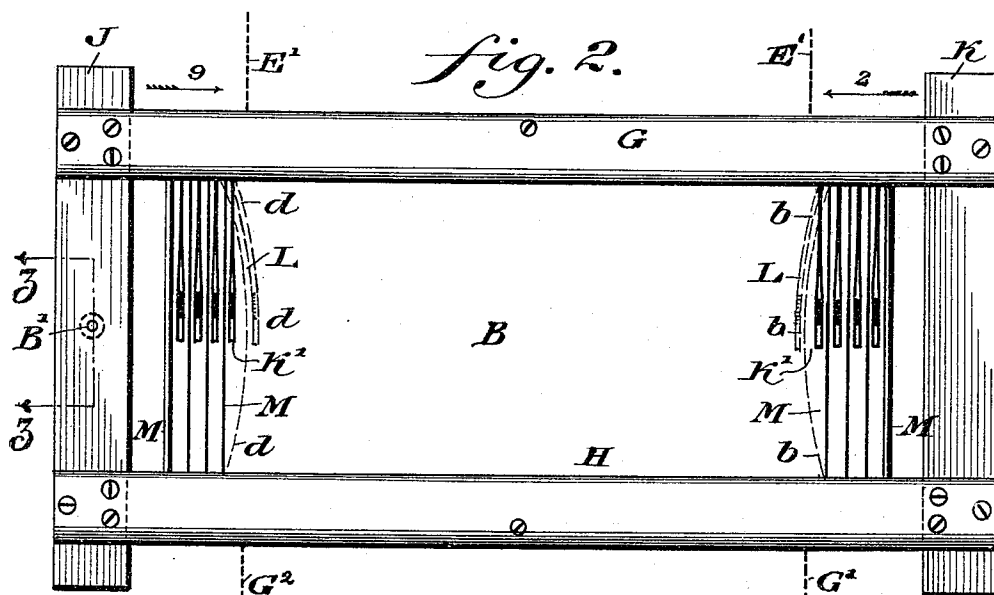
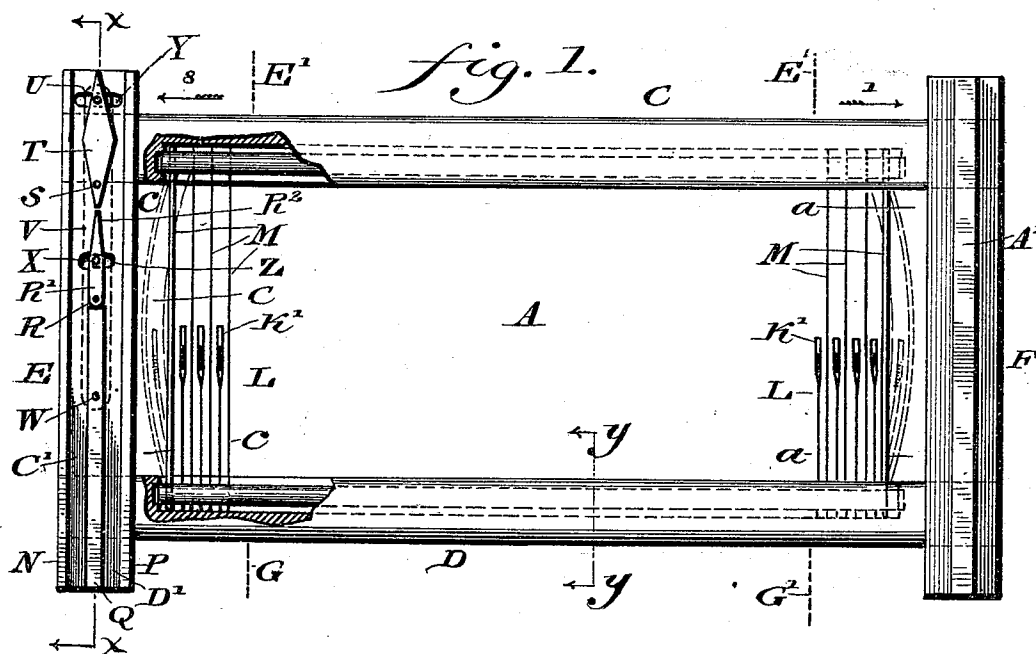
(No Model.)

2 Sheets—Sheet 1.

C. ASHOFF.
DOUP HARNESS FOR CROSS WEAVING.

No. 544,496.

Patented Aug. 13, 1895.



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fig. 3.

fig. 4.

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fig. 5.

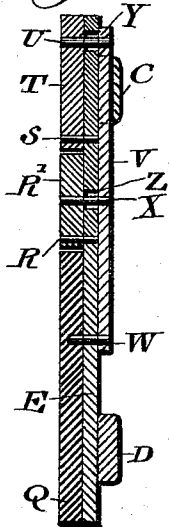


fig. 6.

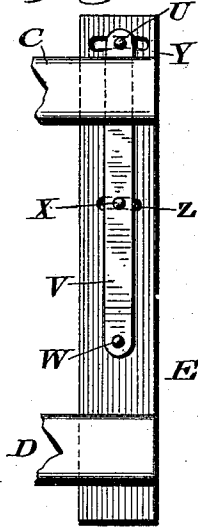


fig. 7.

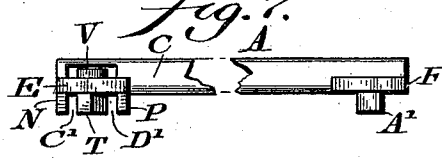


fig. 8.



fig. 9.

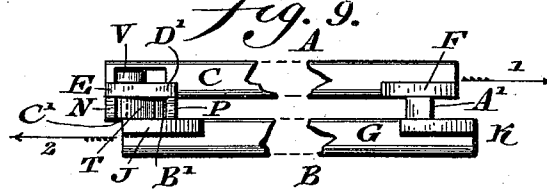


fig. 10.

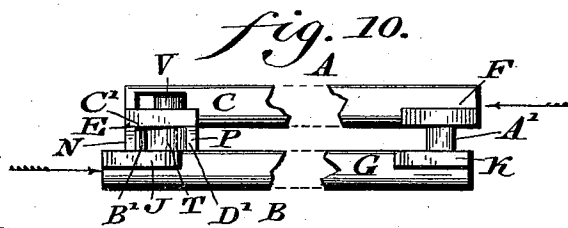


fig. 11.



fig. 12.

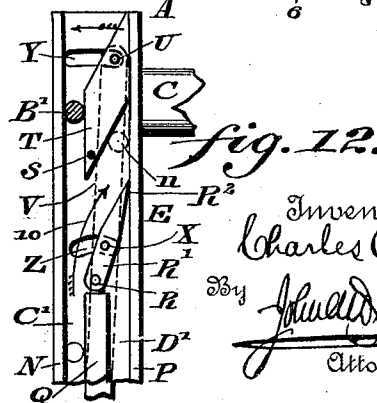
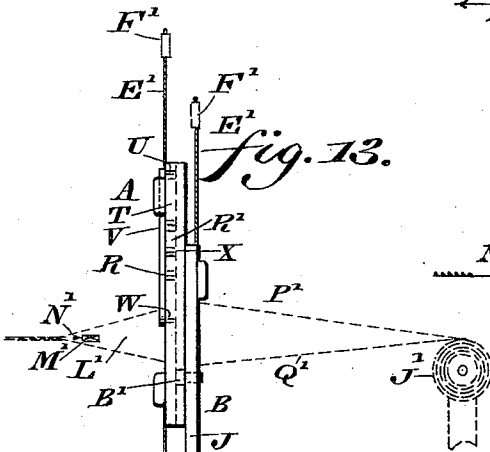


fig. 13.



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UNITED STATES PATENT OFFICE.

CHARLES ASHOFF, OF PHILADELPHIA, PENNSYLVANIA.

DOUP-HARNESS FOR CROSS-WEAVING.

SPECIFICATION forming part of Letters Patent No. 544,496, dated August 13, 1895.

Application filed April 6, 1895. Serial No. 544,760. (No model.)

To all whom it may concern:

Be it known that I, CHARLES ASHOFF, a citizen of the United States, residing in the city and county of Philadelphia, State of Pennsylvania, have invented a new and useful Improvement in Doup-Harness for Cross-Weaving, which improvement is fully set forth in the following specification and accompanying drawings.

My invention relates to an improvement in doup-harness for cross-weaving; and it consists of heddle-frames which when in operation are adapted to be moved laterally with respect to each other and have their relative positions maintained.

It further consists of novel details of construction hereinafter described.

Figures 1 and 2 represent front elevations of a pair of heddle-frames embodying my invention. Figs. 3 and 4 represent, respectively, vertical sections on lines *yy*, Fig. 1, and *zz*, Fig. 2. Fig. 5 represents a vertical section on line *xx*, Fig. 1. Fig. 6 represents a rear elevation of a detached portion of one of the frames. Figs. 7 and 8 represent plan views of portions of a pair of frames. Fig. 9 represents a plan view of a portion of a pair of frames placed together. Fig. 10 represents a similar view, but with certain parts in different positions from those shown in Fig. 9. Figs. 11 and 12 are front elevations of a detached portion of a frame on an enlarged scale. Fig. 13 represents an end view of a pair of frames and portions of the mechanism for operating the same on a reduced scale. Fig. 14 represents a sectional view of a portion of the fabric woven in a loom provided with a set of frames embodied in my invention.

Similar letters of reference indicate corresponding parts in the several figures.

Referring to the drawings, A and B designate heddle-frames, the frame A consisting of the horizontal top and bottom bars C and D and the vertical side pieces E and F, and the frame B of the horizontal top and bottom bars G and H and the vertical side pieces J and K, both of said frames being provided with the heddles L and springs M, which are placed alternately relative to each other in said frames, so that a heddle occupies a portion of the space between two adjacent springs. The heddles in the frame A are suit-

ably secured to and rise from the bar D, while those in the frame B are suitably secured to and depend from the bar G.

The vertical side piece E of the heddle-frame A is provided with the outer walls N and P and the central strip Q, which latter extends from the lower edge of said piece E to a point about midway of the length of said piece E, as will be seen in Figs. 1 and 5. Pivoted at R to the piece E and in alignment with the strip Q is a switch or tongue R', which is adapted to be moved either to the left or right of its pivotal point, as in Figs. 11 and 12, respectively.

Pivoted at S to the piece E is the lever T, which is diamond-shaped in the present instance, and is adapted to be moved from left to right and is connected by a pin U to a lever V, the latter being pivoted at W to the piece E on the side opposite to that to which the tongue R' and lever T are secured, said lever V being connected by a pin X to the tongue R', whose free end R² is preferably tapering, it being noticed that the pins U and X travel in slots Y and Z, respectively, in the piece E.

The piece F is provided with a strip A', which rises therefrom a distance equal to the projection of the walls N and P beyond the bar E, so that when the heddle-frames A and B are placed together, as seen in Figs. 9 and 10, they will be parallel to each other throughout their entire length, and a uniform tension is imparted to the warps carried by the heddles L in said frames. The piece J is provided with a stud B', adapted to travel in grooves or tracks C' and D' in the piece E, it being noticed that said grooves are formed by the walls N and P, the strip Q, tongue R', and lever T, the two latter being for the purpose of directing said stud into either the one or the other of said grooves, as may be required. If desired, the stud B' may be provided with a roller to reduce the friction.

The operation is as follows: The heddle-frames A and B are placed against each other, as shown in Figs. 9, 10, and 13, and are connected by cords, wires, &c., E' (see Fig. 13,) with any well-known form of lifting arms or levers F', and by cords, wires, &c., G', with any well-known form of treadles H', said arms F' and treadles H' being for the purpose, respectively, of lifting and lowering said frames,

and are parts of a loom not shown in the drawings and may be operated in any well-known or suitable manner. The warp ends from the "warp-beam" J' are passed through the loops K' of the heddles L, and are then secured to the cloth-beam of the loom in the usual manner. The loom is then started, it being assumed that the heddle-frames are in the positions shown in Figs. 9, 11, and 13, when the weaving is begun.

Referring to Fig. 13, it will be noticed that the heddle-frame A is up and the frame B is down, thus causing the warp carried by the heddles in the same to produce the shed L', through which is passed the shuttle M', which supplies the filling N' within said shed. (See, also, Fig. 14.) When the pick has been completed, the heddle-frame A is lowered and the frame B is lifted, the former carrying with it the warp P' and the latter the warp Q', it being evident that the warp that was formerly at the bottom of the shed is now on the top thereof, while the one that was on top of the shed is now on the bottom of the same. The warps P' and Q' when changing their relative positions cross each other, so that the chain in the woven fabric is composed of warp-threads which alternately cross each other after each pick of the shuttle M', the same being accomplished in the following manner:

On referring to Figs. 9 and 11 it will be seen that the stud B' of the frame B is in the groove D' in the frame A, and in consequence thereof the frame A is a trifle to the left of the frame B and the latter a trifle to the right of said frame A, and as the warp-threads are forced out of center the tendency of said threads is to seek said center, thus causing a tension on the heddles and springs and bowing the same. When this is the case, the heddles L and springs M in said frame A will be bent or bowed by the said tension of the warp, as indicated by dotted lines *a a a* in Fig. 1, and the tendency of said heddles and springs when in these positions is to move the frame A from left to right, as indicated by the arrows 1 in Figs. 1 and 9. This is due to the fact that the loops K' of said heddles are substantially fixed points, as far as lateral motion is concerned, or, in other words, the loops K' move up and down in the same vertical line throughout the entire distance traveled by the same. Hence when the frame B is in the position shown in Fig. 9 and working in connection with the frame A the heddles L and springs M in said frame B will be bent or bowed by the warp, as indicated by dotted lines at *b b b*, Fig. 2, and the tendency of the same when in these positions is to move said frame from right to left, as indicated by the arrows 2, Figs. 2 and 9.

The tendency of the warp-threads on the bowed springs and heddles to move the respective frames laterally, as hereinbefore described, cannot become effective while the stud B' remains within the groove D'; but as soon as said stud has been raised sufficiently

by the upward movement of the heddle-frame B to reach the space between the tongue R' and the under side of the lever T the resistance presented to said stud by the strip Q no longer exists, and the tongue R', yielding to the pressure caused by the tension of the warp-threads on the bowed springs and heddles, allows the stud B' to follow the course indicated by the arrow 3 in Fig. 11, and is carried to the wall N and comes in contact with the under side of the lever T, as at 4, (see Fig. 11,) and the frame B, continuing in its upward movement, forces the stud B' against said lever T and causes the latter to turn on its pivot S and occupy the position shown in Fig. 12, the stud B' being in the space between the lever T and wall N when said frame has completed its upward movement.

The lever T in moving from left to right carries with it the upper portion of the lever V, with which it is connected, causing it to turn on its pivot W. The lever V has connected to it the tongue R', so that the latter will also be moved from left to right when the lever T is operated, and thereby closes the entrance to the groove D', and thus prevents the stud B' from entering said groove when the same moves downward with the frame B from the position shown in dotted lines at 4 in Fig. 11, and causes said stud to descend in the groove C', so that when the frame B has completed its downward motion the stud B' will be in the position shown in Fig. 10—that is, in the bottom of the groove C'. By this means the warp-threads are made to cross each other in every other pick, so that the chain in the fabric will be composed of warps consisting of two to a set, as shown in Fig. 14, and the warp that is in front, as at 5 and 6, will be in the rear, as at 7 and 8, in the following pick, and at 9 will again be in front, and so on until the warp from the beam J' is entirely used up.

If desired, the warp-threads can be crossed at every pick by using suitable mechanism on the loom.

When the stud B' is in the position shown in Fig. 10, the frame A is to the right and the frame B to the left of each other, or in a position opposite to that shown in Fig. 9.

When the frames A and B are in the positions shown in Fig. 10, the heddles and springs in the frame A are bent or bowed by the action of the warp-threads, as shown in dotted lines at *c c c*, Fig. 1, and the tendency of the tension on said heddles and springs is to move the frame A in the direction indicated by the arrow 8 in said figure, as the loops of the heddles have no lateral motion.

The frame B, when in the position shown in Fig. 10 relatively to the frame A, will have its heddles and springs bent or bowed by the tension of the warp, as shown in dotted lines at *d d d*, Fig. 2, and the tendency thereof is to move the frame B in the direction indicated by the arrow 9 in said figure.

When the stud B' is carried upward by the rising of the frame B, the tendency of the tension on the bowed springs and heddles to move the frame from left to right cannot become effective as long as the stud is in the groove C' below the tongue R'; but as soon as it reaches the space between the tongue R' and the under side of the lever T, the tension on the bowed heddles and springs becomes effective and causes the stud B' to follow the course indicated by the arrow 10, Fig. 12, and come in contact with the under side of the lever T, as at 11.

The tension of the threads will carry the stud B' to the wall P, so that in continuing its upward movement it will cause the lever T to move on its pivot S from right to left and again occupy the position shown in Fig. 21, it being especially noted that by reason of the resiliency of the springs and heddles the liability of the warp-threads to break is reduced to a minimum. When the frame B has completed its upward movement when traveling in the direction of the arrow 10, Fig. 12, the stud B' will occupy the space between the wall P and lever T, as at 12, Fig. 11. When the frame B descends from this latter position, the stud B' cannot enter the groove C' on account of the position of the tongue R', which closes the inlet to said groove and thereby causes said stud to descend in the groove D'.

It will be seen that heddle-frames so constructed may move laterally as well as up and down after each pick, so that the warps in the fabric are in zigzag direction and produce a crossed chain in the process of weaving, and thus bring cross-weaving down to or equal to two-treadle work.

Two heddle-frames constitute a set, and require but two levers and two treadles, in connection with certain well-known parts of a loom, to operate the same, thereby dispensing with the complicated and expensive mechanism now employed to obtain similar results. These frames may be worked in any form of loom, but are intended particularly for that class in which are woven chenille fabric and hammocks, mosquito-netting, and gauze dress goods, &c.

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

1. A set of heddle frames, a portion of one of said frames having tracks thereon, while the other of said frames is provided with a projection adapted to work in said tracks, in combination with mechanism adjacent to said tracks and adapted to be engaged and operated by said projection, whereby the lateral relative position of said frames may be automatically changed, substantially as described.

2. A set of heddle frames, one of said frames having thereon, tracks arranged adjacent to each other, the other of said frames having a projection thereon adapted to work in said tracks, in combination with movable devices

for directing said projection alternately from one to the other of said tracks, substantially as described.

3. A set of heddle frames, one of which is provided with tracks, a pointed tongue, and a substantially diamond shaped lever, pivotally mounted above said tracks, and means for causing said tongue and lever to move in unison, in combination with a projection attached to the other of said frames and adapted to travel in said tracks, substantially as described.

4. A set of heddle frames, one of the same being provided with tracks, a tongue, and a substantially diamond shaped lever, pivotally mounted above said tracks, and means for causing said tongue and lever to move in unison, the other of said frames having attached thereto a pin adapted to travel in said tracks, substantially as described.

5. A set of heddle frames, one of the same having tracks therein, a tongue and a lever of substantially diamond shape mounted above said tracks, a bar on the opposite side of said frame, and connections from said bar to said tongue and lever, whereby the same are caused to be moved in unison, the other of said frames having a projection thereon adapted to work in said tracks, substantially as described.

6. A set of heddle frames, one of the same being provided with tracks, a tongue pivotally mounted on said frame, adjacent to said tracks, a pointed lever pivotally mounted adjacent to said tongue and means for causing said tongue and lever to move in unison, the other of said frames having a projection adapted to work in said tracks, substantially as described.

7. A set of heddle frames, one of the same having thereon tracks, arranged adjacent to each other, the other of said frames having a projection thereon, adapted to work in said tracks, in combination with a tongue and lever pivotally mounted on one of said frames, adjacent said tracks and means for causing said tongue and lever to operate in unison, substantially as described.

8. A set of heddle frames, one of said frames having the raised portion A', the tracks C' and D', the pivotally mounted tongue R', the substantially diamond shaped lever T, pivotally mounted, in combination with means for causing said tongue and lever to move in unison, the other of said frames having a projection thereupon, adapted to work in said tracks, substantially as described.

9. A set of heddle frames, one of the latter having tracks therein, a tongue pivoted above said tracks, a substantially diamond shaped lever pivoted above said tongue, a lever V pivoted to the opposite side of said frame, slots in the latter, and suitable connections passing through said slots and common to said levers and tongue, whereby the same may be moved in unison, the other of said frames having a projection thereon adapted

to work in said tracks, substantially as described.

10. A set of heddle frames, having heddles therein, the heddles of one frame pointing in
5 a direction opposite to the heddles of the other frame, springs attached to each frame and interposed between said heddles, one of said frames having thereon tracks arranged adjacent to each other, and the other of said
10 frames having a projection thereon adapted to work in said tracks in combination with a tongue pivotally mounted on one of said frames, adjacent to said tracks, a pointed lever pivotally mounted adjacent to said tongue,

and means for causing said tongue and lever :5 to move in unison, substantially as described.

11. A set of heddle frames, guiding devices common to each frame, in combination with mechanism mounted on one of said frames and adapted to be actuated by a suitable por- 20 tion of said guiding devices, whereby the lateral relative position of said frames may be automatically changed, substantially as described.

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