

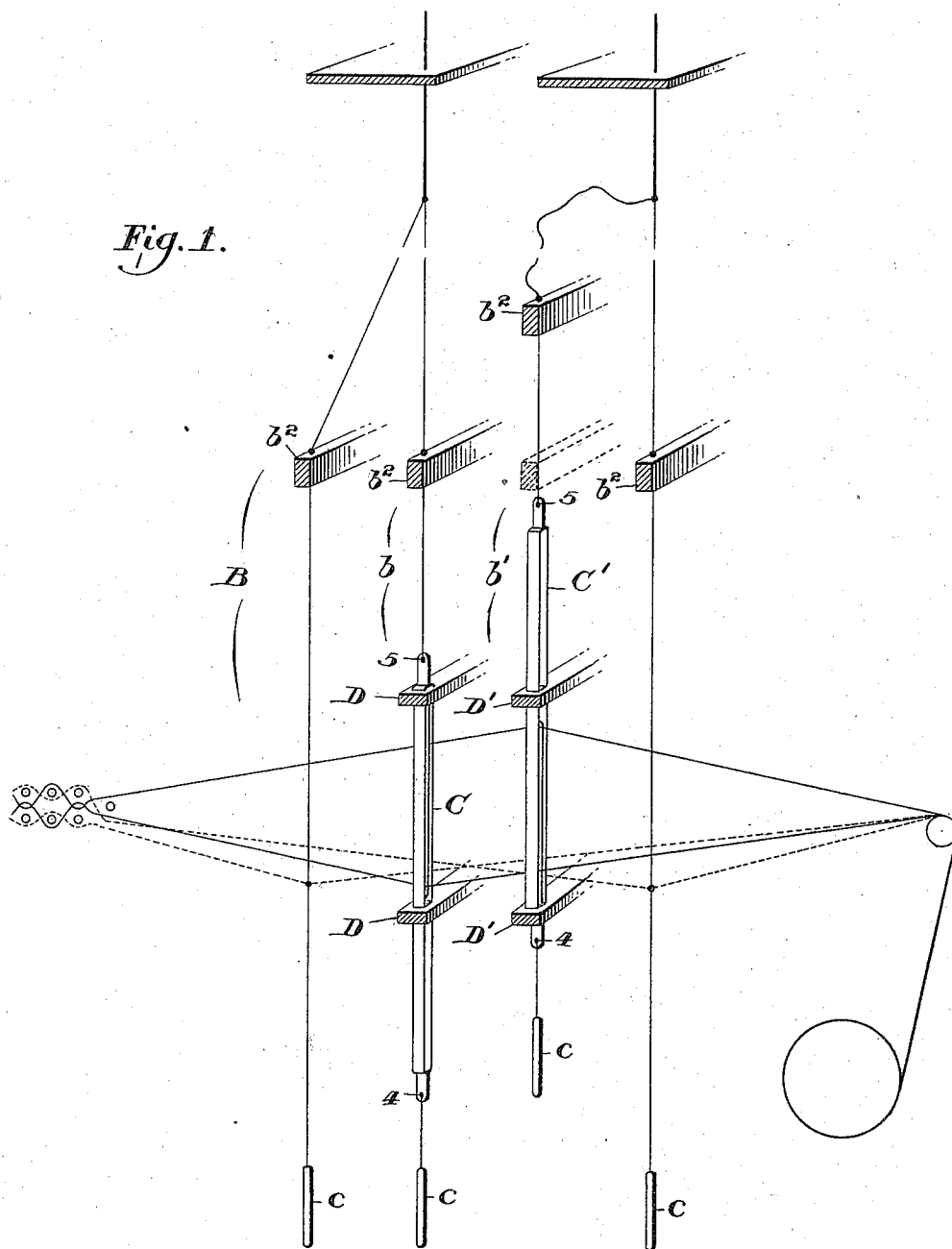
(No Model.)

4 Sheets—Sheet 1.

J. BUCKLER.
LOOM FOR CROSS WEAVING.

No. 576,300.

Patented Feb. 2, 1897



Witnesses.

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4 Sheets—Sheet 2.

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(No Model.)

4 Sheets—Sheet 3.

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Fig. 4.

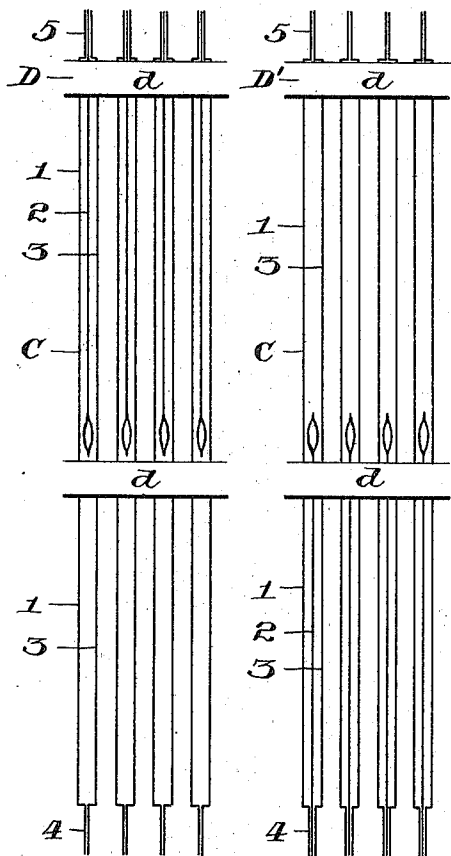


Fig. 5.

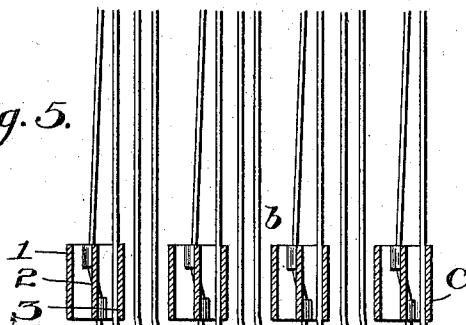


Fig. 6.

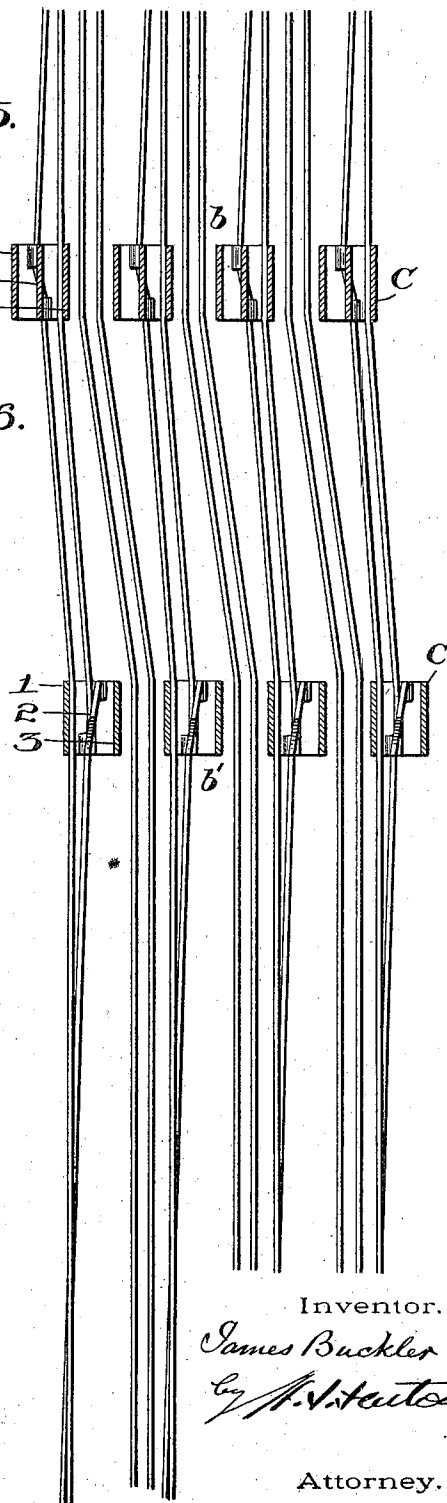
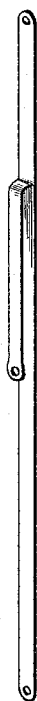


Fig. 7.

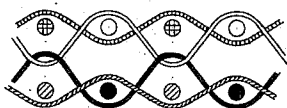
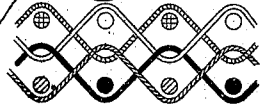


Fig. 8.



Witnesses.

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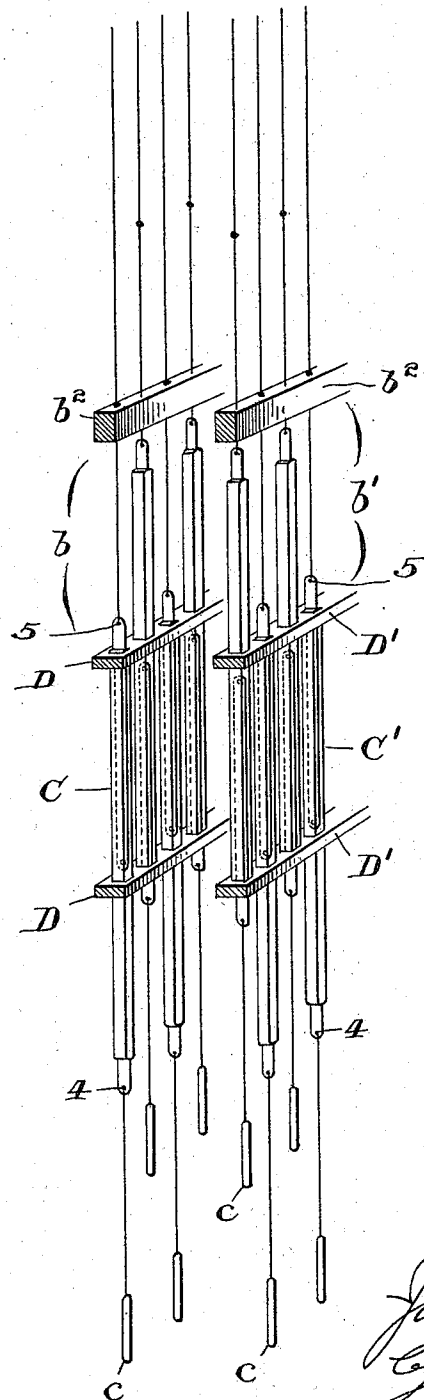
4 Sheets—Sheet 4.

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Fig. 9.



Witnesses.

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UNITED STATES PATENT OFFICE.

JAMES BUCKLER, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR, BY MESNE ASSIGNMENTS, TO JOHN M. RUSSELL, OF WORCESTER, MASSACHUSETTS.

LOOM FOR CROSS-WEAVING.

SPECIFICATION forming part of Letters Patent No. 576,300, dated February 2, 1897.

Application filed February 3, 1896. Serial No. 577,856. (No model.)

To all whom it may concern:

Be it known that I, JAMES BUCKLER, a citizen of the United States, residing at the city and county of Philadelphia, and State of Pennsylvania, have invented certain new and useful Improvements in Looms for Cross-Weaving, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

This invention relates to looms for weaving textile fabrics, having reference more especially to looms for producing multiple-ply ingrain carpet, my aim herein being to provide a construction whereby may be produced a thoroughly-bound fabric, free from pockets or unbound portions between the plies, and in which the threads of one ply shall not appear on the face of the other, excepting when such threads are thrown thereto in the formation of a figure. This result is attained by the crossing, in the interior of the fabric, of the warp-threads of the respective plies, as will hereinafter appear.

In the particular embodiment of the invention illustrated in the drawings a loom for the weaving of two-ply ingrain carpet is employed, the same being equipped with two sets of peculiarly-constructed heddles for respective plies, in combination with means for "shogging" or laterally reciprocating said heddles and means for vertically moving the heddles of each set either singly or collectively, as will be hereinafter described and claimed.

In the drawings, Figure 1 is a diagram illustrating the general arrangement and operation of my improved heddles in respect to co-operating parts of a loom. Fig. 2 is a front elevation of a portion of a loom to which the invention is applied. Fig. 3 is a plan of the connected heddle-frames. Fig. 4 is an elevation on an enlarged scale of portions of said frames with the heddles therein. Fig. 5 is a horizontal section through the two sets of heddles, showing the warp set up therein and the heddles as shogged to cross the warp-threads. Fig. 6 is a perspective of a modified form of heddle. Figs. 7 and 8 are diagrams of fabrics which may be woven by a loom embodying my improvements. Fig. 9

is a diagram, similar to Fig. 1, of a modification wherein the heddles in each frame are alternately inverted, so as to produce a figured fabric.

A designate a portion of the main frame of a loom, and B the harness, whereof the two inner sets $b b'$ are represented as constructed in accordance with my invention.

Briefly described, the harness used in the ordinary two-ply ingrain-carpet loom comprises four parts, each part being distributed across the loom by means of a properly-perforated strip of wood, termed "a journal," such, for example, as represented at b^2 in the drawings. The coupling—that is, the portion of the harness extending through and below the journal—controls one warp-thread, such coupling being connected by means of a leash with the Jacquard mechanism. The several couplings are knotted on the upper face of the journal, so that if the journal be raised the couplings and, perforce, the engaged warp-threads will be simultaneously raised thereby, the harness-leashes becoming slack by this movement. In the journals which remain down the couplings may be raised independently of each other in prescribed order through the medium of the Jacquard mechanism.

The means herein illustrated for bodily raising the journal is of ordinary construction, that is to say, the journal is supported at each end upon a vertical bar or link b^3 , which is connected at its lower end with a bell-crank lever b^4 , that is linked with a cam-actuated lever b^5 , the cam b^6 therefor being mounted upon a shaft b^7 , that is properly geared with and driven from the main shaft of the machine.

In carrying out my invention in a simple and efficient form I substitute for the usual couplings of the two inner sets of harness, whereof one set is arranged in advance of the other, two sets of heddles $C C'$, which are mounted in horizontally-reciprocative frames $D D'$, respectively. These frames each comprise in their construction two horizontal bars d , connected at their ends and maintained a suitable distance apart by means of vertical bars d' , the horizontal bars being provided throughout their length with vertical spaces for the reception of the heddles. The end

bars of the two frames are connected with the respective arms of horizontally-disposed rock-levers d^2 , which are fulcrumed on appropriate brackets or supports d^3 on the sides of the main frame, to the end that if one frame be moved lengthwise in one direction the other frame will be moved in the opposite direction.

Extending from one end of the heddle-frames is a rod d^4 , the outer end of which is connected by means of a strap with an eccentric d^5 on a horizontally-arranged shaft d^6 , which is driven from a suitable source of power. Hence during the operation of the eccentric the two heddle-frames will be oppositely reciprocated transversely of the loom. This reciprocating mechanism is used herein for illustrative purposes only, it being obvious that various well-known reciprocating means may be readily substituted therefor.

The heddles which are mounted in the above-described frames are capable of vertical movement independently of each other, and they are connected with the leashes by means of the strings extending through the usual journals, each set of strings being knotted on the upper side of the journal, so that by bodily raising the latter the entire set of connected heddles may be simultaneously lifted. The heddles are provided at their lower ends with the usual weights or "lingoes" c , which tend to hold them normally down. By this construction it will be seen that the heddles will be collectively and individually controlled similarly to the usual couplings.

Each of the heddles in its preferred, though not essential, form comprises three strips of metal 1 2 3 or other suitable material. These strips are united at one end, the central strip 2 being about one-half the length of the other or lateral parts and constituting a needle through the eye of which passes a warp-thread, as will be presently described. The free ends of the lateral strips 1 3 are provided with eyes 4 to permit the attachment of the lingo thereto, and the opposite end of one of these parts is extended and provided with an eye 5 for connection with the leash-string.

The heddles of each frame are mounted side by side therein, the strips of each heddle embracing the vertically opposite division or space walls of the two horizontal bars, which walls thus not only support and guide the heddles vertically, but also, when the frame is "shogged," move simultaneously therewith the entire series of heddles.

It will be observed that the heddles in the two frames are oppositely disposed, that is, the needles in one set of heddles extend downward, while those of the other heddles extend upward.

The foregoing is a description of my improvements as applied to an ordinary loom.

The operation is as follows: One set of warp-threads for one ply is drawn through the eyes of one set of heddle-needles and through the elongated openings of the opposite heddles.

One set of warp-threads for the other ply is drawn through the eyes of the needles in the heddles last named and through the elongated openings in the other heddles, and the remaining warp-threads for the respective plies are drawn through the outer sections of the harness, as usual, and run between the adjacent heddles in the respective frames. The warp having thus been set up the loom is operated, the heddle-frames, together with their heddles, being thereupon reciprocated transversely of the machine, as above described. At the end of each stroke of the frames the heddles of each set may be raised simultaneously by the elevation of the overhanging journal or may be raised individually by the Jacquard mechanism, as the nature of the fabric or the particular pattern may require. In virtue of the horizontal reciprocating of the heddles the adjacent warp-threads which pass through the eyes in the needles of the respective heddles are crossed upon each other intermediate the two plies, so as to effect a uniform binding of the plies throughout the length and breadth of the fabric; that is to say, assuming that the four sets of harness occupy the relative positions indicated in Fig. 1—the heddle C in frame D being down and the heddle C' in the frame D' being up—the two frames are shogged, as described, the heddles therein remaining in the relative positions indicated. The heddle C' is then let down, so that the thread in the needle thereof is dropped below the eye of the adjacent heddle-needle in frame D. This being done the heddle C' is lifted, the warp-thread engaged thereby thus passing under the eye of the needle of heddle C and causing the warp-thread in the needle of one heddle to lap around and about the thread in the needle of the other heddle. The weft-threads are shot into the sheds in the usual manner, and in consequence there is produced a fabric possessing the characteristics above stated.

It will be seen from the foregoing arrangement of my improved heddles that only the two opposite sets of warp-threads, one of each ply, are bound or crossed in the interior of the fabric, (see Fig. 7;) but it will be apparent that by equipping the four sets of harness with my heddles and shogging the adjacent sets there will be effected a binding or crossing of both pairs of opposite threads, one thread of one pair with one thread of the opposite pair, in alternate succession. (See Fig. 8.)

In the weaving of a plain or unfigured two-ply fabric with differently-colored faces, say one red and the other green, the heddles in each frame are simultaneously operated independently of the Jacquard mechanism, and as the warp-threads of the respective plies are bound together by crossing each other in the interior of the fabric, it will be obvious that the warp of one ply will not appear on the face of the opposite ply.

Where the loom is designed to produce a

figured fabric, the heddles in each frame, instead of being arranged uniformly as above described, are alternately inverted, as represented in Fig. 9; that is, one needle points downward and the next upward and so on alternately, the figuring-warp being handled by the alternate heddles. The heddles are independently controlled by the Jacquard mechanism, as usual, so as to throw the figuring-warp of one ply onto the face of the opposite ply in a manner to effect the weaving of the desired pattern; but such figuring-warp at no other time appears upon the opposite face of the fabric.

15 In Fig. 6 is shown a modified form of heddle comprising a guide-strip and a laterally-disposed needle thereon. In this construction the heddles are arranged in reciprocative frames similarly to those above described, 20 warp-threads of the respective plies being likewise controlled and crossed by the action of the needles.

I claim as my invention—

1. In a loom for weaving multiple-ply fabric, the combination of a plurality of sets of harness for the warp-threads of one ply, a plurality of sets of harness for the warp-threads of another ply, adjacent sets thereof including heddles wherein the needles of one set 30 are in advance of and oppositely disposed in respect to those of the other set and wherein elongated guide-openings are provided between the adjacent needles of each set, so as to extend above and below the eyes of the said needles, and means for shogging said heddles, substantially as described.

2. In a loom for weaving multiple-ply fabric, the combination of a plurality of oppositely-disposed sets of independent heddles for warp-threads for the respective plies, horizontally-reciprocative frames in which said heddles are guided and supported, means for longitudinally reciprocating said heddles, and means for shogging the frames, substantially 45 as described.

3. In a loom for weaving multiple-ply fabric, the combination of two oppositely-disposed sets of independent heddles for controlling warp-threads for the respective plies, horizontally-reciprocative frames in which said heddles are guided and supported, a lever connecting the ends of said frames, means for reciprocating said frames, and means for longitudinally reciprocating said heddles, substantially 55 as described.

4. In a loom for weaving multiple-ply fabric, the combination of a plurality of oppo-

sitely-disposed sets of independent heddles for warp-threads for the respective plies, horizontally-reciprocative supports for said heddles, means for longitudinally reciprocating said heddles, and means for bodily shogging the supports, substantially as described.

5. In a loom for weaving multiple-ply fabric, the combination of a plurality of sets of harness for the warp-threads of one ply, a plurality of sets of harness for the warp-threads of another ply, adjacent sets thereof including independent heddles wherein the needles of one set are in advance of and oppositely disposed in respect to those of the other set and wherein elongated guide-openings are provided between the adjacent needles of each set of heddles, horizontally-reciprocative supporting and guiding frames 75 for the heddles, means for oppositely reciprocating said frames, journals for the respective sets of heddles, connections between said heddles and the journals, and means for bodily raising the journals, substantially as described. 80

6. In a loom for weaving multiple-ply fabric, the combination, with the outer sets of harness, of a plurality of intermediate sets of heddles for controlling warp-threads for the respective plies, the needles of one of said sets of heddles being in advance of and oppositely disposed in respect to the needles of another set, and guides being interposed between the adjacent needles of each set, so as to extend 90 above and below the eyes of said needles supports for said heddles, and means for horizontally reciprocating the same, substantially as described.

7. In a loom for weaving multiple-ply fabric, the combination of a plurality of sets of harness for the warp-threads of one ply, a plurality of sets of harness for the warp-threads of another ply, said several sets being arranged in successive order, and adjacent 100 sets thereof including oppositely-disposed independent heddles comprising each two outer guiding members with an intermediate needle, means for supporting and guiding said heddles, and means for shogging the same, 105 substantially as described.

In testimony whereof I have hereunto affixed my signature this 28th day of January, A. D. 1896.

JAMES BUCKLER.

Witnesses:

JOHN R. NOLAN,
ANDREW V. GROUPE.