

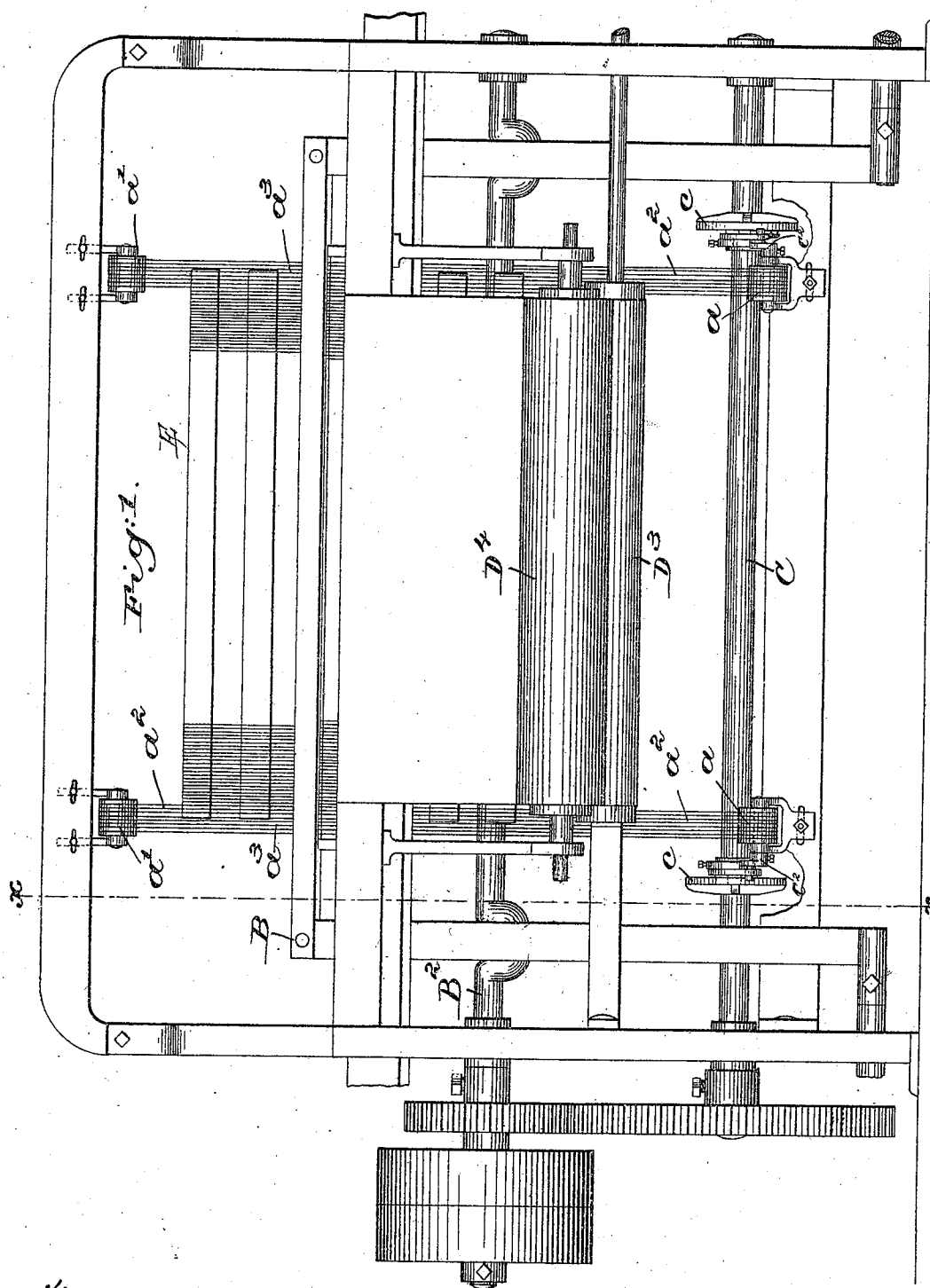
(No Model.)

E. P. WOODWARD.
LOOM.

3 Sheets—Sheet 1.

No. 502,024.

Patented July 25, 1893.



Witnesses.

Louis N. Goull
Fred S. Grunke.

Inventor.

E. P. Woodward,
by Crosby & Gregory Attys.

E. P. WOODWARD.
LOOM.

No. 502,024.

Patented July 25, 1893.



Louis N. Gowell
Fred S. Gumbel.

Ed. P. Woodward,
by Crosby Gregory Allis

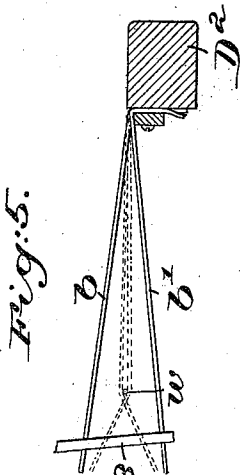
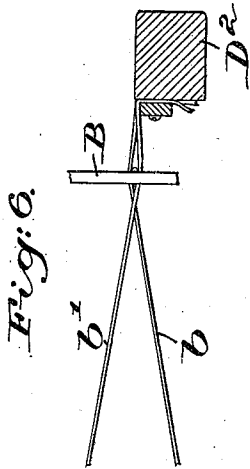
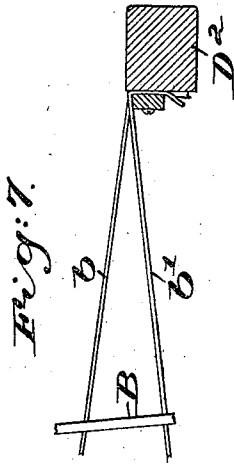
(No Model.)

E. P. WOODWARD.
LOOM.

3 Sheets—Sheet 3.

No. 502,024.

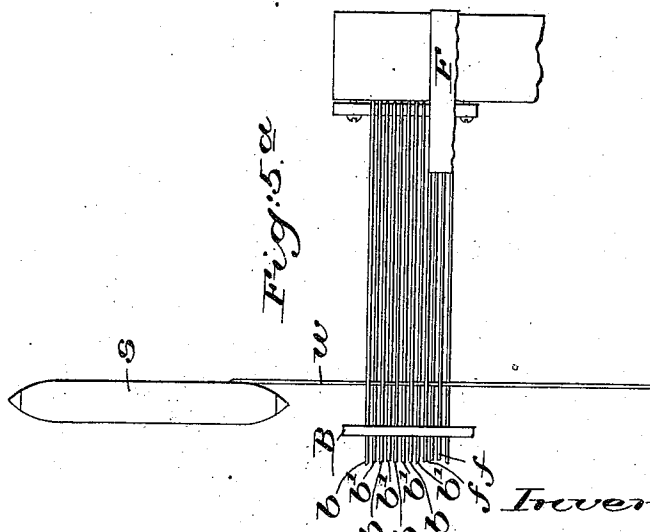
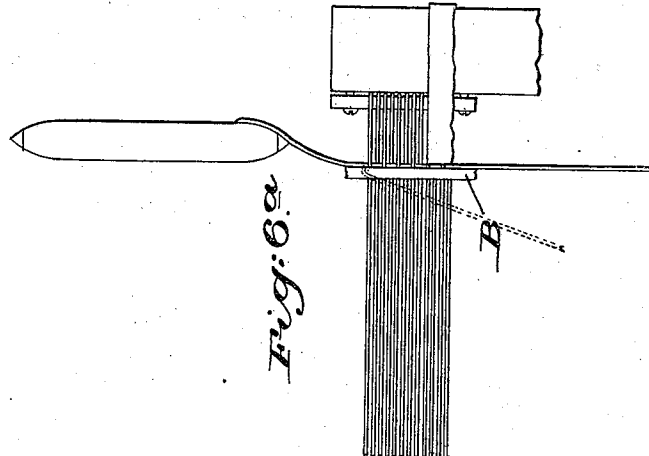
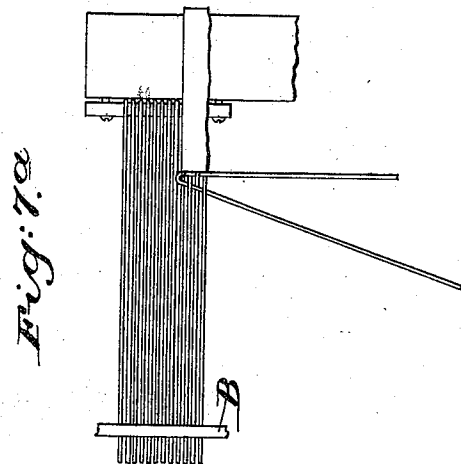
Patented July 25, 1893.



Witnesses.

Louis W. Lowell

Frederic S. Grumbaf.



Inventor:
Ed. P. Woodward,
by Crosby & Gregory
Attys.

UNITED STATES PATENT OFFICE.

ED P. WOODWARD, OF VERNON CENTRE, CONNECTICUT.

LOOM.

SPECIFICATION forming part of Letters Patent No. 502,024, dated July 25, 1893.

Application filed November 7, 1892. Serial No. 451,230. (No model.)

To all whom it may concern:

Be it known that I, ED P. WOODWARD, of Vernon Centre, county of Tolland, State of Connecticut, have invented an Improvement in Looms, of which the following description, in connection with the accompanying drawings, is a specification, like letters and numerals on the drawings representing like parts.

In weaving many kinds of fabrics especially figured fabrics wherein the weft threads are not passed alternately over and under the warp threads but frequently over and under several warp threads at once, and particularly when such fabrics are woven upon what are commonly known as the open-shed type of loom, it frequently happens that the frictional hold of the warp threads upon the weft in the shed is inadequate to keep the weft taut or under the required tension while it is being beat in by the lay, in which case such weft threads are apt to become slack and form defective fabric. To prevent this liability of the formation of slack in the weft threads while being beat in, it is now the common practice to employ in addition to the warp threads which are to constitute the fabric proper, several additional warp threads called "leecing threads" which are arranged at each side of and close to the warp threads which are to form a part of the fabric proper. These "leecing threads" during weaving are crossed regularly at each pick of the loom to cause the weft left by the shuttle to pass alternately over and under them as in the weaving of simple cotton cloth, thus forming at each side or edge of the fabric proper a selvage edge which varies in width from one-quarter to three-eighths of an inch according to the number of leecing threads employed. These leecing threads being crossed regularly at each pick of the loom back of the weft thread last laid by the shuttle bear frictionally upon the weft thread and hold the same stretched tightly as left by the shuttle while it is being beat in by the lay, so that it cannot slacken and leave a defect in the fabric. The wide selvage edge necessitated by these leecing threads is detrimental to the appearance and ready sale of the fabric. Again, the closely woven selvage edge upon each side of a loosely woven or figured fabric frequently tends to draw and pucker the fab-

ric in places, that being due to holding the weft tighter than necessary. The "leecing threads" which constitute this objectionable selvage edge are of use only during the time the weft threads are being beat in, and are thereafter useless, for the threads when once beat in under the required tension and forming a part of the fabric will remain as left.

In my efforts to dispense with the objectionable selvage edge and also waste of material, and at the same time furnish suitable means for holding the weft under proper tension while being beat in, I have discovered that the "leecing threads" may be crossed sufficiently to hold the weft while the latter is being beat in and then opened to their original uncrossed positions for the return motion of the shuttle, the weft on its return being drawn back to the edge of the fabric proper, thus avoiding the objectionable selvage edges referred to and made necessary where the "leecing threads" when crossed remain crossed until the next weft has been left by the shuttle before they are returned to their original positions. These "leecing threads," or temporary binders, as I shall hereinafter term them, for the reason that they only temporarily bind or hold the weft between the selvage proper and the shuttle while it is being beat in, are moved by suitable mechanism forming a part of this invention and which will be hereinafter described.

Other features of this invention, together with the above method will be hereinafter described and set forth in the claims at the end of the specification.

Figure 1, of the drawings represents in front elevation a loom equipped with one form of temporary binders in accordance with this invention; Fig. 2, a vertical section of the same taken on the dotted line $x-x$; Fig. 3, an enlarged detail view showing one of the binder operating cams and its arm; Fig. 4, a longitudinal section of the same on the dotted line $x'-x'$; and Figs. 5, 5^a, 6, 6^a, 7 and 7^a, diagram views to be described illustrating by successive steps my improved method of temporarily holding the weft threads under tension while being beat into the fabric.

Referring to Figs. 1 and 2, the frame A; the lay B driven by a connecting rod B' from a crank on the crank shaft B²; a picker shaft

C; a roller beam D; roll D'; breast beam D²; sand roll D³; cloth roll D⁴, and harness frame E, are and may be of any other or desired construction and arrangement and operated in usual manner.

The frame A, as herein shown, has suitable bearings for the binder pulleys *a*, *a'*, there being preferably two upper and two lower pulleys arranged in vertical pairs, each pair of pulleys being adjustable longitudinally on the frame to accommodate varying widths of fabric woven by the loom. Short binder belts *a*² are passed over the pulleys, as shown, the adjacent ends of the belts being connected by the binder heddles *a*³ through the eyes of which are passed the temporary binder threads *b*, *b'*, the threads *b* being passed through and moved by the back set of heddles, while the threads *b'* are passed through and moved by the front set of heddles. These binder threads are preferably fixedly secured at their front ends to the breast beam or other stationary part of the loom, and at their rear ends are passed over rollers *b*^x and drawn taut by springs *b*² attached thereto and to the loom frame. These "leecing threads" *b*, *b'*, in the present embodiment of this invention constitute the temporary binders and fulfill, as will be hereinafter shown, all the functions of the "leecing threads" of the present time and dispense with the selvage edge.

The pulleys *a*, *a'*, over which the binder straps are passed, are, as herein shown, rocked to alternately raise and lower the front and back set of heddles *a*³ to effect the closing or crossing of the temporary binders by means of cams *c*, one of which is shown on an enlarged scale in elevation and section Figs. 3 and 4, fast on the picker shaft of the loom. These cams are herein shown as path cams, in each of which respectively run rolls or other studs *c'* on the arms *c*² said arms at their outer ends being jointed to studs *c*^x on the lower pulleys *a*, and at their opposite inner ends slotted to straddle and be guided by the picker shaft C. The temporary binders must be closed to hold the weft temporarily, or while it is being beat in, and then opened to release the weft before the next weft is laid by the shuttle, and as the picker shaft C in the loom shown makes but a single revolution for each two picks of the loom, the cam *c* thereon each have two high surfaces 10, and two intervening low surfaces 11 to give to the arms *c*² the pulleys *a*, to which they are jointed and the heddles *a*³ a reciprocating movement to close the binders to bind a weft thread and open the binders again to release a weft thread twice during each revolution of the shaft, *i. e.*, to close and open the binders at each pick, of which there are two during each revolution of the picker shaft.

Referring now to the diagram Figs. 5 to 7^a, B represents the lay; *b*, *b'* the temporary binders; *w* the weft thread; *s* the shuttle, and D² the breast beam to which the temporary binders are secured, as described; F

a portion of the completed fabric, and *f* several of the warp threads forming a part of the fabric proper.

Referring particularly to Figs. 5 and 5^a, the lay is shown in its rearmost position, the warp threads and temporary binders opened, (the binders *b'* depressed, the binders *b* raised,) and the weft *w* shown in position as left by the shuttle *s*. Immediately after the shuttle has laid the weft as in Fig. 5, and preferably just before or at the commencement of the forward or beating in movement of the lay, the rotating picker shaft C causes the cams *c* thereon to move the arms *c*² to the left, Fig. 2, to shift the heddles *a*³ to cross the temporary binders *b*, *b'*, as shown by dotted lines Fig. 5, the crossing points of the binders being immediately back of the weft so that the binders act upon the weft at its opposite sides and between the selvage proper and the shuttle and grip or hold the same frictionally between them. The lay now moves forward to its position Figs. 6 and 6^a, and beats in the weft, the crossing point of the temporary binders following the weft as the latter is pushed forward, as will be seen by reference to Fig. 6, so that the weft is at all times during its forward movement held frictionally between the temporary binders. So far the action of the temporary binders in the motion shown is practically the same as the movement of the usual "leecing threads" employed in the looms at the present time. With the "leecing threads" as now used, however, the "leecing threads," corresponding to the temporary binders, remain crossed, as in Fig. 6, during the next succeeding pick of the loom, so that the shuttle *s*, Fig. 5^a, when returned with its weft at the next pick, will pass between the crossed "leecing threads" which are thereafter crossed again back of the new weft to hold the same in the manner described while it is being beat in back of the one previously beat in, so that the "leecing threads" are thereby woven into or forming a part of the fabric and forming the selvage edge previously referred to. In this present invention, however, and in accordance with my improved method, the temporary binders *b*, *b'*, instead of being permitted to remain in their crossed positions, Figs. 6 and 6^a, during the next pick of the loom, during the backward movement of the lay and previous to the next succeeding pick, remain in such positions temporarily only, and are opened or returned to their normal uncrossed positions, as in Fig. 7, the same binders *b* being raised as in Fig. 5, thereby releasing the weft beyond the edge of the fabric between its selvage proper and the shuttle, so that when the weft is returned by the shuttle at the next pick, the weft, instead of turning at the outer "leecing thread" as heretofore, is permitted to draw in between the opened binders to the selvage of the fabric proper, as shown in Fig. 7^a, so that no weave whatever is made beyond the edge of the fabric proper.

From this description it will be seen that the temporary binders involved in this invention clamp and hold the weft between the selvage proper and the shuttle while the weft is being beat into the fell, but that instead of the binders remaining closed or crossed after binding a thread and thereby being woven into and forming a part of the fabric, the said binders are again opened to release the weft and permit the latter when returned to draw in to the edge or selvage of the fabric proper. At each pick or during each complete or forward and back movement of the lay the temporary binders are both opened and closed to hold and again release a weft thread; the weft being held during its beating-in movement and thereafter released when it is not necessary that it should be held to permit the weft to draw back to the fabric.

Herein lies the gist of this invention. Where a single weft and shuttle only is employed, the shuttle being thrown alternately from one to the other side of the loom at each pick, the temporary binders at the sides of the loom may be closed and opened only at alternate picks, or at those times at which the threads are to be held at a particular side of the loom or fabric; but as a greater proportion of the fabrics in the connection with the weaving of which the binders must be used are figured fabrics wherein it frequently happens that two or more weft threads are entered in succession from the same side of the fabric, it is necessary that the binders at each side of the fabric close and open at each pick in order to catch and hold the weft if it happens to be at that side of the fabric.

While I prefer to employ binders consisting of threads as herein shown, yet the invention is not necessarily restricted in this particular, as the binders may be of any form or construction capable of holding the weft between the selvage proper and the shuttle while being beat in and releasing the weft prior to the next succeeding pick.

I claim—

1. In a loom, the combination with a lay, of temporary binders for the weft thread, said binders being located at each end of the loom, and mechanism to move said binders to hold and release a weft thread at each pick of the loom, substantially as described.

2. In a loom, the combination with a lay, of

temporary binders for the weft thread, said binders being attached to the loom at one of its ends, and mechanism to move said binders toward and from each other to hold and release a weft thread, substantially as described.

3. In a loom, the combination with a lay, of two or more temporary thread-like binders for the weft thread, heddles through which said binders are passed, and mechanism to shift said heddles to thereby move said binders toward each other and return them again to their normal positions at a single pick of the loom, substantially as described.

4. In a loom, the combination with a lay, and supports, of two or more temporary thread-like binders fixedly attached at one of their ends to one of said supports and yieldingly attached at their opposite ends to another of said supports, and means to move said binders to hold and release a weft thread, substantially as described.

5. In a loom, the combination with a lay, of two or more temporary thread-like binders, heddles through which said binders are passed, a rotating cam, pulleys reciprocated therefrom and connected with and to shift said heddles and thereby move said binders toward each other and return them again to their normal positions at a single pick of the loom, substantially as described.

6. In a loom, the combination with a lay, of two or more temporary thread-like binders, heddles through which said binders are passed, pulleys to shift said heddles, and cams having two high and two low surfaces and adapted to rotate once during every two picks of the loom to thereby shift said heddles twice at a single pick of the loom, substantially as described.

7. In a loom, the combination with a lay of two or more temporary thread-like binders, heddles through which said binders are passed, and actuating mechanism for and whereby said heddles are shifted twice during a single pick of the loom, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

ED P. WOODWARD.

Witnesses:

W. E. PETTENGILL,
HENRY L. NOBLE.