Plummer & Schofield.

Shedding.

No. 80,876. Patented Aug. 11, 1868.

Fig. 2.

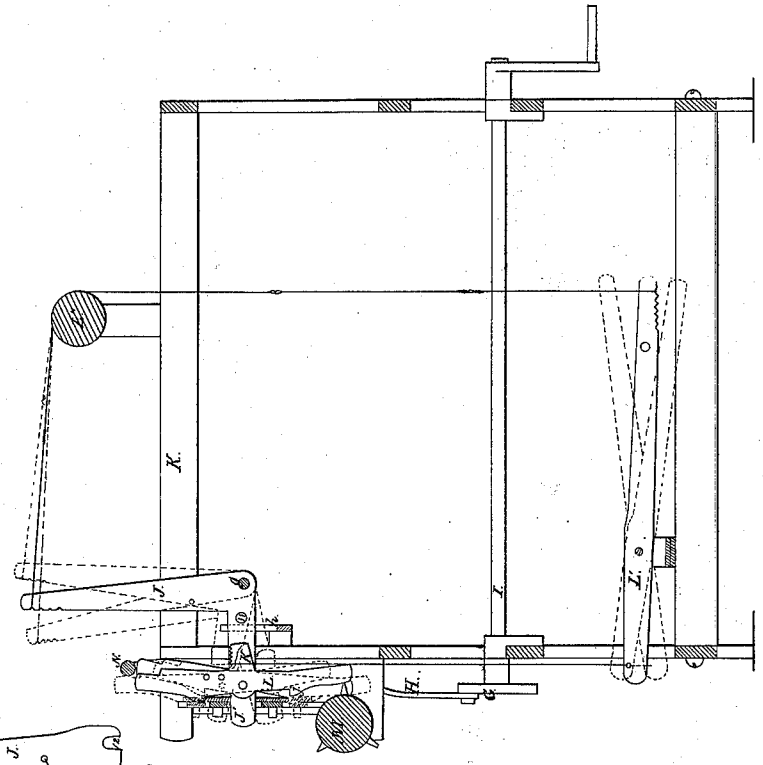


Fig. 3.

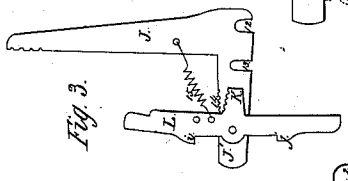


Fig. 4.

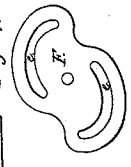
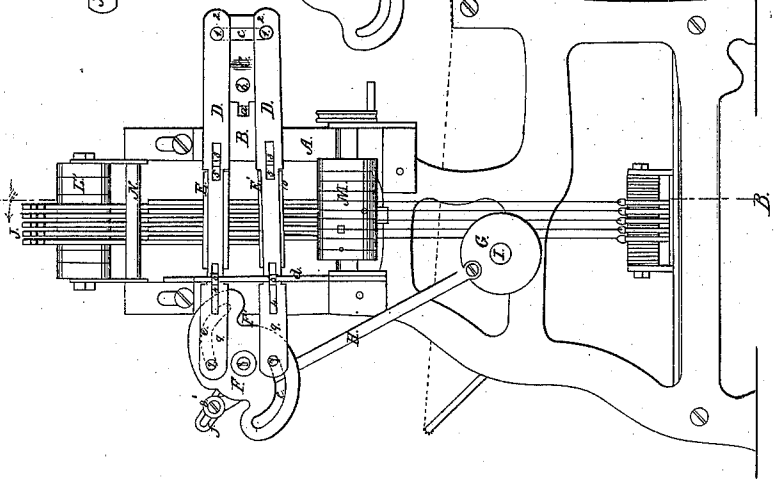


Fig. 1.



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OSGOOD PLUMMER AND JAMES SCHOFIELD, OF WORCESTER, MASS.

IMPROVEMENT IN MECHANISMS FOR OPERATING HARNESS IN LOOMS.

Specification forming part of Letters Patent No. **80,876**, dated August 11, 1868.

To all whom it may concern:

Be it known that we, OSGOOD PLUMMER and JAMES SCHOFIELD, both of the city and county of Worcester, and Commonwealth of Massachusetts, have invented certain new and useful Improvements in Looms; and we do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification, and in which—

Figure 1 represents an end view of so much of a former loom as is necessary to illustrate our present improvements. Fig. 2 represents a vertical central section on line A B, Fig. 1. Fig. 3 represents a side view of a detached part, when made in a modified form, and Fig. 4 represents a side view of the elevating and depressing cam, showing a slight modification in the mode of construction.

To enable those skilled in the art to which our invention belongs to make and use the same, we will now proceed to describe it more in detail.

Our present improvements relate to the mechanism employed for elevating and depressing the harnesses, and to which the description will be mainly confined, the other parts of the loom shown in the drawings being referred to incidentally only.

To one end of the loom-frame A is fastened an arm, B, having a slot, *a*, through which the bolt *b* passes, to secure and fasten the piece C to arm B. The outer end of the piece C has a vertical slot, *c*, to receive the bolts 1 1, on which the ends 2 2 of the elevating and depressing arms D D are hinged.

The arms D D have each two slots, 3 4. Into the slots 3 3 the tenons or hooked front ends 5 5 of the elevator and depressor plates E E′ are passed, the hooked ends 5 5 lapping back upon the arms D D, while the rear hooked ends 6 6 of plates E E′ are passed through the rear slots 4 4, and clasped around the vertical rod *d*, but not so closely as to occasion much friction as said hooked ends slide up and down on the rod *d*.

The rear ends of the arms D D have studs 7 7, which pass through the cam-like slots *e e* in the double cam-piece F.

Friction-rolls are placed upon studs 7 7, to reduce the friction as the cam-piece F is vibrated upon its stationary journal 8, supported in the end of arm F′, fastened to the side piece of the main frame.

Arm F′ may be made with a slot, so that it can be set out from or in toward the frame of the machine.

From the inner hub of the cam-piece F projects a slotted arm, *f*, and which arm *f* is connected to the balance-wheel G by a connection, H, whereby a greater or less vibration can be given to the cam-piece F by one revolution of shaft I and wheel G by simply moving the bolt 8′ in the slot in arm *f*.

The knee-jacks J are supported upon a common fulcrum or journal, *g*, which in turn is supported by hangers attached to the top pieces K of the loom.

The horizontal parts J′ of the jacks project out through guides *h*, and between the arms D D.

The notched bars L are hinged to ends J′, as shown in the drawings, whereby, when the jacks J are arranged in place, as indicated in Figs. 1 and 2, the projections *i* of the bars L will be above the upper arm D, and the projections *j* below the lower arm D when the parts are in the positions shown in Fig. 1.

The harnesses or heddles are to be suspended between the bottom levers L′ and the top roll or rolls L″, cords being attached to the lower sides of the heddles or harness-frames, and then to the ends of levers L′, while other cords are to be attached to the top of the harness-frames or heddles, and then passed up over roll or rolls L″, then forward, and attached to the tops of the jacks J. The outer ends of the levers L′ are connected by cords with the rear projections *k* of the bars L.

Each jack J is connected to its respective harness and lever L′ and bar L, whereby, when the jacks are rocked back and forth, as indicated in Fig. 2, their respective harnesses are raised and lowered, as the case may be.

It will be observed that when cam-piece F is rocked to bring the pins 7 7 into the opposite ends of the slots *e e* from what they are shown in Fig. 1, the rear ends 9 9 of the arms D D will be separated—that is, the rear end of the lower arm will be depressed, and the rear end of the upper arm will be elevated, and consequently the bars L will either be depressed or elevated by the operation.

As the outer ends of levers L′ are connected to the rear projections *k* on the bar L when the harnesses are strained up, the draft is such that the lower ends of the bars L are always forced out toward the pattern-roll M or the pattern-chain, which may be used in its place in the ordinary manner, so that the hooks or projections *g* will always be caught or struck by the lower edge 10 of plate E′ when the lower arm D is depressed, unless the lower ends of the bars L have been forced in by projections on the pattern roll or chain, so as to throw the upper ends of bars L forward, as shown in Fig. 2, in which case a part of the bars L will be depressed by plate E′, and a part will be elevated by plate E, the number which are depressed or elevated at any one time depending upon the particular pattern which is being woven.

Plate E catches under the projections *i* of all the bars L which have their upper ends turned forward, while plate E′ catches above the projections *j* of all the bars L which have their lower ends turned out at each spring of the harnesses.

In order to relieve the pattern roll or chain from the pressure and contact of the bars L, as soon as the shed begins to be formed or the harnesses begin to be opened we arrange a roll, N, in such a position that the ends of the bars L will be forced still farther forward as they are raised, thus throwing their lower ends away from the pattern chain or roll, as indicated in Fig. 2.

We have shown the roll arranged to throw back from the pattern roll or chain the lower ends of the bars L which are elevated only; but a similar device may be placed below the pattern-roll, to throw back the ends of the bars which are depressed.

By relieving the pattern chain or roll from the bars L, as before stated, the pattern chain or roll can be moved from one position to another before the jacks are "evened," and hence may be moved with a much slower motion, and thus obviate much jarring of the loom and the pattern-chain incident to a rapid and sudden movement of the latter, as is the case in the looms in common use.

The rear ends of the arms D D may be slotted out, so that the studs 7 7 can be adjusted back and forth, when desired, to obtain the proper motion or elevation and depression of arms D D.

The holes in the jacks through which the journal *g* passes are made a little large or oblong, for the purpose of allowing a slight forward and back motion of the jacks to prevent binding of the parts, since the bars L are guided so as to move in nearly or quite vertical planes.

The inner ends of the levers L′, upper ends of jacks J, and rear ends of the projections K are provided with adjusting-notches, as fully shown in Figs. 2 and 3 of the drawings.

It is often the case that a part of the jacks is dispensed with in weaving some patterns; and if the jacks are removed from the loom they are liable to get broken or misplaced, while if they are left in the loom, as looms have been heretofore constructed, they are very liable to become entangled with some of the mechanism connected with the harness motion and broken themselves, or the working parts of the loom otherwise injured or displaced.

To remedy the above-named and other difficulties incident to a change of pattern, the jacks may be made with a second hole, 11, so that when not in use they can be set back and the journal passed through the hole 11; or the jacks may be made as shown in Fig. 3, with two slots, 12 and 13, so that when the jack is arranged for use the slot 12 will fit on the journal *g*, while, when the jack is not to be used, it can be easily lifted up and moved back, so that slot 13 will fit on the journal *g*, thereby removing its bar L so far from those in use that all danger of breakage, as before explained, is obviated.

When a number of harnesses are employed. it is desirable, and really essential to good and proper weaving, that all of the threads forming each shed should be opened or spread upon the same angle, the front harnesses having the least motion, and the motion of the others increased as they extend back.

By our present improvements the above-named object can be obtained in a very perfect manner, no matter how many harnesses are used; and the angle at which the sheds shall stand when open can be increased or lessened, at the will of the weaver, by a very simple adjustment of the arms D D.

By means of the slot *a* the journals 1 1 of the arms D D can be set on a line with the cloth-forming line, while by means of the slot *c* the front ends of the arms D D can be set nearer to or farther apart, while the back ends remain supported in the slots *e e*, thus causing the arms D D to stand at different angles from what are shown in the drawings.

It will be seen that the arms D D must vibrate on centers a little forward of the cloth-making point if the arms D have less motion than is required in the threads of the warp to form the sheds, and they do in this case, since the sweep of jack J is greater than the motion of bar L. As the arms D D have a circular motion when the bars L are being elevated and depressed, there would be a twisting motion imparted to the said bars if the notched parts *i* and *j* were directly acted upon by the arms D D.

To overcome this objection we combine the plates E E′ with the arms D D, said plates being so arranged that, while they have the same up and down motion as the arms D D, they do not have any longitudinal motion, being held by the vertical rod *d*, as before explained.

The projections *i* and *j*, as they are acted upon by the plates E E′, move the bars L into the same relative positions at which the threads

forming the sheds stand—that is, the bars nearest to the front ends of the arms D D will be separated the least, while the motion of the others, as they extend back, will be increased to bring them on the same angle as the front ones.

In lieu of connecting the front ends of levers L′ with the projections K, notches 14 may be made upon the horizontal part J′, and the cords or hooks attached directly to the parts J′, and in which case a spiral or other spring, 15, may be employed to keep the lever ends of the bars L out against the pattern roll or chain.

The cam-grooves *e e* may be made in any proper form to give an easy and any desired motion to the jacks and harnesses; and the ends of the slots may be made, for a short distance, concentric with the center of motion of the cam-piece F, whereby any desired dwell to the harnesses, when open or closed, can be obtained.

As the ends of the parts J′ project out between the arms D D, the jacks are all "evened" by the arms D D when they approach nearest to each other, as shown in Fig. 1.

It is apparent that the plates E E′ may be combined with the arms D D in a different manner, without departing from the principle of our invention. It will be noticed, also, that the arms D D are made narrower opposite the plates E E′, whereby the plates come in contact with the ends of the parts J′, so that the jacks are evened without any twisting motion being imparted to them.

In lieu of a vibrating cam shown, the motions described may be obtained by a sliding cam or cams, although we prefer the plan shown in the drawings.

The arms D D may be arranged horizontally, and at the bottom or top of the loom, in lieu of at the end of the loom, as shown in the drawings.

With a view to compactness and ease of motion of the harness-operating mechanism, we make the jacks J so as to give greater throw to the harness than what the arms D D have, and then hinge the latter on fulcra forward of the cloth-making point, whereby we accomplish the same desired uniformity of shed which would be accomplished by hinging the arms on the cloth-line and giving them the same motion as the harnesses.

Having described our improvements in looms, what we claim therein as new and of our invention, and desire to secure by Letters Patent, is—

1. The combination, with the double-slotted cam-piece F, of the slotted arm *f* and connection H, substantially as and for the purposes set forth.

2. The combination, with the arms D D, of the plates E E′ or their equivalents, substantially as and for the purposes set forth.

3. The combination, with the arms D and plates E E′, for lifting and depressing the bars L, of the pieces C and B, with which the front ends of said arms are connected, substantially as and for the purposes set forth.

4. The combination, with the bars L or their equivalents, of the lifting and depressing plates E E′ and arms D, substantially as and for the purposes set forth.

5. The combination, with the bars L, of the roll N or its equivalent, substantially as and for the purposes set forth.

6. The combination, with the mechanism which works against the pattern wheel or chain of a fancy-loom, of mechanism for freeing the pattern wheel or chain from contact with said mechanism, for the purposes set forth.

7. The jacks J, provided with the slots 12 and 13, substantially as and for the purposes set forth.

8. The combination, in a fancy-loom, having elevating and depressing arms, working on fixed fulcra forward of the cloth-making point, of a series of jacks, constructed substantially as described, combined with a series of harnesses by means of cords or their mechanical equivalents, passing over a roll or rolls, L″, as to give to the harnesses a greater throw or motion than is imparted to the lifting and depressing arms, for the purposes set forth.

9. The combination, with a jack, J, and bar, constructed as described, of a spring, 15, substantially as and for the purposes set forth.

10. The combination, with a knee-jack, J J′, of a bar, L, having two front projections, *i* and *j*, and a rear projection, *k*, substantially as and for the purposes set forth.

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