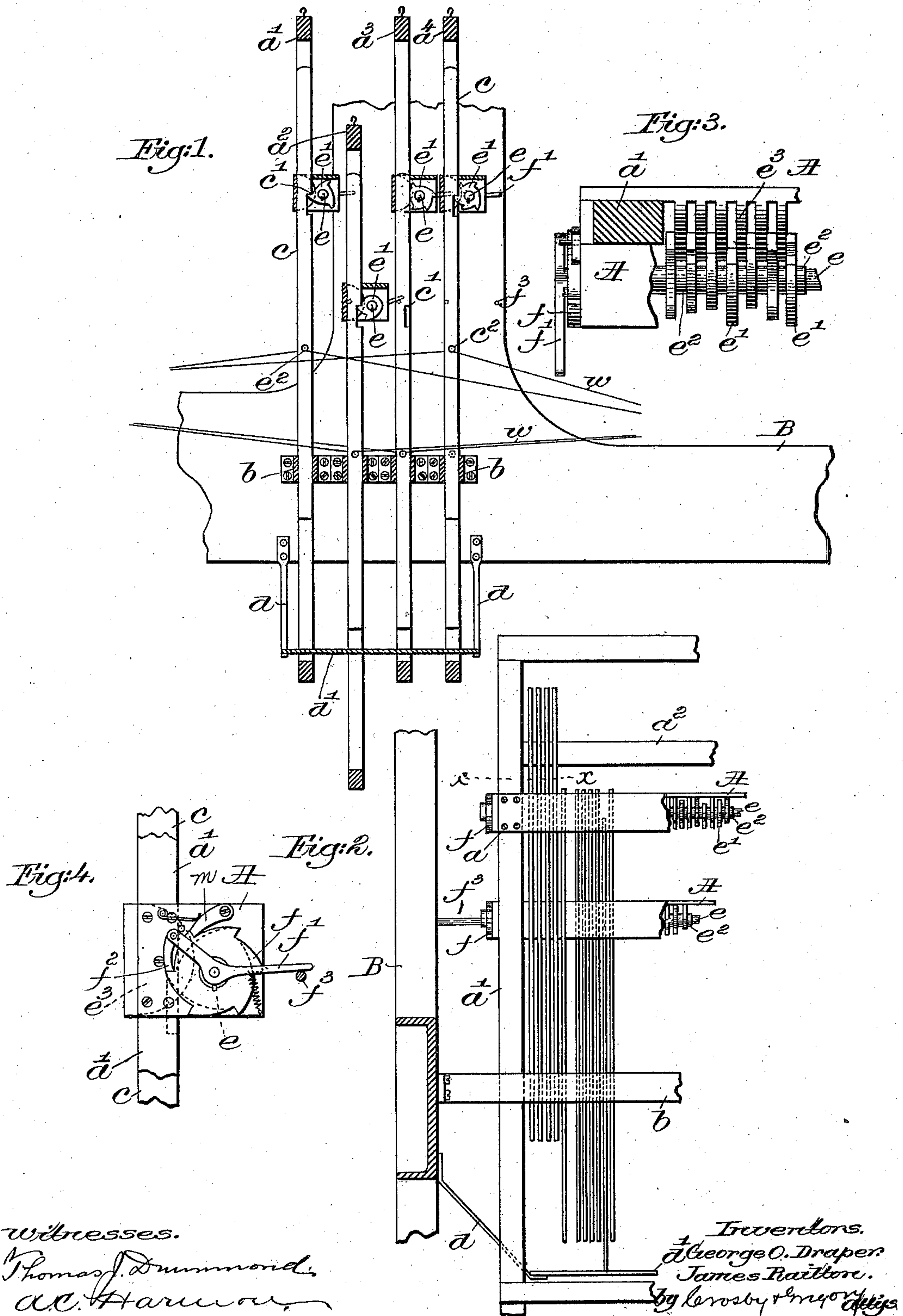


(No Model.)

J. RAILTON & G. O. DRAPER.
SHED FORMING MECHANISM FOR LOOMS.

No. 575,309.

Patented Jan. 12, 1897.



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UNITED STATES PATENT OFFICE.

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SHED-FORMING MECHANISM FOR LOOMS.

SPECIFICATION forming part of Letters Patent No. 575,309, dated January 12, 1897.

Application filed September 2, 1896. Serial No. 604,597. (No model.)

To all whom it may concern:

Be it known that we, JAMES RAILTON, a subject of the Queen of Great Britain, residing at New Bedford, county of Bristol, and
5 GEORGE O. DRAPER, of Hopedale, county of Worcester, State of Massachusetts, have invented an Improvement in Shed-Forming Mechanism for Looms, of which the following description, in connection with the accompanying drawings, is a specification, like letters
10 on the drawings representing like parts.

In fancy weaving figures more or less elaborate are produced by using a greater or less number of harness-frames which are lifted
15 when the warp-threads which those frames control are to appear at the face of the fabric.

Other more elaborate fancy weaves are effected by the usual jacquard where each warp-thread is controlled by its own individual harness-cord.
20

In this our invention we employ harness-bars connected to or carried by suitable frames, which are raised and lowered in any usual order or manner, and these bars or
25 frames have each a series of metallic heddles, composed, preferably, of sheet-steel strips, each heddle having combined with it a locking device which will or will not connect it to and so as to be raised by the bar as it is lifted,
30 such heddles in any one bar which are locked to and lifted by the bar putting their threads in the upper plane of the shed, while the heddles which are not so connected to their rising bars are left down and their warp-threads
35 are not lifted into the upper plane of the shed.

In our invention the locking devices, one for each heddle, rise and fall with the bars or frames and are rotated intermittingly, and they coöperate with a notch or projection
40 made in or at the edge of the individual heddles, the locking device being so shaped as to control the raising and lowering of the individual heddles in one bar or frame in different and any desired order, according to the
45 requirements of the pattern to be made.

Our invention consists in reciprocating bars provided with intermittingly-rotated locking devices and heddles mounted in said bars

loosely, said locking devices engaging and releasing said heddles at intervals to lift them, 50 according to the requirements of the pattern to be produced in the fabric being woven.

Other features of invention will be hereinafter described and made subject of claims.

Figure 1 of the drawings shows a sufficient 55 portion of a loom with our improvements added to enable our invention to be understood; Fig. 2, a partial rear side elevation of the device shown in Fig. 1; Fig. 3, an enlarged detail below the dotted line *x*, Fig. 2. 60 Fig. 4 is an end view, chiefly to show one of the bars, the shaft carrying the locking devices, and one way of rotating said shaft.

Each heddle-bar *A* is shown as connected by suitable screws *a* to one of a series of like 65 frames *a'* *a*² *a*³ *a*⁴, and each of said frames may be raised and lowered in weaving in any usual or predetermined order and by any usual devices, not necessary to be herein shown because not of the gist of our invention. The 70 loom-frame *B* may also be of any usual shape, it having arranged across it between its sides suitable parallel bars *b b*, which serve as guides, in which may slide up and down the metallic heddles *c*, each heddle having at one edge 75 a suitable notch, projection, or shoulder, as *c'*, and a warp-eye *c*².

Attached to the loom side are hangers *d*, which sustain a supporting plate or rest *d'*, on which may drop those heddles which are not 80 to be lifted to place the warp-threads carried by them into the upper plane of the shed, provided the threads in their eyes should break.

The bars *A* will for the best results be composed of metal, so shaped as to furnish bearings for the shaft *e*, on which will be splined 85 at suitable distances apart a series of locking devices *e'*, they preferably being separated by a series of collars or washers *e*².

The rear side of each bar is provided with 90 a series of projecting fingers *e*³, and in the spaces between said fingers we place the heddles *c*, composed of strips of sheet metal, the notched edges of the heddles lying next the locking devices.

The warp-threads *w* in the eyes of the hed- 95

dles, in case a heddle is not raised, will lie on the top of the guide-bars *b*, and the heddles so supported will present their notches *c* all in a line.

5 In practice all the bars *A* will be lowered to the same line after each weft-crossing, and all the heddles will be lowered into such position that their notches *c* will all stand in the same line.

10 The locking devices consist, as shown, of a series of wheels or disks having a greater or less number of teeth.

In our invention, as herein illustrated, we have fixed on the end of the shaft *e* a ratchet-wheel *f*, having six teeth, and said shaft has 15 loosely mounted on it a pawl-carrier *f'*, having a pawl *f''* to engage the teeth of the said ratchet, and at each descent of a bar the tail of a pawl-carrier meets a pin or projection *f'''*, 20 fixed to the frame, which causes the pawl-carrier to be moved and turn the shaft for one-sixth of a rotation.

We have accordingly so arranged the teeth on the locking device that one-sixth of a rotation of the shaft *e* will either put a tooth of 25 the locking device into the notch *c* of a heddle or will take a tooth out from said notch.

When the locking device has three equally-spaced teeth, the said teeth will enter and engage a notch *c* at every other rotation of the 30 shaft *e*, and when the bar is lifted with a tooth in a notch of the heddle said heddle will be raised with the bar; but if a bar is raised after a tooth has left a notch *c*, leaving an un-toothed part or space of the locking device 35 opposite the notch *c*, then that heddle will not be lifted with the bar. So it will be understood that with a three-toothed locking device, (shown at the left in Fig. 1,) the shaft 40 *e* being rotated one-sixth of a rotation before it is lifted, a heddle will be lifted to place the warp carried by it into the upper plane of the shed at every other rising of the bar.

If the locking device has two teeth, one close 45 to the other, as shown in the second locking device from the left in Fig. 1, the heddle will be raised twice in succession and will be left down for four sheds. The third locking device from the left has three teeth close to- 50 gether and a fourth tooth with a space at each side, and this will lift the heddle at one shed, leave it down for the next shed, and then lift it for three sheds in succession, and then leave it down for one shed, while the fourth lock- 55 ing device from the left in Fig. 1, it having five teeth and one space, will lift the heddle five times in succession and then leave it down once.

The third locking device from the left, Fig. 60 1, shows a space next the edge of the heddle, and the heddle was consequently not lifted.

It will thus be seen that by arranging the teeth and spaces on the locking devices in the proper order with relation to its distance of

rotation it may be made to lift a heddle any 65 desired number of times in succession, or lift and then leave it down in any desired order; and by arranging these differently-toothed locking devices side by side on the same shaft 70 it is possible to raise or leave down any desired heddle in each bar, and in this way by merely changing the locking devices on the shafts many different and complicated pat- 75 terns may be woven.

This invention is not limited to the em- 75 ployment of a shaft rotated at each step for sixty degrees, as the distance which the shaft *e* may be moved and the number of teeth and spaces on each locking device and the order of their arrangement may be varied at will 80 and yet be within the scope of the invention, nor is the invention limited to the exact shape shown for the notch, shoulder, or projection at the edge of the heddle.

A detent *m* holds the ratchet-wheel *f* 85 against accidental rotation.

Having described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. In a shedding mechanism for looms, the 90 following instrumentalities, viz: a reciprocable heddle-bar, a shaft carried thereby and provided with a series of locking devices, a series of metallic heddles adapted to slide 95 transversely in said bars, and means to rotate said shaft step by step, said locking devices in one position or step of the shaft acting to lift some of said heddles with said bars, and at another position or step of said shaft act- 100 ing to leave down said heddles when the bars are raised, substantially as described.

2. In a shedding mechanism for looms, the following instrumentalities, viz: a series of 105 reciprocable heddle-bars, shafts mounted thereon, and provided with toothed locking devices, means to rotate said shafts inter- 110 mittingly, a series of metallic heddles having warp-eyes and notches or projections, and guides for said heddles, to operate substan- 115 tially as described.

3. In a shedding mechanism for looms, the following instrumentalities, viz: a series of 120 reciprocable heddle-bars, shafts mounted thereon, and provided with toothed locking devices, the teeth of each series of said lock- 125 ing devices varying in number and location, means to rotate said shafts intermittingly, a series of metallic heddles having warp-eyes and notches or projections, and guides for said heddles, to operate substan- 130 tially as described.

4. A series of reciprocable heddle-bars, shafts mounted on said bars and provided with toothed locking devices, means to rotate 135 said shafts intermittingly at each descent of said bars, a series of notched heddles, and guides for said heddles, combined with a rest 140 located below the ends of said heddles to sup-

port the same in case the warp-threads in their eyes break, substantially as described.

5. In a loom, the following instrumentalities, viz: a series of metallic heddles having warp-eyes to contain warp-threads, means to engage and lift any desired number of heddles in each set, and a rest to support the lower ends of those heddles of each set which are not engaged and lifted, substantially as described.

In testimony whereof we have signed our

names to this specification in the presence of two subscribing witnesses.

JAMES RAILTON.
GEORGE O. DRAPER.

Witnesses as to James Railton:

GEORGE S. MOTHOM,
DANIEL H. HOWLAND.

Witnesses as to George O. Draper:

EARLE E. HOWARD,
E. D. BANCROFT.