

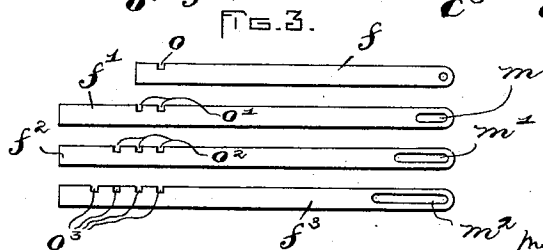
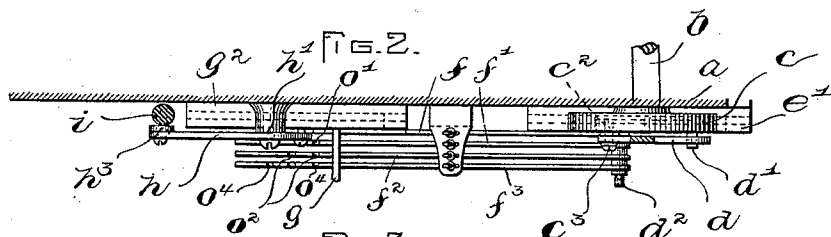
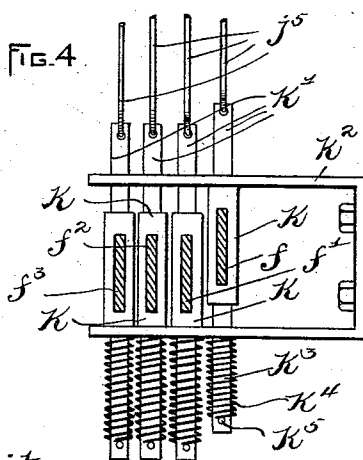
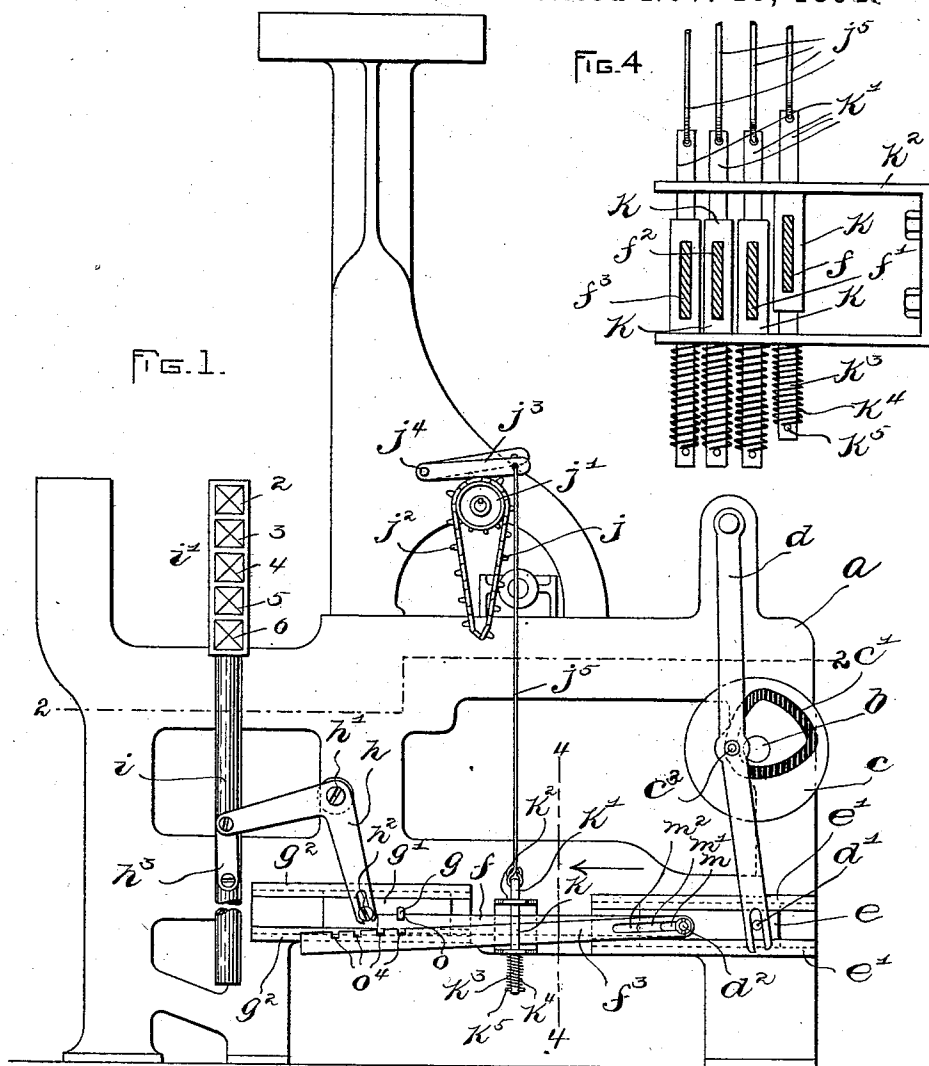
(No Model.)

L. H. DOWNING.

SHUTTLE BOX OPERATING MECHANISM FOR LOOMS.

No. 529,163.

Patented Nov. 13, 1894.



WITNESSES:

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LEVERETT H. DOWNING, OF NORTH ANDOVER, MASSACHUSETTS.

SHUTTLE-BOX-OPERATING MECHANISM FOR LOOMS.

SPECIFICATION forming part of Letters Patent No. 529,163, dated November 13, 1894.

Application filed May 31, 1894. Serial No. 512,971. (No model.)

To all whom it may concern:

Be it known that I, LEVERETT H. DOWNING, of North Andover, in the county of Essex and State of Massachusetts, have invented certain new and useful Improvements in Shuttle-Box-Operating Mechanism for Looms, of which the following is a specification.

This invention relates to "shuttle-box" operating mechanism for looms, whereby shuttles containing differently colored bobbins may be brought into operative position with the warp, and it consists in the improvements which I will now proceed to describe, the essential elements being recited in the appended claims.

Of the accompanying drawings which form part of this specification Figure 1 represents a side elevation of a portion of a loom-frame to which my improvements are attached. Fig. 2 represents a section on line 2—2, looking downwardly. Fig. 3 represents a detail view of a portion of the mechanism hereinafter described. Fig. 4 represents a section on line 4—4 of Fig. 1, looking in the direction of the arrow in said figure.

The same letters of reference indicate the same parts in all the figures.

In the drawings, *a* represents the frame of the loom in which is suitably mounted a shaft, *b*, having a disk, *c*, secured thereto and adapted to be rotated by said shaft. Said disk is provided with a cam-groove, *c'*, with which is engaged a cam-roll, *c''*, attached to a stud, *c'''*, on a lever, *d*, pivotally attached at its upper end to the frame and having a slot at its lower end adapted to receive a stud, *d'*, attached to one end of a block, *e*, adapted to move in guides, *e'*, secured to the frame of the machine, the arrangement being such that rotary motion of the cam-disk imparts positive reciprocatory motion to said block through lever, *d*. The block is provided near its other end with a pin, *d''*, to which are secured bars, *f*, *f'*, *f''*, *f'''*, provided in their upper edges with notches adapted to be brought into engagement with a lug or projection, *g*, on a block, *g'*, adapted to slide in guides, *g''*, secured to the frame.

The letter, *h*, represents a bell-crank lever pivotally attached at *h'* to the frame, *a*, and provided with a slot in its lower arm with which is engaged a pin, *h''*, secured to the

sliding block, *g'*. To the upper or outer end of said bell-crank lever is pivotally attached a "hanger," *h''*, the lower end of which is suitably connected to a vertically extending rod, *i*, at the upper end of which is suitably attached the box, *i'*, containing a plurality of shuttles, 2, 3, 4, 5 and 6, in the usual manner common to looms. Said rod, *i*, is adapted to be raised and lowered so that either shuttle may be brought into operative position at a predetermined time by means of a pattern chain, *j*, arranged to travel over a wheel, *j'*, said chain being provided with projections, *j''*, adapted to engage levers, *j'''*, pivoted at *j''''* to the frame and having rods, *j'''''*, at the outer ends, whereby connection between the levers, *j'''*, and the bars, *f*, *f'*, *f''* and *f'''* is effected. The said bars extend through guides, *k*, Fig. 4, preferably square in cross-section, and provided with upwardly projecting rounded portions, *k'*, which project through the upper half of a bracket, *k''*, secured to the frame. Said upwardly projecting portions are connected to the levers, *j'''*, through the connecting rods, *j'''''*. The guides, *k*, are also provided with downwardly projecting rounded portions, *k''*, which project through the lower half of the bracket, *k''*, and are surrounded by springs, *k'''*, the upper ends of which bear against the under side of said bracket, and the lower ends bear upon pins, *k''''*, in said portions, *k''*, the arrangement being such that the springs exert sufficient tension to hold the guides normally in engagement with the lower portion of the bracket, when unemployed or inoperative. (See Fig. 4.)

The guides, *k*, are shouldered between their central square portions and their rounded end-portions and the shoulders limit the movements of the guides by abutting the arms of the bracket, *k''*.

The connecting bars, *f*, *f'*, *f''* and *f'''* are adapted to slide freely through the guides, *k*, at all times by the action of cam, *c*, which is continuously in motion, and are always inoperative unless raised to bring one of their notches into engagement with the lug, *g*, as already described. The connecting bars, *f*, *f'*, *f''* and *f'''*, are in the present instance four in number, three of which are provided with slots *m*, *m'*, *m''*, of varying length, the object of said slots being to admit varying motion

to be transmitted to the shuttle-box. The movement of the sliding-block, *e*, is uniform and is arranged so that when the bar, *f*, is brought into operative position as shown in Fig. 1, the movement communicated to the shuttle-box equals the capacity of the cam, and the uppermost shuttle being in operative position before this movement, the lowermost shuttle will be in operative position at the end of the movement and vice versa.

When a less movement of the shuttle-box is desired such as to bring other than the end shuttles into play, one of the other bars, *f'*, *f*² or *f*³, is brought into play, and the extent of movement is governed by the length of slot in the bar. Thus the slot, *m*, in the bar, *f'*, is of such an extent as to cause lost motion sufficient to reduce the movement of the shuttle-box by one shuttle as compared with the movement imparted through the bar, *f*.

The slot, *m'*, in the bar, *f*², is enough longer than the slot, *m*, to further reduce the movement of the shuttle-box, and the slot, *m*², in the bar, *f*³, is still longer so that the shuttle-box is moved by it only the extent of one shuttle.

The notches in the bars vary in number to correspond with the varied movements of the bars, the bar, *f*, having a single notch, *o*, the bar, *f'*, having two notches, *o'*, the bar, *f*², three notches, *o*², and the bar, *f*³, four notches, *o*⁴. The notches correspond in the longitudinal extent of the bars which they occupy, with the slots in the bars, so that at the ends of the movement imparted to the bars by the cam, the notches will register as shown in Fig. 2, so that any of the bars can be brought into engagement with the lug, *g*. It will now be seen that by bringing the proper bar into engagement with the lug, *g*, any of the shuttles can be moved to operative position at any time.

The distance between each two notches in the bars, *f'*, *f*² and *f*³, equals the extent of the movement imparted to the slide, *g'*, to move the shuttle-box the extent of one shuttle, and hence wherever the pin, *g*, is left it is in register with one or more notches when the bars are at the limit of their movement in either direction. In further explanation of this and to make clear the necessity of the graduation in the number of notches in the different bars, let us imagine that with the parts adjusted as shown in Fig. 2, the bar, *f*³, is raised so that its innermost notch is brought into engagement with the pin, *g*. As before explained, the movement imparted to this bar, *f*³, is only sufficient to move the shuttle-box the extent of one shuttle. Hence, when the movement has taken place, the pin, *g*, will be left standing over the next notch in the bar, *f*³, and the registering notches in the bars, *f*² and *f'*, when the bars return to their initial position. Now, if the shuttle-box is to be moved again the extent of one shuttle, the bar, *f*³, is again raised and its second notch brought into engagement with the pin, *g*,

and the latter is moved along another step and left in position for registry with the third notch of the bar, *f*³, and the last notch of the bar, *f*². If however, when the pin, *g*, is in the second position above described, *i. e.*, standing over the second notches of the bars, *f*³, *f*² and *f'*, and the shuttle-box is to be moved the extent of two shuttles, for example, then the bar, *f*², will be raised so as to engage its second notch with the pin.

In the first bar, *f*, there is but a single notch for this bar partakes of the full movement of the cam and only comes into play when the shuttle-box is to be moved from one extreme to the other, and hence, only when the shuttle-box is at the limit of its movement in one direction or the other and consequently the pin, *g*, is at the limit of its movement in one direction or the other. The next bar, *f'*, however, does not move the shuttle-box through its full movement and when the said bar has been moved one shuttle, the full movement of the bar, *f'*, can still take place and hence the provision of two notches in this bar, *f'*, so that it can come into play either initially or when the shuttle-box has already been moved one shuttle.

For similar reasons the bars, *f*² and *f*³, are provided respectively with three and four notches, the bar, *f*², having a movement which carries the shuttle-box the extent of two shuttles and the bar, *f*³, having a movement which carries the said box the extent of a single shuttle.

It will be understood that with each completion of the cam's revolution, the bars, *f*, *f'*, *f*² and *f*³, are restored to their initial positions with their notches in register as shown in the drawings.

The friction between the slide, *g'*, and its guides, *g*², is generally sufficient to hold the shuttle-box at the different positions to which it is brought by the notched bars. Positive locking means may however be employed if found necessary.

What I claim as my invention is as follows:

1. In a shuttle-box movement for looms, the combination with the shuttle-box adapted to contain a plurality of shuttles and movable to bring them severally to position for use, of a pair of normally disconnected slides one being operatively connected with the shuttle-box and the other with reciprocating means, a number of push-bars or links for connecting the two slides, said bars being pivotally connected to the reciprocating slide with provisions for differential lost motion in all but one of them, and also constructed for separate engagement with the other slide, and pattern devices for moving the bars separately into such engagement.

2. In a shuttle-box movement for looms, the combination with the shuttle-box adapted to contain a plurality of shuttles and movable to bring them severally to position for use, of a pair of normally disconnected slides one being operatively connected with the

shuttle-box and the other with reciprocating means, and each carrying a projecting pin or lug, a number of push-bars pivotally mounted at one end on the pin of the reciprocating slide and all but one of the bars being provided with slots graduating in length, the said bars being also formed with notches graduating in number for engagement with the pin on the other slide; and pattern-devices for bringing the bars separately into engagement with that other slide.

3. In a shuttle-box movement for looms, the combination with the shuttle-box adapted to contain a plurality of shuttles and movable to bring them severally to position for use, of a pair of normally disconnected slides one being operatively connected with the shuttle-box and the other with reciprocating means, and each carrying a projecting pin or

lug, a number of push-bars pivotally mounted at one end on the pin of the reciprocating slide and all but one of the bars being provided with slots graduating in length, the said bars being also formed with notches graduating in number for engagement with the pin on the other slide, spring-held guides for the bars, and pattern-devices connected with said guides and operating to move the bars separately into engagement with the last-named slide.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 28th day of May, A. D. 1894.

LEVERETT H. DOWNING.

Witnesses:

C. F. BROWN,

A. D. HARRISON.