

A. NIMMO.

Improvement in Shuttle-Box Actuating Mechanism.

No. 129,361.

Patented July 16, 1872.

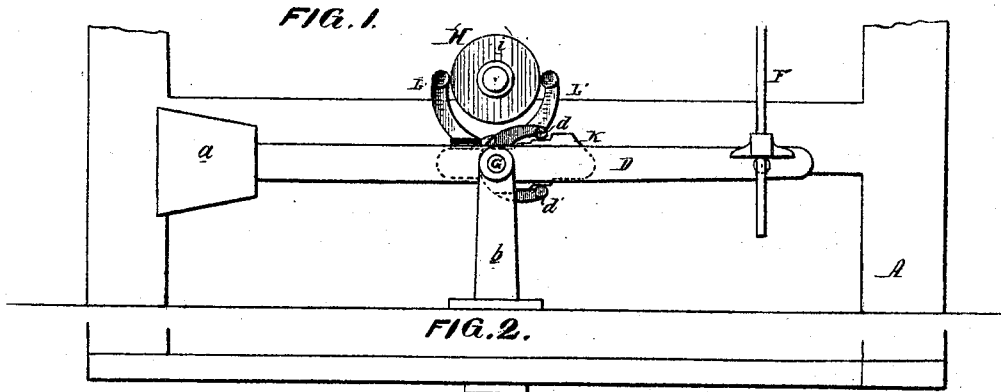


FIG. 3.

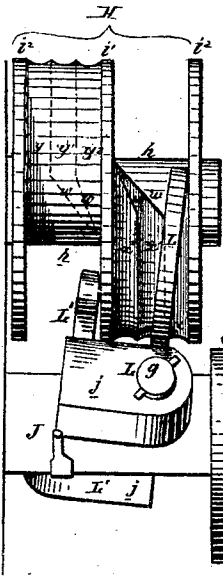
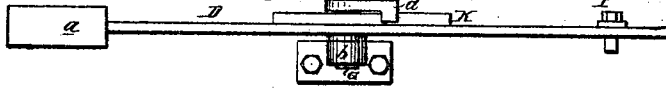


FIG. 6.

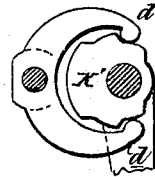
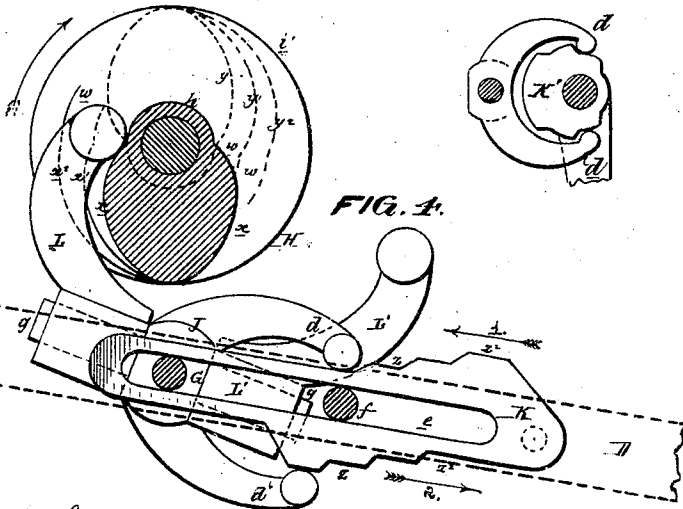


FIG. 4.



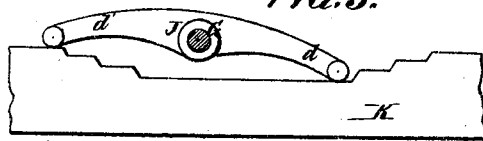
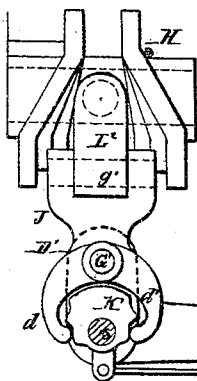
Archibald Nimmo

by his Attor<sup>y</sup>

Sturson and Son.

FIG. 5.

FIG. 7.



WITNESSES

John Parker  
John K. Rupertus

# UNITED STATES PATENT OFFICE.

ARCHIBALD NIMMO, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO HIMSELF, VALENTINE STAUSSE, AND GEORGE W. ENSINGER, OF SAME PLACE, AND THOMAS MORAN, OF NEWARK, NEW JERSEY.

## IMPROVEMENT IN SHUTTLE-BOX-ACTUATING MECHANISMS.

Specification describing Letters Patent No. 129,361, dated July 16, 1872.

Specification describing certain Mechanism for Operating the Shuttle-Boxes of Looms, invented by ARCHIBALD NIMMO, of Philadelphia, Pennsylvania.

### *Mechanism for Operating the Shuttle-Boxes of Looms.*

My invention consists of mechanism, too fully explained hereafter to need preliminary description, for operating the shuttle-boxes of looms through the medium of the cam-shaft and a pattern-chain, the method of operation being such that any desired box can be brought opposite the shuttle-race by a single movement of the operating-lever, the time lost by the usual step-by-step movement required in making the changes on ordinary looms being thus avoided.

In the accompanying drawing, Figure 1 is a side view of a portion of a loom with my invention; Fig. 2, a plan view of the same; Figs. 3 and 4, enlarged views of the mechanism for operating the shuttle-boxes; and Figs. 5, 6, and 7, views of modifications.

A represents one of the side frames of a loom; B, the cam-shaft; and D, the usual balanced lever, provided at one end with a weight, *a*, and connected at its opposite end to a rod, F, by which the drop-box is controlled and operated. The weight *a* balances the drop-box and shuttles, and the lever is provided with any of the well-known friction devices for retaining it in any position to which it may be adjusted. The lever has its fulcrum upon a rod or spindle, G, parallel with and directly beneath the cam-shaft, and supported at its opposite ends by the side frame of the loom and by a standard, *b*, secured to the floor. Upon this rod, adjacent to the lever, and directly beneath a peculiar duplex cam, H, on the cam-shaft, which will be fully described hereafter, is a loose sleeve, J, provided at its outer end with two curved fingers, *d* and *d'*, one of which bears upon the upper and the other upon the lower edge of a sliding bar, K, attached to the drop-box lever D. (See Figs. 3 and 4.) The bar K has a longitudinal slot, *e*, through which extend the fulcrum-rod G and a pin, *f*, on the lever, this arrangement enabling the said bar to be slid longitudinally

on the lever to a limited extent, for the purpose of vibrating the sleeve J through the medium of its fingers *d* and *d'*, the latter being acted on by a series of inclined planes or steps on the upper and lower edges of the slide, in such a manner as to be raised when the latter is moved in the direction of the arrow 1, Fig. 4, and to be lowered when the said slide is moved in the opposite direction. It will be observed, however, that as the slide is of sufficient width to occupy the whole of the space between the ends of the fingers *d* and *d'*, the latter and their sleeve can have no vibratory movement upon the fulcrum-rod independently of the lever, but must retain the position in respect to the latter to which they are adjusted by the slide, the latter thus serving to lock the said sleeve to the lever, as well as to adjust the same, the object of which will be rendered apparent hereafter. Two vibrating arms, L and L', hung to pins *g* *g*, which project from opposite sides of the sleeve J, at right angles to the fulcrum-rod G, extend upward into the path of the compound duplex cam H, by which they are not only turned upon their fulcrums, but are also, with the sleeve J, slide K, and lever D, caused to vibrate upon the said rod G, as will be hereafter described. The cam H has a hub, *h*, and three circular disks, *i*, *i'*, and *i''*, of a diameter somewhat greater than the distance between the ends of the arms L and L'. The space between the disks *i* and *i'* is occupied by three cams, *x*, *x'*, and *x''*, the former of which has the greatest throw, as it starts at the hub and extends as far outward as the edges of the disks, while the second cam *x'* starts at some little distance outward from the hub, and the third cam at a still greater distance, but the whole of the cams extend outward to the same line—that is, to the edges of the disks. The arms L and L' turn freely upon their fulcrums *g*, and are weighted at *j*, so that each, when not otherwise acted upon, may lie against the central disk *i'* of the cam, one upon one side and the other upon the opposite side. There is the same gradation or arrangement of cams upon both sides of the disk *i'*—upon one side the above-described cams *x*, *x'*, and *x''*, and at the opposite side a precisely similar set, *y*, *y'*

and  $y^2$ , and in each case the cams having the least throw ( $x^2$  and  $y^2$ ) are adjacent to the central disk, while the cams  $x$  and  $y$ , which have the greatest throw, are furthest removed from the same. (Figs. 3 and 4.) It should be understood, however, that the two sets of cams  $x$  and  $y$  are not directly opposite or on line with each other, but are reversed and arranged in respect to each other, in the manner plainly shown in Figs. 3 and 4. The cams  $x$  act upon the arm L, and the cams  $y$  upon the arm L', the object of the former being to elevate the drop-box lever and rod, and of the latter to depress the same, and in order that the said arms may be acted upon by any or all of the cams, they are pivoted, as before described, upon pins  $g$ , while each of the outer cams  $x$   $x^2$  and  $y$   $y^2$  has at its inner end an inclined plane,  $w$ , extending to the side of the central disk  $i^1$ , so that by adjusting either of the arms L or L' toward or from the center of the said disk it can be caused to be acted on by any one of the cams. In Fig. 4, for instance, if the arm L is thrown in against the hub of the compound cam, as shown, while resting against the disk  $i^1$ , it will be drawn out from the latter by the incline  $w$ , and brought within the influence of the cam  $x$ , while, if not thrown inward to so great an extent, it would be drawn over onto the intermediate cam  $x^1$ , and if merely thrown inward slightly, it would not be brought into the path of either of the inclines  $w$ , but would, while resting against the side of the disk  $i^1$ , be acted on by the cam  $x^2$ . It will be observed that the several cams or gradations  $x$  and  $y$ , although capable of imparting different degrees of movement to the drop-box lever, are all of a uniform length, so that the time required for the movement will be precisely the same for all of the said cams. This is one of the most important features of my invention, as will be rendered apparent hereafter.

The several parts, arranged as above described, are intended for a four-box loom, and their operation is as follows: When the lever D is in the position shown in Fig. 4 the highest box is opposite the shuttle-race, but by the action of the cam  $x$  upon the arm L, which, as before described, is locked to the lever D by the slide K and forms, in effect, a rigid part of the same, the said lever D will be turned upon its fulcrum to such a position as to bring the lowest shuttle-box opposite the race. The cam  $x$  during this movement will also force the arm L outward and correspondingly draw the arm L' inward, as shown in Fig. 1, and as soon as the said cam has passed the arm L the latter will, owing to the weight  $j$ , Fig. 3, at its lower end, turn upon its pin  $g$  until it rests against the side of the central disk  $i^1$  of the compound cam, the other arm L resting against the opposite side of the same disk, but both being beyond the influence of the rotating cams until one or the other is thrown inward against the same. The locking-slide K on the drop-box lever is connected to and

controlled by a pattern-wheel or chain, but as long as it remains in the position shown in Fig. 4, after the above-described operation of the parts, the position of the lever will remain unchanged and the lowest shuttle-box will be opposite the race. If the said slide, however, is moved by the pattern-chain in the direction of the arrow 1, so as to elevate the arms  $d$  and  $d'$  onto its second step  $z$ , the arm L will be correspondingly thrown outward and the arm L' inward until brought within the influence of the outer cam  $y^2$ , which as it rotates will again force the arm L' outward to its original position, and this will have the effect of lowering the front end of the lever D sufficiently to bring the next to the lowest box opposite the race. If after this adjustment the slide K be again moved in the direction of the arrow 1 until the arms  $d$   $d'$  are raised onto the steps  $z^2$  the arm L' will be thrown inward sufficiently to be drawn over by the incline  $w$  of the intermediate cam  $y^1$ , by which the said arm will be again pushed outward to its original position, but as the throw of the cam  $y^1$  is twice as great as that of the cam  $y^2$  the lever D will be lowered twice as far as by the latter, so that two boxes instead of one will be lowered, and the upper box will be again brought opposite the race. This will restore the lever to the position shown in Fig. 4, and a reverse movement of the slide K in the direction of the arrow 2 will cause the arm L to be brought within the influence of any of the cams  $x$ ,  $x^1$ , or  $x^2$ , according to the extent of the movement of the said slide and the extent to which the said lever is to be raised at its front end. As before mentioned, one of the main peculiarities, and, in fact, the most essential feature of the compound graduated cam H, is that all of its gradations or cams  $x$   $x^1$  and  $y$   $y^1$ , &c., are of equal length, so that while capable of imparting different degrees of movement to the box-lever no more time is required in moving the latter to the extent of three boxes than of one, and the movement of the said lever is uniform and smooth and free from jerks, whether it be great or slight. For a loom of more than four boxes the number of cams or gradations  $x$  and  $y$ , and of steps on the slide K, would have to be increased in order to enable a change to be made from the highest to the lowest box, or vice versa, by a single movement of the lever, but if this was not considered essential the changes could be made to the extent of three boxes at a time, by the use of the same cams, by merely increasing the number of steps on the slide K. It is not essential that the steps on the slide K should be on opposite sides of the same, as before described, as they might all be on one side, if arranged as shown in Fig. 5, and in some cases the slide might be dispensed with altogether and a step-cam, K', such as shown in Fig. 6, to be connected to and operated by a pattern-chain, be substituted for the same. It is essential, however, that the slide or cam should be of such a character as to lock the

sleeve J and arms L and L<sup>1</sup> to the lever in whatever position, in respect to the same, they may be adjusted; and to insure this I prefer that the said slide or cam should be constructed with steps, as before described, although simple inclines would answer the purpose.

Although I have described my invention in connection with a drop-box loom it can be used quite as advantageously for operating rotary shuttle-boxes. It is essential in carrying out my invention that the compound graduated cam H should be employed, and that there should be two sets of graduated cams upon the same—one for moving the shuttle-box rod in one direction and the other set for moving it in the opposite direction—but the arrangement of these cams and the character of the transmitting mechanism between the same and the box-rod may be variously modified. In Fig. 7, for instance, the central disk *i'* is dispensed with and the two sets of cams or cam-like graduations are directly opposite each other, so that any one of them upon either side may act upon a single arm, L<sup>2</sup>, which is used instead of the two arms L and L<sup>1</sup>. This arm L<sup>2</sup> is pivoted, at *g'*, to a block, J', which corresponds to the sleeve J, and is pivoted, at G', to a bell-crank shuttle-box lever, D', having its fulcrum at *s*. A step-cam, K', controlled by a pattern-chain, has its fulcrum also at *s*, and acts upon fingers *d* and *d'* of the block

J', so as to throw the latter and the arm L<sup>2</sup> into the path of the required cams on one side or the other, according as the operating arm of the bell-crank lever D' is to be raised or lowered. The arm L<sup>2</sup> after being operated by any one of the cams is brought to a position midway between the two sets, as shown in the drawing, so as not to be again operated until turned to one side or the other by the step-cam K'.

I claim as my invention—

1. A compound cam, graduated, substantially in the manner described.

2. The combination of the duplex graduated cam H with a shuttle-box lever, and the intervening mechanism described, or its equivalent, to be controlled by a pattern-chain, all substantially as described.

3. The combination, with the shuttle-box lever and arm or arms L, of a slide or cam, K, for adjusting the said arm or arms upon the lever in respect to the cam H, and for temporarily rendering the said arm or arms a part of the lever, all substantially as specified.

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

ARCHIBALD NIMMO.

Witnesses:

WM. A. STEEL,  
HARRY SMITH.