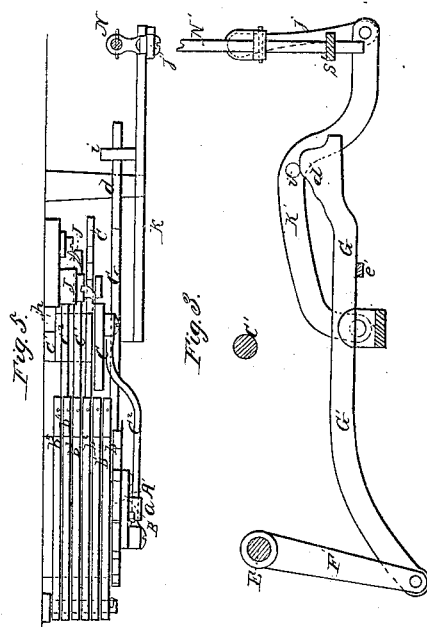
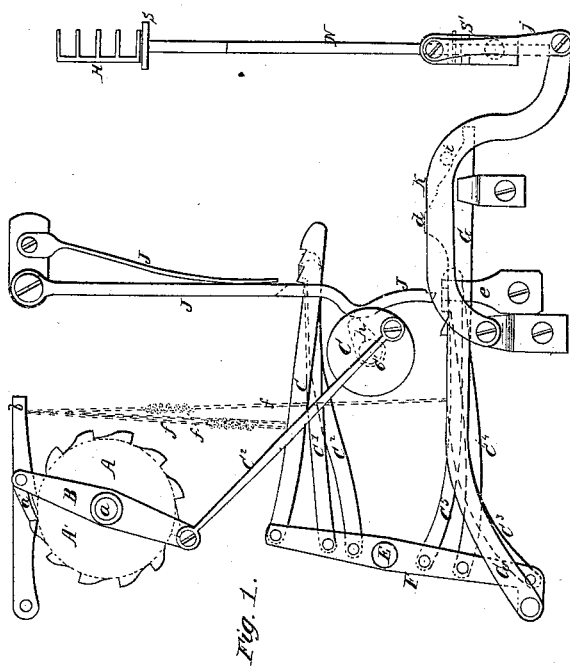
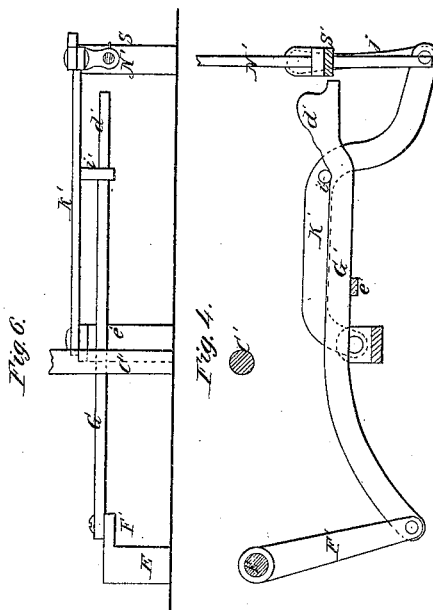
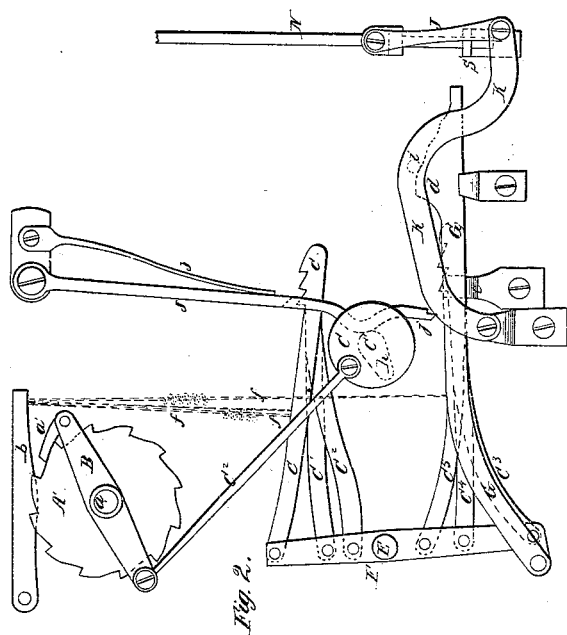


C. Duckworth.
Shuttle Box.

Sheet 1-2 Sheets.

No 51,932.

Patented Jan. 9, 1866.



Witnesses
R. T. Campbell
Edw. Schofer

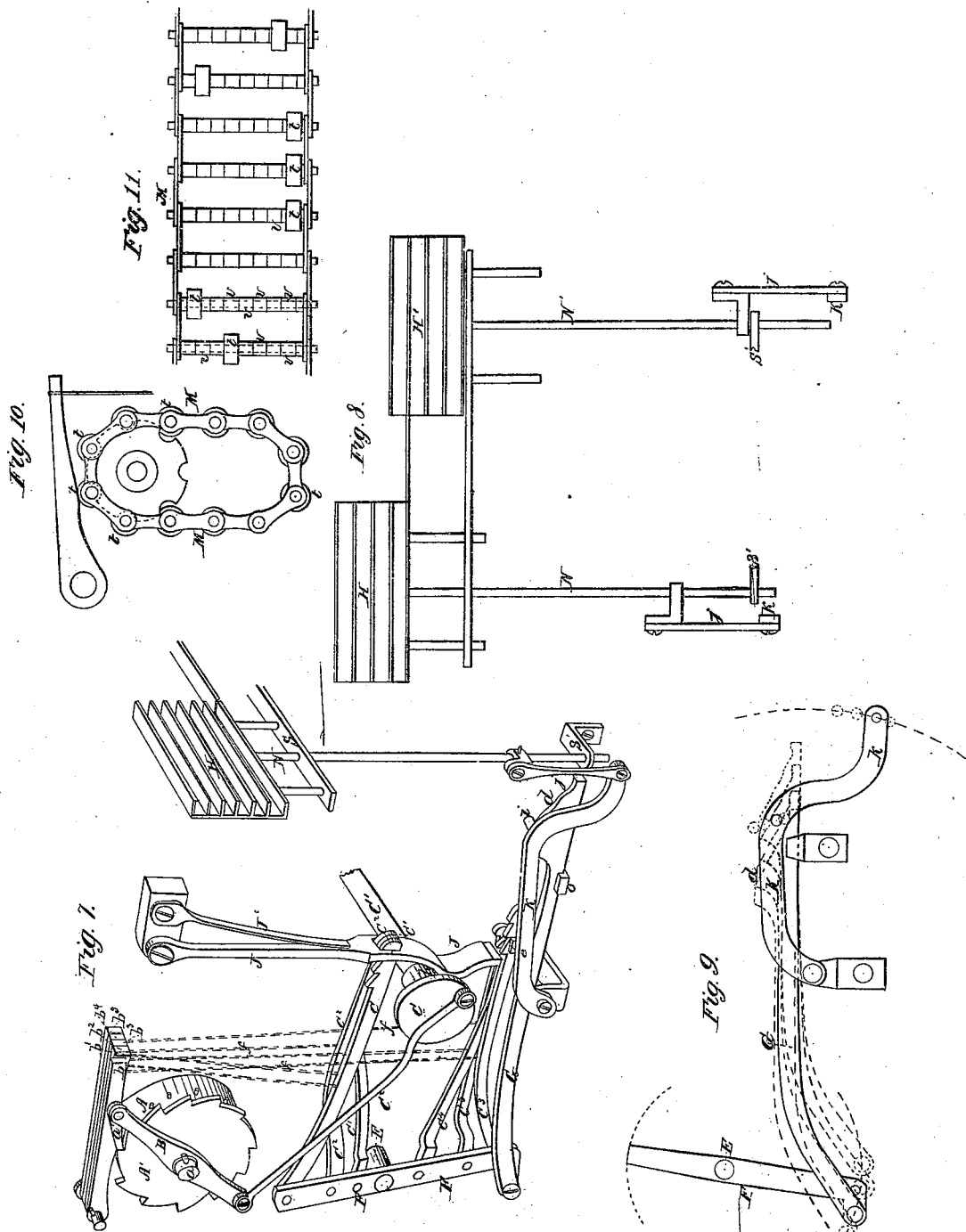
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Maurice K. H. H. H.

C. Duckworth. Shuttle Box.

Sheet 2-2, Sheets.

N^o 51,932.

Patented Jan. 9, 1866.



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UNITED STATES PATENT OFFICE.

CHRISTOPHER DUCKWORTH, OF MOUNT CARMEL, CONNECTICUT.

IMPROVEMENT IN SHUTTLE-BOX MOTIONS IN LOOMS FOR WEAVING FIGURED FABRICS.

Specification forming part of Letters Patent No. 51,932, dated January 9, 1866.

To all whom it may concern:

Be it known that I, CHRISTOPHER DUCKWORTH, of Mount Carmel, in the county of New Haven and State of Connecticut, have invented certain new and useful Improvements in Looms for Weaving Figured Fabrics; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, making a part of this specification, in which—

Figure 1, Sheet 1, is a side elevation of the mechanism on one side of the loom for operating the shuttle-boxes. Fig. 2 shows the same parts in different positions. Fig. 3 is a view of the contrivances on the opposite side of the loom for operating the boxes on side shown in Figs. 1 and 2. Fig. 4 shows the same parts in different positions. Fig. 5 is a top view of the mechanism shown in Fig. 1. Fig. 6 is a top view of the mechanism shown in Fig. 4. Fig. 7, Sheet 2, is a perspective view of the mechanism shown in Figs. 1 and 2. Fig. 8 is a front elevation of the shuttle-boxes on both sides of the loom and their guide-rods. Fig. 9 is a view showing the wedge-shaped cam in four positions. This cam alternates with the movement of the cam shown in Figs. 3 and 4. Figs. 10 and 11 show a pattern-chain which may be used for controlling the movements of the shuttle-boxes instead of the pin-cylinder shown in Figs. 1, 2, 5, and 7.

Similar letters of reference indicate corresponding parts in the several figures.

This invention relates to certain novel improvements in mechanism for operating the shuttle-boxes of looms for weaving figured or fancy fabrics.

The object of this invention is to give vertical movements of a greater or less distance to shuttle-boxes which are composed of a number of a number of shuttle-cells arranged one above another, so that any one of the cells of the boxes on either side of the loom can be brought in a position for throwing any desired color of weft, employing for this purpose a pattern-chain, card-pattern, cams, or their equivalents, for governing the movements of certain hooked connecting-rods of different lengths, which operate, through the medium of oscillating arms and wedge-cams, upon rods to

which the shuttle-boxes are secured, as will be hereinafter described.

It also consists in a vibrating lever or pawl which is so arranged with reference to the hooked connecting-rods that it will operate upon any one of them which may be lifted by the pattern-chain or pin-cylinder and move the wedge-cams a greater or less distance backward or forward, according to the movement required of the shuttle-boxes and the color of weft which it is desired to throw, as will be hereinafter described.

To enable others skilled in the art to understand my invention, I will describe its construction and operation.

I have represented in the accompanying drawings only such parts of a loom as are used for actuating the shuttle-boxes. Other parts may be constructed in the usual or most improved manner and my invention applied to them by any person familiar with the construction of looms for weaving fancy fabrics.

A represents a cylinder which is allowed to turn freely upon a fixed stud, *a*, projecting from the frame of the loom. This cylinder has a number of pins or elevations projecting from its periphery, which pins are to be arranged relatively to each other with reference to the figure which it is desired to weave. When a different pattern is to be woven a cylinder having a different arrangement of pins or elevations must be used. On the outer end of this cylinder a ratchet-wheel, *A'*, is secured, the teeth of which are acted upon by a vibrating pawl-arm, *B*, which carries a pawl, *a'*, and which is oscillated by a crank or disk, *C*, on the main driving-shaft *C'* through the medium of a connecting-rod, *C²*, pivoted to it eccentrically. At every rotation of the main shaft *C'* the cylinder *A* is moved the distance of one tooth of the ratchet-wheel *A'*, and in this manner the pins on the cylinder are brought successively beneath a series of lifting-arms, *b b'* *b² b³ b⁴ b⁵*, and one or the other of these arms is raised and allowed to fall upon the cylinder again.

Beneath the cylinder *A* is an oscillating shaft, *E*, which extends horizontally across the frame of the loom and projects a short distance from each side thereof. On one end of this shaft is an oscillating arm, *F*, to the up-

per end of which and on one side of the shaft E three hooked arms, $c' c^2$, are pivoted. On the opposite side of this shaft, and pivoted to the lower portion of the arm F, are three more hooked arms, $c^3 c^4 c^5$. At the lowermost point of the lower portion of the arm F a rod, G, is pivoted, the forward end of which has a wedge, d , formed on it, as shown in Figs. 1, 2, 7, and 9. On the opposite end of the shaft E to that carrying the arm F is an arm, F', to the lower end of which a rod, G', is pivoted, which rod has a wedge, d' , formed on its forward end, the upper edge of which inclines backward, or in an opposite direction to the inclined plane of the wedge d , as shown in Figs. 3 and 4. The two rods G G' are sustained near their forward ends upon brackets $e' e'$ projecting from the sides of the frame of the loom, so that when the shaft E is given an oscillating movement the wedges or inclined planes $d d'$ will alternately elevate and depress the shuttle-boxes H H' a greater or less distance, according to the length of movement given to the arms F F' by the action of a vibrating pawl, J, as will be hereinafter described.

The hooked or toothed arms $c' c^2$ and the arms $c^3 c^4 c^5$ are each attached to their respective arms $b b' b^2 b^3 b^4 b^5$ by means of wires f , so that when one of the pins on the surface of the cylinder A elevates one of the lifting-arms such arm will elevate one of the toothed arms, and this latter arm will be acted upon by the pawl J. All the hooked arms are in this manner actuated; but as they are pivoted at different distances from the center of the shaft E, or at different points on the arm F, it will be seen that some of the hooked arms will move this arm F a greater distance than others, and then again the hooked arms on one side of the shaft E will move the rods G G' backward, while those on the opposite side of this shaft will cause the rods G G' to be moved forward.

The pawl J is arranged in front of the cylinder A and acted upon by a cam, h , on the main shaft C', against which cam the pawl is held by a spring, J'. The hooked arms $c' c^2$ pass through the pawl J above the main shaft C', and are operated by it at this point, and the hooked arms $c^3 c^4 c^5$ below the main shaft are acted upon by the lower end of the pawl J. Thus it will be seen that this pawl operates upon both sets of hooked arms, and by its vibration the arms F F' receive an oscillating motion.

K K' are two curved lifting-arms, which are pivoted at their rear ends to brackets projecting from each side of the loom-frame, and at their forward ends to pitman-rods $j j$, which rods are pivoted at their upper ends to vertical rods N N', which work in guides S S', and carry upon their upper ends the shuttle-boxes H H'. The lifting-arms K K' have pins $i i'$ projecting from them, which pins support these arms upon the inclined surfaces of the cams or wedges $d d'$, and as these cams are moved back and forward they alternately elevate and depress the two shuttle-boxes H H'. The in-

clined edges of the cams $d d'$ are constructed with flat surfaces or points of repose on them, so that the weight of the shuttle-boxes will not be liable to move the cams at each point of repose of the pins $i i'$. The shuttle-boxes are thus positively held in the position in which they were adjusted by the last movement of the pawl J.

In the accompanying drawings I have represented two shuttle-boxes having four cells each; but any number of cells may be employed, provided the mechanism for moving the boxes be arranged and constructed accordingly. This may be done without departing from the nature of my invention by increasing the length of the cams or inclined planes $d d'$ and employing a number of hooked arms corresponding to the number of shuttle-cells.

By my invention the shuttle-boxes may be lifted or dropped either the distance of one cell at each revolution of the main shaft C' or the distance of two or three cells. In this way the shuttles may be shot from the cells in their regular order of arrangement, or one or two cells may be skipped over; or a shuttle may be thrown from any one of the cells any desired number of times in succession.

By the arrangement shown in the drawings the hooked arms $c' c^2$ each have three teeth, and when one of these arms is lifted by a tooth on the cylinder A the pawl J will move the boxes H H' the distance of one cell at each rotation of the main shaft. The hooked arms $c' c^4$ have but a single notch or hook, and these arms move the boxes H H' the distance of two cells either upward or downward; and the hooked arms $c^2 c^5$ move the shuttle-boxes H H' the distance of three cells. All of these different movements are made or governed by means of a cylinder, A, having pins on its surface, which pins are arranged with reference to the figure which it is desired to weave, as above stated.

Instead of the pin-cylinder A, a pattern-chain, M, (shown in Figs. 10 and 11,) may be used, which chain may have a number of rolling elevations, t , upon its transverse bars, arranged in any suitable manner. The transverse bars of the pattern-chain may have a number of short spacing-tubes, v , upon them, for keeping the rollers t in their places and admitting of these rollers being adjusted laterally and fixed at any desired point upon their bars.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The pawl-lever J, suspended in front of the cam h , in combination with the hooked arms $c' c^2$ and $c^3 c^4 c^5$, substantially as described.

2. Attaching the hooked arms $c' c^2$ or their equivalents at different distances from the axis of motion of their oscillating lever F, substantially as described.

3. Arranging hooked arms, which are indi-

rectly connected to the pin-cylinder or its equivalent, so as to be operated by it, in such manner that a vibrating pawl-lever, J, will operate upon all of them at proper times, substantially as described.

4. The combination of hooked arms *c c'*, oscillating arm F, and a pattern-governing device, substantially as described.

5. Pivoting the cam-rods G G' to arms F' F, the movements of which are controlled by a pin-cylinder or its equivalent, substantially as described.

C. DUCKWORTH.

Witnesses:

JAMES DUCKWORTH,
LEVERETT HITCHCOCK.