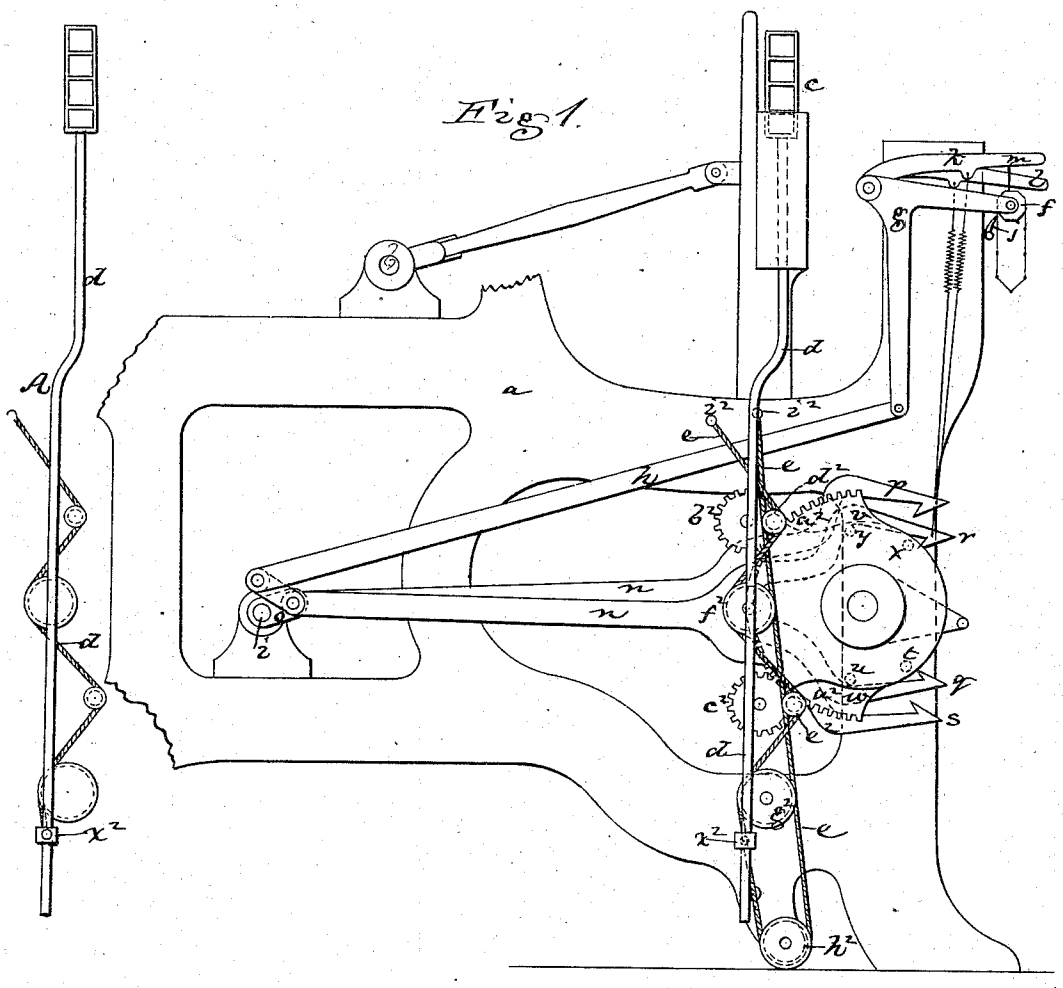
2 Sheets--Sheet 1.

H. WYMAN.

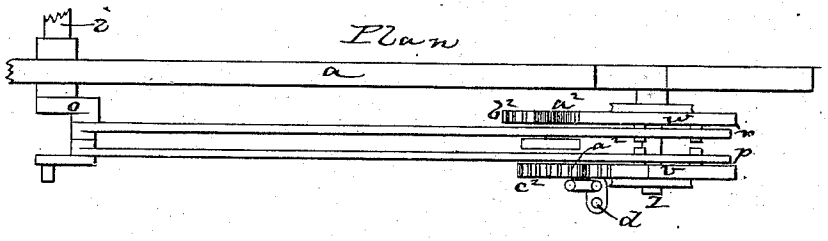
Shuttle-Box Mechanisms for Looms.

No. 158,394. Patented Jan. 5, 1875.

Fig 1.



Plan



Witnesses.
M. W. Frothingham.
L. H. Latimer.

Inventor,
Horace Wyman.
By his Attys.
Crosby & Gould

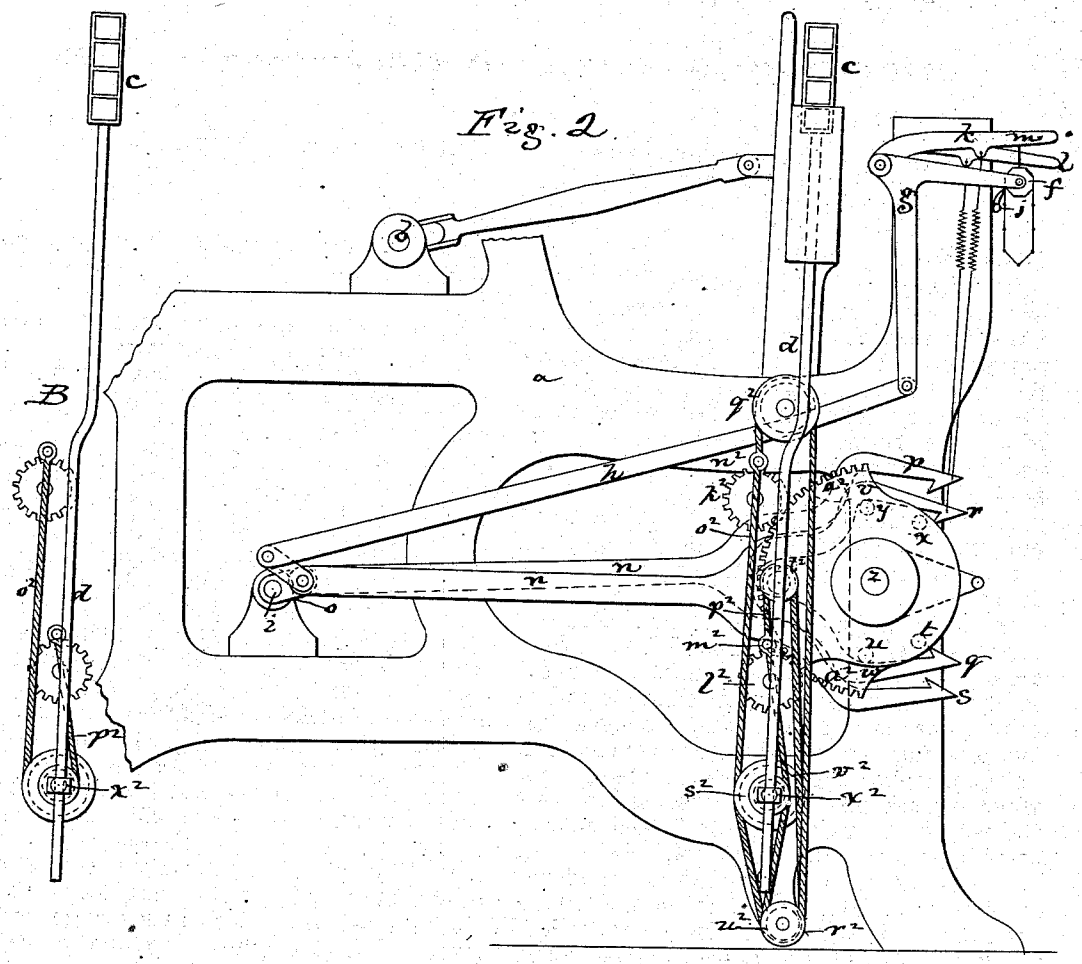
2 Sheets--Sheet 2.

H. WYMAN.

Shuttle-Box Mechanisms for Looms.

No. 158,394. Patented Jan. 5, 1875.

Fig. 2.



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UNITED STATES PATENT OFFICE.

HORACE WYMAN, OF WORCESTER, MASSACHUSETTS, ASSIGNOR OF ONE-HALF HIS RIGHT TO GEORGE CROMPTON, OF SAME PLACE.

IMPROVEMENT IN SHUTTLE-BOX MECHANISMS FOR LOOMS.

Specification forming part of Letters Patent No. **158,394**, dated January 5, 1875; application filed June 26, 1873.

To all whom it may concern:

Be it known that I, HORACE WYMAN, of Worcester, in the county of Worcester and State of Massachusetts, have invented an Improvement in Looms; and I do hereby declare that the following, taken in connection with the drawings which accompany and form part of this specification, is a description of my invention sufficient to enable those skilled in the art to practice it.

The invention has particular reference to a new organization of mechanism for operating the drop-boxes or drop-box compartments of fancy-looms.

In my invention I connect each drop-box rod to a cord extending around, or partially around, a vertical, or approximately vertical, series of pulleys or rolls, part of which pulleys or rolls turn on pins extending from gear-pinions meshing into and driven by segment-gears on the peripheries of a series of wheels, from which extend pins that are operated (to turn the wheels) by pawls on the forked ends of arms jointed to a crank-shaft, the pawls being suspended from indicating-levers, which are raised by the pattern mechanism, and which, with the pawls, fall by gravity when not held up by the pattern mechanism. When either arm is raised the bottom pawl, connected to it, is brought into position to catch the lower pin of a gear segment-wheel as the pawl is drawn back, the pawl turning the segment so that it turns the pinion meshing into the segment-gear one hundred and eighty degrees, and when any arm falls the upper pawl is brought into similar position with reference to the upper pin of one of the gear segment-wheels, the action of the pawl, as it is drawn back by the crank-shaft, turning said segment-wheel, and imparting a half-rotation to the pinion, but in the opposite direction to the movement imparted by a bottom pawl. As either pinion is thus turned the action of its roll or pulley upon the cord extending around or partially around said pulley is such as to raise or lower the box-rod, and through a series of pinions and pulleys the extent of movement, by means of the various pinions, may be made such as to bring any box of a series into position.

My invention consists, primarily, in the method of working drop-boxes thus generally described.

The drawing represents a loom, or parts of a loom, embodying my invention.

Figure 1 shows the mechanism in end view. Fig. 2 shows a modification of the mechanism.

a denotes the loom-frame; *b*, the crank-shaft connecting with and operating the lathe in the ordinary manner. *c* denotes one set of the drop-boxes, a similar set being at the opposite end of the lathe. Each set of boxes is mounted on a vertical rod, *d*, sliding in suitable guides. In Fig. 1 the rod *d* is shown as fastened to a cord or other suitable flexible connector, *e*, at x^2, the rod and its boxes being operated thereby to carry any shuttle-box into position. *f* denotes the pattern-cylinder, supported by one arm of a bell-crank lever, *g*, whose other arm is connected by a link, *h*, to a crank on the bottom shaft, *i*, rotation of the shaft vibrating the lever, and imparting reciprocating vertical movements to the cylinder. The cylinder is intermittingly turned by a suitable pawl, *j*, which engages with and moves a ratchet at each reciprocation of the lever. Over the cylinder are the indicating-levers *k l*, (two levers only being shown,) and from each of these levers extends a pin, *m*, which pin strikes the card on the pattern-cylinder when the cylinder moves up, and rises with the cylinder, except when one of the holes of the pattern-card is beneath the pin, in which case the pin enters the hole, and the pattern-cylinder rises without imparting movement to the indicating-lever. Suspended from each lever is a forked or double-hook pawl at the end of an arm, *n*, pivoted to a crank, *o*, on the shaft *i*, rotation of the shaft imparting reciprocating horizontal movements to the pawls. *p* denotes the upper pawl, and *q* the bottom pawl, of one fork; and *r*, the upper pawl, and *s* the bottom pawl, of the other fork. By the rise of either fork (by the pattern-cylinder) its bottom pawl, *q* or *s*, is brought into position to engage with a pin, *t* or *u*, extending from a pin-wheel, *v* or *w*, and when either fork is down its upper pawl, *p* or *r*, is brought into position to engage with a pin, *x* or

y, extending from said wheels, such engagement taking place when either of the arms n is drawn back by the rotative movement of the crank o.

The pin-wheels v w are hung on a stud, z, and are worked on said stud by the pawls. Each wheel is made with a segment-gear, a^2, the teeth of one of which meshes into the teeth of a pinion, b^2, while the teeth of the other mesh into and drive a gear-pinion, c^2. The pinion b^2 carries a grooved friction-roll, d^2, and the pinion c^2 a similar roll, e^2, and around or over these rolls and grooved rolls or pulleys f^2 g^2 h^2, turning on stationary pins, the cord e passes, as seen in the drawing, the cord passing by and through the grooves at each side of the rolls or pulleys d^2 e^2 f^2 g^2 h^2, and under the bottom pulley, h^2, and its opposite ends being fastened to the frame, as seen at i^2. When either pawl engages with a pin of the pin-wheel it turns the segment, and imparts a semi-rotation to the pinion connected therewith, carrying the roll connected therewith to a diametrically-opposite position, which movement of the roll will bend the straight cord passing by it, and straighten the bent cord.

Now, it will be obvious that if either or both of the pinions b^2 c^2 be rotated one-half of a revolution, bringing one or both of the friction-rolls d^2 e^2 on the opposite side of the pinions, the cord on the outside of the roll will become straight, while that portion on the inside will assume a bent position, thereby altering the position of the fulcrum x^2, and consequently bringing a different shuttle-box into line with the race, the distance of d^2 from the center of the pinion being such that with one-half of a revolution the boxes will be moved over one division, or from one box to that next adjoining it, while the distance of e^2 from the center of its pinion is such that with one-half of a revolution the boxes will be moved over two spaces or divisions, and by the movement of one or both pinions with the rolls, either one of the four boxes may be obtained. It is also obvious that by increasing the pinions and friction-pulleys an increased number of boxes, as six or eight, may be operated.

The flexible connection d may terminate at x^2, as shown at A, the series of boxes being carried down by gravity, instead of being carried by a positive motion, as shown; but I prefer the former method shown.

In the modification shown at Fig. 2 the gear-segments mesh into pinions k^2 l^2, and the movement of the pawls is so graduated that the pinions will make one-half of a revolution when either of the pawls engages with one of the teeth of the wheels a^2, in the same way as is shown in Fig. 1. These pinions carry studs m^2 n^2, to which are attached the cords o^2 p^2, the cord o^2 passing over the stationary pulleys q^2 and r^2, and returning and passing around the pulley s^2, attached to the drop-box rod d, and the cord p^2 passing around the stationary pulleys t^2 and u^2, and, returning, passing around the pulley v^2, fast upon s^2. To prevent the cords o^2 p^2 from slipping around the pulleys, the cords should be fastened to their respective pulleys s^2 and t^2 at such points of connection that neither cord will leave its pulley during its partial rotation.

Now, it will be obvious that if either or both of the pinions k^2 or l^2 be rotated one-half of a revolution, bringing one or both of the studs on the opposite side of the pinion, the fulcrum x^2, carrying the rolls s^2 and v^2, will assume a different position, and bring a different box into line with the race. The movements of the studs m^2 n^2 are proportioned to the movement of the whole number of the boxes, and the diameter of the pulleys s^2 and v^2 is such that when the pinion carries m^2 to its opposite position a movement of one box will be made, and when the pinion carries n^2 to its opposite position a movement over two boxes will be made, and by the movements of one or both combined any one of four boxes may be obtained.

It is apparent that if, instead of having the pulleys s^2 and v^2 of different diameters, they be made of the same diameter, and the distance of one of the studs n^2 or m^2 from the center of the pinion be increased, the same result may be obtained; but I prefer the method first described.

The flexible connections o^2 p^2 may terminate on their respective pulleys at x^2, as shown at B, the series of boxes being carried down by gravity, instead of being carried by a positive motion; but I prefer the former method shown

I claim—

A system of grooved pulleys, cranks, and cording, substantially as described, combined with the pattern mechanism and drop-boxes of a fancy-loom, and operated and operating to control the boxes, as set forth.

HORACE WYMAN.

Witnesses:
J. A. WARE,
J. B. SYME.