A. B. CAPRON.

LOOM-SHUTTLE-BOX MECHANISM.

No. 171,989. Patented Jan. 11, 1876.

Fig. 1.

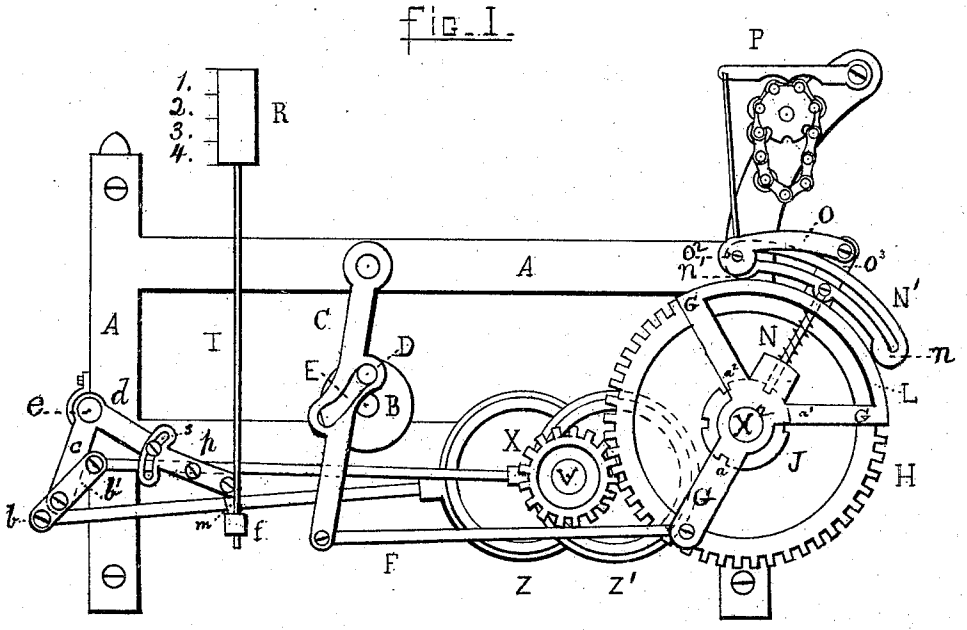


Fig. 4.

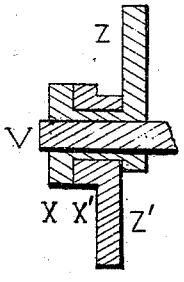
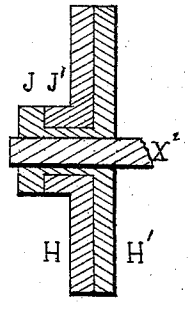


Fig. 3.



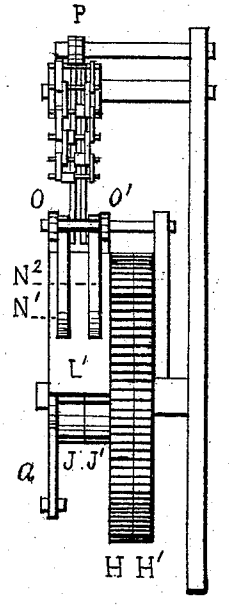
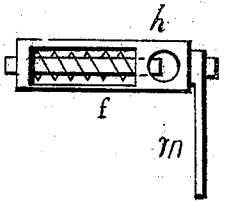


Fig. 2.

Fig. 5.



Witnesses.

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ARIEL B. CAPRON, OF WORCESTER, MASSACHUSETTS.

IMPROVEMENT IN LOOM-SHUTTLE-BOX MECHANISMS.

Specification forming part of Letters Patent No. **171,989**, dated January 11, 1876; application filed November 19, 1873.

To all whom it may concern:

Be it known that I, ARIEL B. CAPRON, of Worcester, State of Massachusetts, have invented a Shuttle-Box Mechanism, of which the following is a specification:

My invention relates to the mechanism for changing the position of a series of shuttle-boxes in such a manner as to bring any one of the series in line with the shuttle-race, so that the shuttle contained therein may be thrown through the shed, and is fully explained in the following specification and the accompanying drawings, in which—

Figure 1 represents a side elevation of my device attached to the side of a loom. Fig. 2 is a partial rear elevation of the same. Fig. 3 shows a sectional view of the oscillating gear-wheels and the attached notched plate-wheels. Fig. 4 shows a sectional view of the eccentrics and pinions, and Fig. 5 represents the lifter *f*.

My shuttle-box mechanism is constructed and operated as follows: Pivoted upon the side of the loom A A, and in proper position above the main revolving shaft B, is the hanging lever C, capable of receiving an oscillating motion when actuated by the crank-pin D moving in the slot E, which slot should be so shaped that the lever C will receive a movement toward the right during one quarter of a revolution of the crank-pin, and during the next quarter revolution to remain at rest, and during the third quarter of a revolution to move back toward the left, and during the last quarter revolution to remain at rest, or, in other words, to receive a movement and a "dwell" during alternate quarter revolutions of the crank-pin. A rod, F, connects the end of the lever C with the carrier G, which turns upon a pivot or stud, X^2, attached to the side of the loom. The movement of the lever C will thus impart an oscillating motion to the carrier G, and the arrangement of so much of the device just described should be such that the carrier G will oscillate through an arc of sixty degrees at each movement of the lever C. Upon the stud X^2, and between the carrier and the loom side, are two gear-wheels, H and H′, the wheel H′ turning upon the stud X^2, and the wheel H turning upon the hub of the wheel H′. To the wheel H is attached a plate-wheel, J′, having six notches arranged at equal distances apart about its circumference, and upon the hub of the wheel H′ is attached a similar notched plate-wheel, J, as shown in sectional view in Fig. 3. The carrier G consists of a radial arm, *a*, connected with the lever C, and upon the opposite side the two radial arms a^1 a^2, making an angle greater than the oscillation of the carrier. Connecting the arms a^1 and a^2, and projecting over the notched plate-wheels J and J′, is a bar, L, with a flange, L′; and supported by this bar and flange, and sliding freely therein, are two rods or plungers, N, pressed downward by spiral springs, and having their lower ends entering the notches in the plate-wheels J and J′. The oscillating movement of the carrier G is thus imparted to the gear-wheels H and H′. In Fig. 1 only one plunger and spiral spring are shown, as the other is placed directly behind it. Pivoted to the upper ends of the plungers N are curved plates N^1 N^2, having slots describing an arc of sixty degrees, or equal to the oscillation of the carrier, and also having protuberances *n n′* on the under side of each end resting upon the flange, serving as fulcra. Sliding in the curved slot, and connected to the swinging arms O O^1, loosely pivoted to the support O^3, are pins O^2, which are connected with the levers P, so placed that at times one or both of them may be raised by any known and suitable pattern mechanism. The pattern mechanism should be brought into proper position to actuate the levers P at each end of the oscillation of the carrier G, or while it is at rest, and whenever the exigencies of the weaving may demand, and the pattern mechanism cause one of the levers P to be raised, the corresponding end of the movable arm O or O^1, with the pin in the slot of the curved plate attached thereto, is raised, thereby raising the corresponding plunger and withdrawing it from the plate-wheel, thus breaking the connection between the carrier G and the gear-wheel actuated by the plunger so raised. The gear-wheel thus disconnected will remain at rest during the next oscillation of the carrier, and whenever either one of the levers P are not so raised by the pattern mechanism

the spiral springs upon the plungers N will force them downward into a notch of a corresponding plate-wheel.

It will thus be seen that the weaver, by suitably arranging the pattern mechanism actuating the levers P, may cause either one or both of the gear-wheels H and H′ to oscillate through an arc of sixty degrees at each oscillation of the carrier G, or to remain at rest.

Having secured an oscillating movement of the gear-wheels H and H′ optional with the weaver, such circular oscillating motion may be converted into rectilinear reciprocating motion of the rod T and the series of shuttle-boxes R by any of the various modes known to mechanics. One method devised and preferred by me is shown, and is as follows: Upon the stud V, fastened to the side of the loom, I place two pinions, X X^1, gearing with the wheels H H′, and one-third their size, the pinion X turning upon the stud V, and the pinion X^1 turning upon the hub of pinion X. To the pinion X^1 is attached the eccentric Z′, and to the hub of the pinion X is attached the eccentric Z, as shown in sectional view in Fig. 4. For each oscillation of either one of the gear-wheels H or H′ the pinion in gear therewith, and also the corresponding eccentric, will receive a circular motion consisting of one-half a revolution forward or backward, according to the motion of the carrier G. The pinions are so arranged with reference to the gear-wheels that at each dwell of the gear-wheels the eccentrics will stand either horizontally in front of the stud V or horizontally behind it, but never above or below it.

The eccentrics are appropriately connected with the lever *b b′* upon the vertical arm C of a bell-crank lever, either turning upon a stud fastened to the side of the loom or attached to a rocking shaft, *e*, extending through the loom in any convenient position. The lever *b b′* turns upon a pin in the vertical arm of the bell-crank lever, and has the arm *b′* twice the length of the arm *b*. To the horizontal arm of the bell-crank lever is attached the shuttle-box rod T by means of a device hereinafter described.

As four shuttle-boxes are as many as are ordinarily required in most kinds of fancy weaving, I will describe the operation of my shuttle-box mechanism with reference to that number of boxes in the series. Whenever, by the proper control of the plungers N, both of the eccentrics are caused to stand directly in front of the stud V, the vertical arm of the bell-crank lever will be thrown forward, thereby depressing the horizontal arm and lowering the rod T, so as to bring box marked 1 of the series in line with the shuttle-race. If, now, the eccentric connected with the long arm of the lever *b b′* be brought back behind the stud V, the horizontal arm of the bell-crank lever will be raised a distance equal to that between the centers of two adjacent shuttle-boxes, bringing box marked 2 in the series into line with the shuttle-race. If the eccentric connected with the long arm of the lever *b b′* be now thrown forward, and the eccentric connected with the short arm be thrown back behind the stud V, the horizontal arm of the bell-crank lever will be raised so as to bring box marked 3 in the series into line with the shuttle-race, and when both eccentrics are thrown back the horizontal arm of the bell-crank lever will be raised so as to bring box marked 4 in the series into line with the shuttle-race.

It will be observed that the bell-crank lever is so arranged that a lateral movement of the vertical arm, equal to the throw of the eccentrics, will impart a vertical movement to the horizontal arm equal to the distance between the centers of the highest and lowest boxes in the series. Thus, as the two eccentrics are capable of being brought into either one of the four positions described above, with reference to each other, at each oscillation of the carrier G, either one of the four shuttle-boxes in the series may be brought into line with the shuttle-race at each oscillation of the carrier by causing the pattern mechanism to so operate upon the plungers as to cause either one or both of the eccentrics to change their position, or to remain at rest, as may be desired.

It will be seen that in the above-described device the gear-wheels H H′ have an oscillating motion, which is communicated to the eccentrics Z Z′ by means of the intervening pinions X X^1. The eccentrics having an equal eccentricity, and the varying movements of the shuttle-rod box being produced by the combination of the bell-crank lever and lever *b b′*, I am thereby enabled to use a single pattern for the eccentrics Z Z′, both being alike, and the eccentrics may be attached to the loom-frame by a fixed stud, V.

I make the connection between the horizontal arm of the bell-crank lever and the shuttle-box rod T by means of the lifter *f*, (shown in Fig. 5,) having a pin, *g*, with a beveled end, fitting a corresponding beveled incision in the rod T, the end of which passes through the hole *h*. The pin *g* is pressed against the rod T by a spiral spring, so that whenever a shuttle is caught in entering a box the lifter *f* can move independently of the rod T, and thereby prevent a breakage in the moving parts of the machinery. A link, M, unites the lifter *f* with the extension-arm *p*, attached to the end of the horizontal arm of the bell-crank lever, and rendered capable of a certain adjustment by means of the slot I, so as to permit my mechanism to be applied to any loom without any change in the length of the supporting-rod T.

With two oscillating gear-wheels, actuated by two plungers, as above described, I am enabled to operate a series of four shuttle-boxes, or one of three, or one of two, and the movement of the boxes is also rendered positive, being both raised and lowered by the action of the eccentrics, instead of being only

raised by the mechanism and allowed to fall by their own weight, as is the case in many shuttle-box mechanisms.

I intend, when advisable, to balance the weight of a series of shuttle-boxes by any of the well-known methods, and I also intend, when desirable, to cause a bell-crank lever upon the opposite end of the loom to be actuated by the opposite end of the rocking shaft *e*, in such a manner as to move a series of shuttle-boxes in unison with the one just described, but having a reverse motion—that is, a motion downward while the first series move upward—in which case the weight of the two series will counterbalance each other.

The arrangement of my device will also permit a duplicate set of mechanism to be operated upon the opposite end of the loom and in connection with a second series of shuttle-boxes; or, by the use of one or more oscillating gear-wheels and plungers in addition to those described, a series of shuttle-boxes may be operated, consisting of a greater number than four.

What I claim is—

1. The combination, with the carrier G and plungers N, of the gear-wheels H H′ and notched plate-wheels J J′, as described.

2. The combination, with the carrier G and plungers N, of the connected oscillating lever C, in the manner described, and operating as set forth.

3. The combination, with the oscillating gear-wheels H H′ and pinions X X^1, all constructed, arranged, and operating as described, of the eccentrics Z Z′, as described, and for the purposes set forth.

4. The combination of the carrier G, plungers N, adapted to be operated by pattern mechanism, plate-wheels J J′, gear-wheels H H′, pinions X X^1, and eccentrics Z Z′, all arranged and operating as described, and for the purposes set forth.

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Witnesses:

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