3 Sheets—Sheet 1.

F. CHRISTEN.

SHUTTLE-BOX MECHANISM FOR LOOMS.

No. 189,922. Patented April 24, 1877.

Fig. 1.

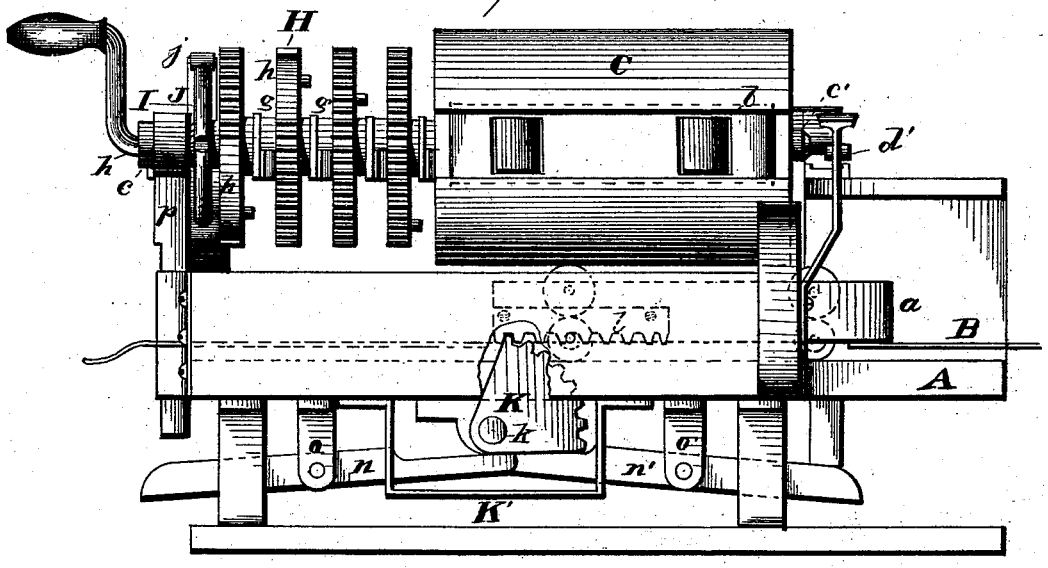
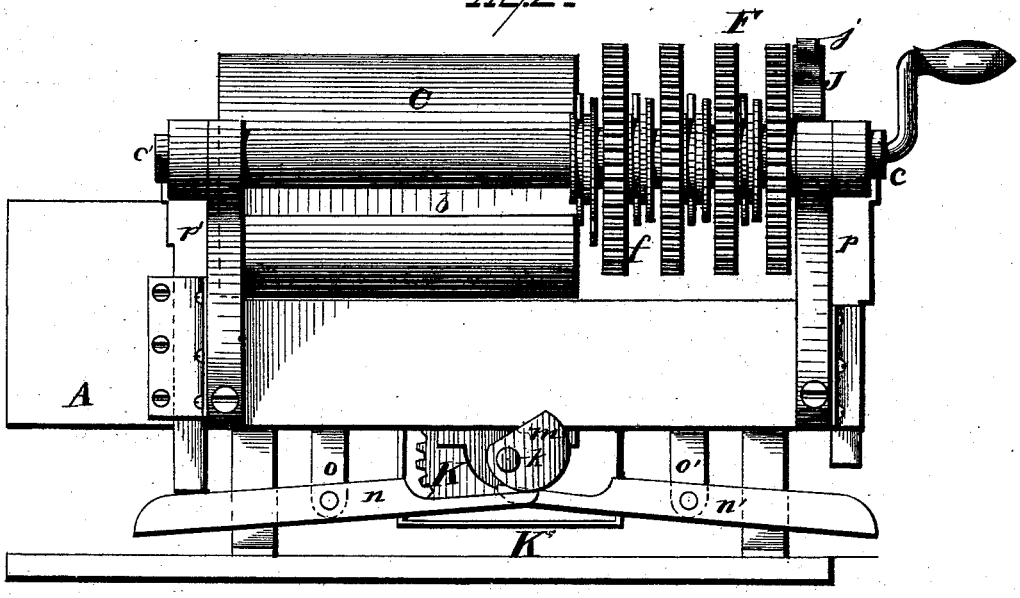


Fig. 2.



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3 Sheets—Sheet 2.

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SHUTTLE-BOX MECHANISM FOR LOOMS.

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Fig. 3.

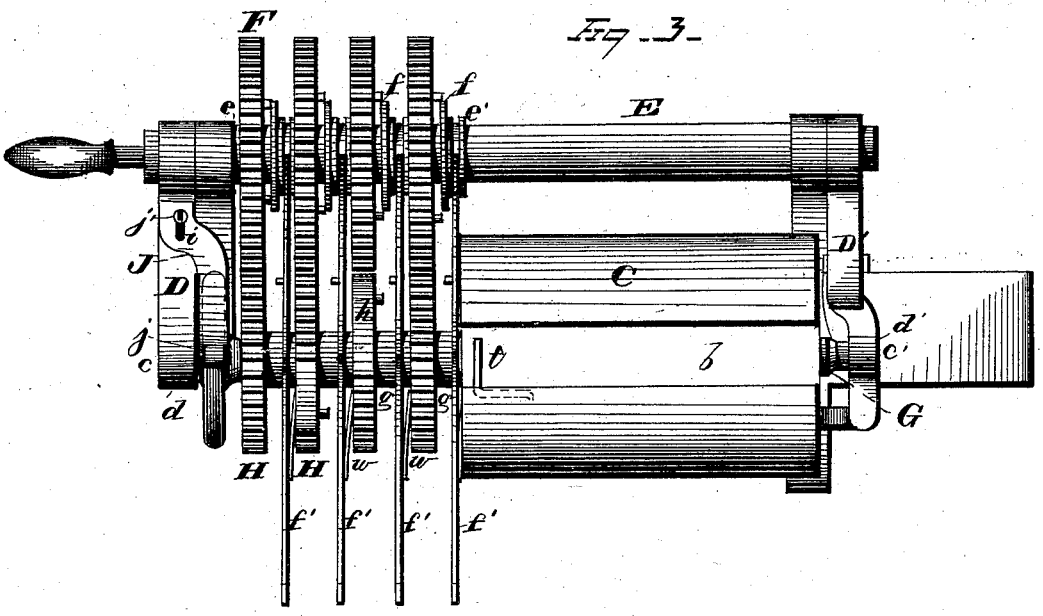
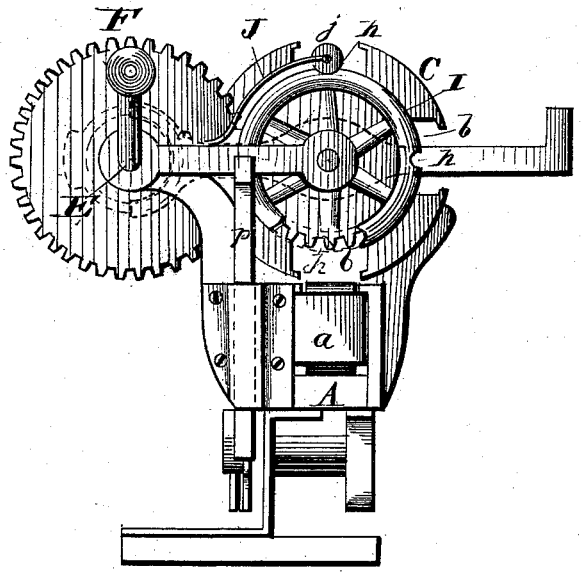


Fig. 4.



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SHUTTLE-BOX MECHANISM FOR LOOMS.

No. 189,922. Patented April 24, 1877.

Fig. 5.

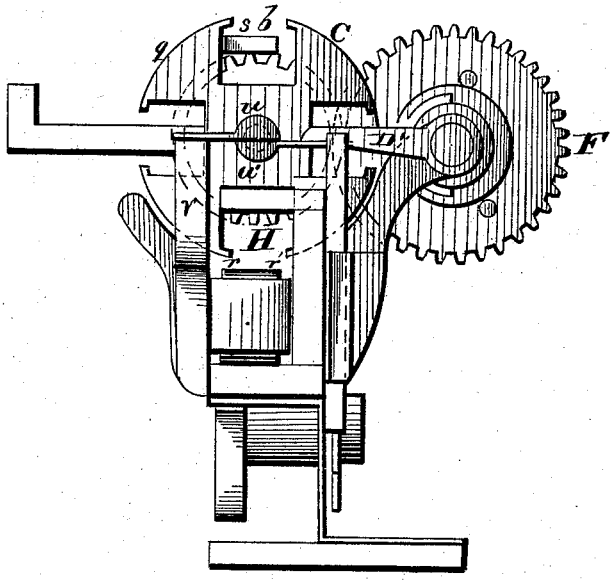
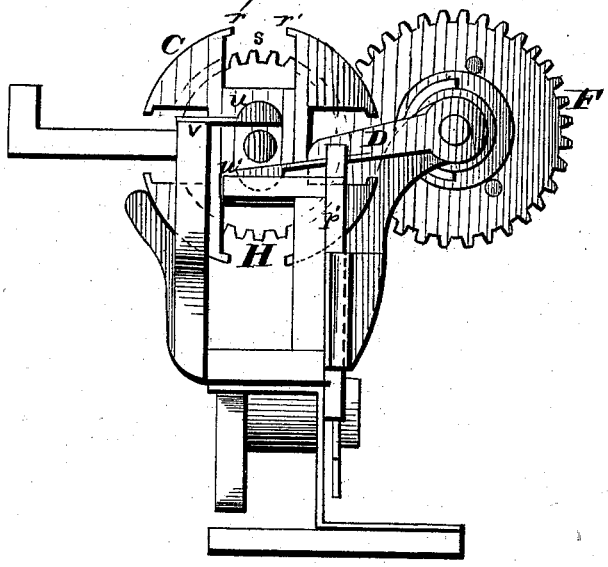


Fig. 6.



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UNITED STATES PATENT OFFICE.

FRED. CHRISTEN, OF HOMESTEAD, IOWA.

IMPROVEMENT IN SHUTTLE-BOX MECHANISMS FOR LOOMS.

Specification forming part of Letters Patent No. **189,922**, dated April 24, 1877; application filed February 21, 1877.

To all whom it may concern:

Be it known that I, FRED. CHRISTEN, of Homestead, in the county of Iowa and State of Iowa, have invented certain new and useful Improvements in Shuttle-Box Mechanism for Looms; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use it, reference being had to the accompanying drawings, which form part of this specification.

My invention relates to an improved shuttle-box mechanism for looms.

The object of this invention is to provide a shuttle-box mechanism for operating rotary shuttle-boxes in looms wherein the shuttle is actuated by a positively reciprocated carriage, of such a construction that as many different shuttles may be employed as there are differently-colored filling-threads in the desired fabric to be woven, the mechanism to be such that any one of the shuttles may be used as long as required, or the several shuttles may be used in succession according as the pattern requires.

My invention consists in the combination, with a shuttle and positively-reciprocated carriage, of a rotary shuttle-box cylinder and suitable mechanism, as will hereinafter be described, whereby the shuttle is taken from the carriage when it arrives near the end of the loom-lathe; and after the carriage has commenced its return movement any desired shuttle in the cylinder may be delivered to the carriage and carried to the opposite end of the race.

In the drawings, Figure 1 is a front view of my improved shuttle-motion, a portion of the race being cut away to show the engagement of the sector-gear with the rack attached to the shuttle-carriage. Fig. 2 is a rear elevation. Fig. 3 is a plan view. Fig. 4 represents the outer end of the shuttle-box. Fig. 5 shows the inner end of the same, with the shuttle-box cylinder raised clear of the race. Fig. 6 represents the inner end of the shuttle-motion with the shuttle-box cylinder resting on the race.

A designates the shuttle-race, and B the belt, having a carriage, *a*, secured thereto, the same as in the ordinary positive-motion looms. I do not show any particular mechanism for propelling the shuttle, as any of the known mechanisms employed in positive-motion looms may be employed, my improvement being adapted for use with any loom of this class.

C represents the shuttle-box cylinder, which may have any desired number of shuttle-boxes *b* formed therein. In the present example I have shown the cylinder provided with four shuttle-boxes. A shaft passes through cylinder C, the journals *c c'* of said shaft resting in bearings *d d'*, which latter are secured to the outer ends of arms D D'.

The opposite ends of the arms D D' are fitted to or sleeved upon the driving-shaft E, for a purpose hereinafter described. Gears F corresponding in number with the number of shuttle-boxes in cylinder C, are loosely mounted upon the driving-shaft E, and kept from lateral displacement by means of collars *e e'* secured to the driving-shaft. Each gear-wheel F is provided with a sliding clutch, *f*, and a shifting-lever, *f'*, the bifurcated arms of the latter engaging in grooves formed in the clutches *f*, whereby any one of the series of gears may be thrown in or out of connection with the continuously-moving driving-shaft.

The cylinder-shaft G is provided with sectional gears H, corresponding in number with the number of shuttle-boxes in cylinder C. Gears H are arranged to mesh with loose gears F on the driving-shaft, and are arranged on, and rigidly secured to, the cylinder-shaft in such a manner that the cut-away portion of one gear is opposite the cogs of the next gear, and hence by this arrangement three of the sectional gears are always in engagement with the loose gear-wheels F on the driving-shaft. Gear-wheels H are separated from each other by collars *g*, loosely secured to the cylinder-shaft. Collars *g* serve as fulcrums for the clutch-levers, the latter being pivoted to said collars, whereby they have lateral movement to throw the sliding clutches in or out of engagement with the loose gears F. Upon the end of cylinder-shaft G is secured an arrest or stop wheel, I, which is provided with as many notches or depressions *h* as there are shuttle-boxes in the cylinder, said notches be-

ing arranged in line with said shuttle-boxes. A spring, J, having an oblong slot, *i*, in one end to admit of varied adjustment, is secured by a clamp-screw, *j'*, or in any other suitable manner to the arm D, the free end of the spring having an anti-friction roller, *j*, journaled therein. Roller *j* travels upon the periphery of the arrest-wheel I, and as the roller *j* enters one of the notches *h* in the wheel the roller serves to lock the cylinder and hold it stationary while a shuttle is being deposited in or taken from a shuttle-box in the cylinder.

The rotary shuttle-box cylinder is raised and lowered as follows: K represents a toothed sector, secured to the outer end of a counter-shaft, *k*, journaled in bearings beneath the shuttle-race. A rest or stop bar, K', is secured to the race, the rest serving to limit the movement of sector K.

Sector K projects upward into the race, and is operated and turned in either direction by means of a rack, *l*, secured to the side of the shuttle-carriage *a*. When the carriage approaches the end of the race the rack *l* secured to the carriage engages with the teeth of the sector, and turns the same in the direction of the line of travel of the carriage. Immediately after the carriage commences its return movement, the rack *l* engages with the sector, and turns it in the opposite direction.

To the opposite end of the counter-shaft *k* is secured a cam, *m*, which rests upon the free ends of levers *n n'*, which are pivoted to supports *o o'*. Upon the outer ends of levers *n n'* rest the vertically-sliding bars *p p'*, the upper ends of said levers being forked to receive the arms D D'.

By the arrangement of parts last described it will be seen that when the shuttle-carriage approaches the end of the race, and after the shuttle has been delivered into the shuttle-box-cylinder, the rack on the carriage engages with the toothed sector turning the same, which operation imparts a part revolution to the cam, thus depressing the inner ends of levers *n n'*, and raising the sliding bars *p p'*, which latter operate to raise the cylinder clear of the race, and allow the cylinder to be revolved, if so desired, to bring another shuttle in line with the race. When the carriage commences its return movement the rack *l* engages with the sector, and turns it in the opposite direction, and reverses the movement of the several parts above described, thus lowering the cylinder, so that the rollers of the carriage engage with the rollers of the shuttle, and draw the latter from its box and carry it across to the opposite side of the loom.

It will be noticed that the periphery or shell *q* of cylinder C extends slightly over the side walls of each shuttle-box, as at *r r'*, forming a ledge or flange on each side of the shuttle-box. The opening *s* of each shuttle-box is of sufficient width to allow of the entrance of the rollers of carriage and shuttle, but of less width than the width of either carriage or shuttle. As the flanges *r r'* rest in direct contact with the upper portion of the race the carriage conveys the shuttle within the shuttle-box in line with the race. The rollers of the shuttle project through the opening *s* of the shuttle-box; but as this opening is narrower than the shuttle the latter is securely retained within the cylinder, as it is revolved, to carry any one of the number of shuttles therein contained to the shuttle-carriage. Each shuttle-box is provided with a stop-spring, *t*, or some equivalent device, to prevent the shuttle from coming in contact with the gearing on the cylinder-shaft.

In order to allow the weft-threads to be disengaged from the rotary shuttle-box cylinder, the inner bearing is formed of the upper and lower sections *u u'*, the upper and fixed sections *u* being secured to an arm, *v*, at the highest point attained by the journal of the cylinder in its vertical movement. The movable sectional bearing *u'* is secured to the arm D'. When the cylinder is being revolved the journal is supported in the bearing *u'*; but when the cylinder is resting on the race, and a shuttle is being taken from one of the shuttle-boxes, then the movable bearing rests on the loom-lathe, as shown in Fig. 6, and the journal is freed from contact with either bearing, thus allowing the weft-thread to pass freely over the journal.

Each one of the clutch-levers is provided with a spring, *w*, one end of which is secured to the clutch-lever, while the outer end of the spring rests against the side of the opposing sectional gear. This arrangement serves to keep the sliding clutches disengaged from the loose gears on the driving-shaft, unless the clutch-levers are forced against the spring to compel such engagement.

The operation of my improved shuttle-motion is as follows: The rotary cylinder having been filled with as many different shuttles as different colors are desired in the fabric to be woven, continuous rotary movement is imparted to the driving-shaft E, the loosely-fitting gears F remaining in a stationary position on said driving-shaft until thrown in engagement therewith, as hereinafter described.

The rotary cylinder, in its normal position, rests on the race, and as the shuttle-carriage passes beneath the cylinder the shuttle is delivered into the shuttle-box of the cylinder in line with the race. The carriage still keeps traveling toward the end of the race, and just before it reaches its limit of movement the rack *l*, attached to the side of the carriage, engages with the toothed sector *k*, turning it from right to left. As sector *k* is rigidly secured to the counter-shaft carrying the cam *m*, the latter is actuated, and, through the medium of levers *n n'*, bars *p p'*, and arms D D', serves to raise the cylinder C clear of the shuttle-race.

If it is desired to use the same shuttle again, the cylinder is not rotated; but if a different shuttle is required, the clutch is

moved, which serves to throw the loose gear on the driving-shaft into engagement with the sectional gear on the cylinder-shaft, which is adapted and arranged to rotate the cylinder a sufficient distance to bring the desired shuttle-box in line with the race. When the cylinder has attained the proper position, the gear, which has been locked to the driving-shaft by the clutch, becomes disengaged from the sectional gear as the cut-away portion of the latter rests in proximity to the cogs on the revolving gear, and the cylinder is thus brought to a rest, where it is retained in a fixed position by means of the roller engaging with the notch or depression in the arrest-wheel.

The shuttle-carriage then commences its return-movement, and when it enters that portion of the shuttle-race situated beneath the cylinder the rack *l* on the carriage engages with the toothed sector and reverses the operation of the parts heretofore described, thus lowering the cylinder, which latter again rests on the shuttle-race. The rollers on the shuttle-carriage then engage with the rollers of the shuttle and convey the shuttle from its box. As heretofore set forth, the weft-thread is allowed to pass readily from the journal of the cylinder as said journal is freed from its bearing when the cylinder is in its lowest position.

The clutch-levers and springs mounted on the cylinder-shaft are raised and lowered with the shaft, allowing said levers to engage with, and be disengaged from, the filling-chain levers.

I do not limit myself to the exact construction of parts shown and described, as it is evident that they may be modified in form and relative arrangement without departing from the spirit of my invention.

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

1. The combination of a rotary shuttle-box cylinder with a series of shuttles and a carriage, the latter permanently secured to a positively-reciprocated carrier, substantially as and for the purpose set forth.

2. In a loom wherein the shuttle is actuated by a positively-reciprocated carriage, the combination, with the shuttle-carriage and rotary shuttle-box cylinder, of mechanism, substantially as described, whereby the carriage, in its travel, serves to raise or lower said cylinder, substantially as and for the purpose set forth.

3. In a loom wherein the shuttle is actuated by a positively-reciprocated carriage, the combination, with the shuttle-box cylinder, journaled in vibrating bearings, and mechanism for operating the cylinder, of the shuttle-carriage, provided with a rack, and a toothed sector, and mechanism arranged to impart vertical movement to the shuttle-box cylinder, substantially as and for the purpose set forth.

4. The combination, with the shuttle-box cylinder and supporting-arms, pivoted upon the driving-shaft, of the shuttle-carriage, rack, toothed sector, rock-shaft, cam, levers, and sliding bars, substantially as and for the purpose set forth.

5. The combination, with the driving-shaft having gears loosely mounted upon the same, and sliding clutches adapted to lock said gears to the shaft, of the cylinder-shaft, provided with sectional gears, and clutch-levers adapted to throw the gears on the driving-shaft in or out of gear with the sectional gears on the cylinder-shaft, substantially as and for the purpose set forth.

6. The combination, with the loose gears on the driving-shaft, of sectional gears and collars on the cylinder-shaft and clutch-levers pivoted to said collars, substantially as and for the purpose set forth.

7. The combination, with the cylinder-shaft and mechanism for vertically moving the same, of the sectional bearing for its inner end, whereby the weft-thread may pass from the journal when the shuttle leaves the box, substantially as and for the purpose set forth.

8. The combination, with a positively-reciprocated shuttle-carriage and a rotary shuttle-box, the same adapted to be raised and lowered by the shuttle-carriage, of mechanism, substantially as set forth, whereby the cylinder may be actuated to bring any one of its boxes in line with the shuttle-race, substantially as and for the purpose set forth.

In testimony that I claim the foregoing I have hereunto set my hand this 17th day of February, 1877.

FRED. CHRISTEN.

Witnesses:
J. E. FRICK,
P. P. KUNZ.