No. 832,154. PATENTED OCT. 2, 1906.

A. R. PATTEN.

SHUTTLE BOX OPERATING MECHANISM FOR LOOMS.

APPLICATION FILED MAY 25, 1904.

2 SHEETS—SHEET 1.

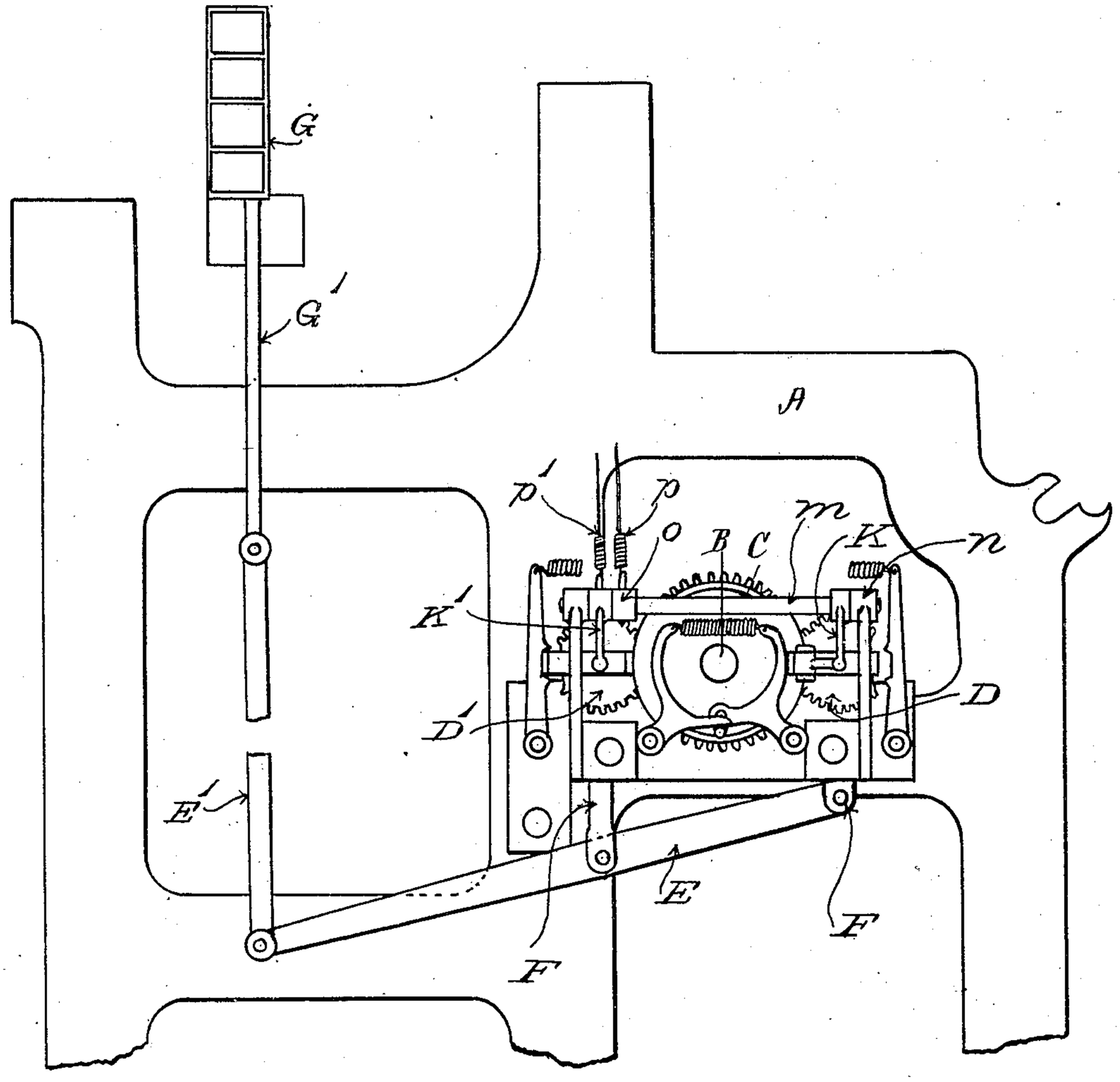

Fig. 1.

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Fig. 3.

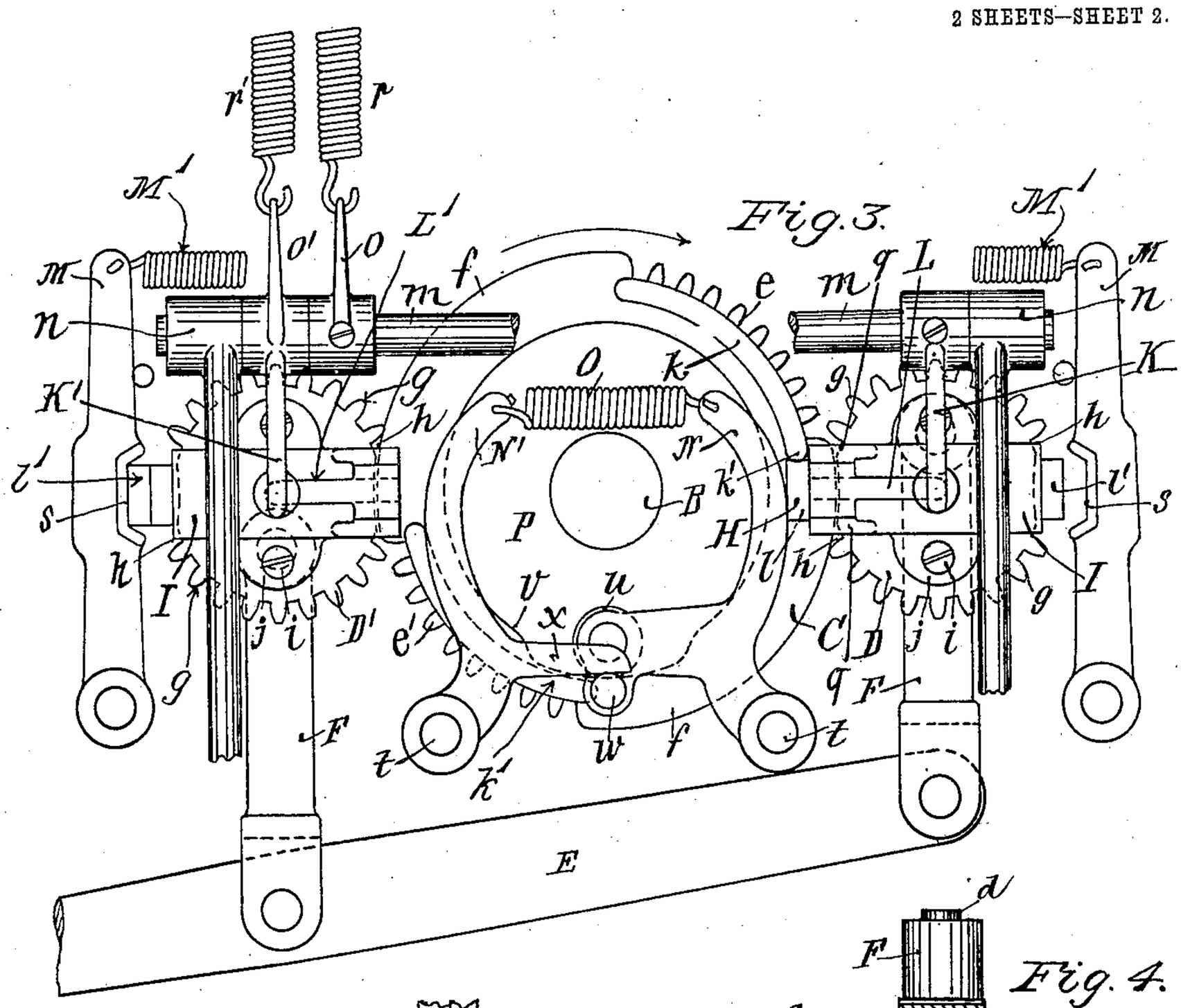


Fig. 2.

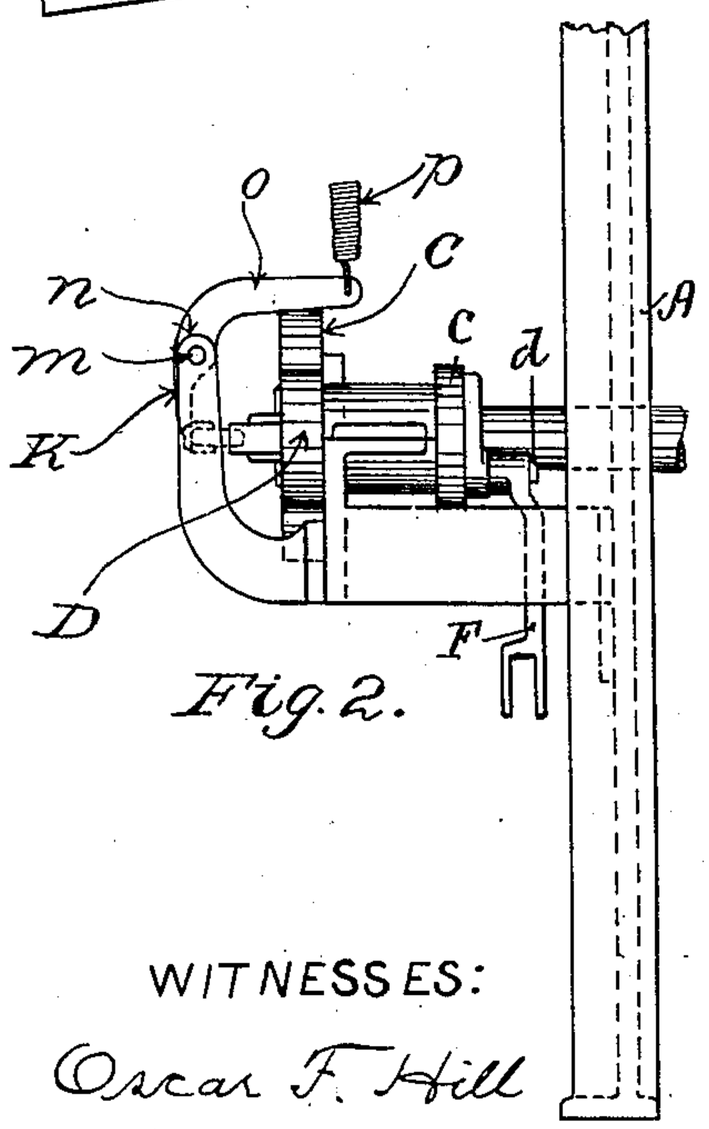
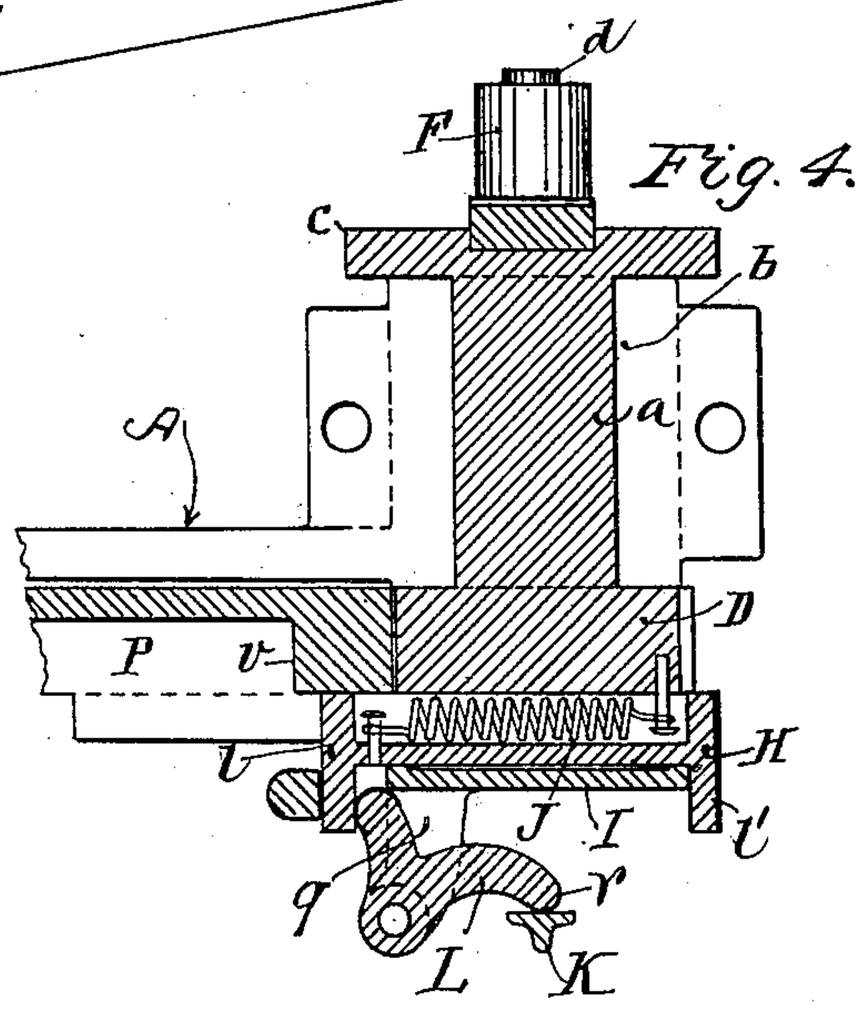


Fig. 4.



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SHUTTLE-BOX-OPERATING MECHANISM FOR LOOMS.

No. 832,154. Specification of Letters Patent. Patented Oct. 2, 1906.

Application filed May 25, 1904. Serial No. 209,629.

To all whom it may concern:

Be it known that I, ALONZO R. PATTEN, a citizen of the United States, residing at Hyde Park, in the county of Norfolk, State of Massachusetts, have invented a certain new and useful Improvement in Shuttle-Box-Operating Mechanism for Looms, of which the following is a specification, reference being had therein to the accompanying drawings.

The invention relates to shuttle-box-operating mechanism of the class in which a box motion comprises one or more mutilated pinions in operative connection with the shuttle-boxes, a diametrically-movable starting-tooth carrier applied in connection with each of the said pinions, the said carrier being provided with opposite starting-teeth, pattern connections in operative control of the said starting-tooth carrier, and a master-gear operating when a starting-tooth pertaining to either of the said mutilated pinions is placed in position to be engaged by the said master-gear to engage with the said starting-tooth, and thereby start in rotation the corresponding mutilated pinion and communicate a half-rotation thereto, whereby shifting movement is communicated to the shuttle-boxes.

One feature of the invention consists more particularly in improved means to operate the starting-tooth carrier.

Another feature of the invention consists in safety means to prevent actuation of the mutilated pinions at the wrong time in the working of the loom by the toothed segments of the master-gear in constructions of box motions employing two or more mutilated pinions and a corresponding number of toothed segments upon the master-gear.

The invention in its different phases may be embodied in different forms, constructions, and arrangements of mechanism.

In the drawings, Figure 1 represents in side elevation portion of one side frame or end frame of a loom with one embodiment of the invention applied thereto. Fig. 2 shows in rear elevation certain of the parts of Fig. 1. Fig. 3 shows in side elevation, on an enlarged scale, the main working parts of Figs. 1 and 2. Fig. 4 is a detail view in horizontal section passing through the axis of one of the mutilated pinions.

In the drawings, A represents an end frame or side frame of a loom, B being the cam-shaft of the loom, and C the rotating master-gear of the box motion, the said master-gear being fast with the cam-shaft in the present instance and thereby rotated. For convenience the invention has been illustrated as applied in connection with shifting or drop shuttle-boxes G, containing four cells, and accordingly the drawings show two mutilated pinions D D′, Figs. 1 and 3, combined and coöperating with the master-gear C. Each of the said mutilated pinions is furnished with a hub *a*, Fig. 4, working in a bearing *b*, with which the loom-frame is provided, the said hub having at its inner end a disk *c*, that is provided with a crank-pin *d*. From the crank-pins *d d* of the respective mutilated pinions connection is made, by means of connecting-links F F, with the box-lever E, Figs. 1 and 2, the said box-lever being in connection with the box-rod G′, Fig. 1, by means of a link E′. The mutilated pinions D D′ are actuated by the master-gear C under the control of a pattern mechanism of usual character. (Not shown in the drawings). The box-operating mechanism comprising the master-gear C, the two mutilated pinions D D′, the two crank-pins *d d*, the two connecting-links F F, and the box-lever E operates to transmit movement to the shuttle-boxes G in the ordinary manner, so as to present any desired cell of the latter in line with the shuttle-race of the lay.

The master-gear C is provided with the opposite toothed segments *e e′*, which are adapted for engagement with the teeth of the mutilated pinions, and the said master-gear is also provided with plain convex segments or rests *f f*, intervening between the said toothed segments *e e′* and concentric with the axis of the master-gear. The mutilated pinions D D′ are each provided with two oppositely-located toothed segments *g g* for engagement with the toothed segments of the master-gear, the said pinions also having the untoothed concave-bottomed spaces or recesses *h h* intervening between the segments *g g* and in which the teeth of the master-gear may rotate without actuating the mutilated pinion, the entrance of the plain segments or rests *f f* of the master-gear into the spaces or recesses *h h* of the respective mutilated pinions, and the engagement of the said segments or rests *f f* with the concave bottoms of the said spaces or recesses holding the pinions locked from accidental movement between the proper times of rotation. Each time a toothed segment of the master-gear becomes engaged with a toothed segment *g* of a mutilated pinion the said pinion is rotated to the extent

of a half-revolution, thereby carrying the connected crank-pin *d* from its upper center to its lower center, or vice versa.

The diametrically-moving starting-tooth carrier with which each mutilated pinion is provided consists, preferably, of a sliding bar or bolt H, which extends diametrically across the outer side of such pinion. The said sliding bar or bolt is suitably mounted upon the said side of the mutilated pinion—as, for instance, by means of a holding-case I, Figs. 3 and 4, the latter being attached to the pinion by means of screws *i i*, Fig. 3, that pass through the ears *j j* of the case into the pinion.

In conformity with my invention the starting-tooth carrier of each mutilated pinion is acted upon by a contracting spiral spring J tending to move the same diametrically of the said pinion in one direction, one extremity of the said spring being in connection with the sliding bar or bolt and the other thereof in connection with the mutilated pinion, the tension of the said spring tending to move the sliding bar or bolt in the direction to carry the head *l'* of the said sliding bar or bolt away from the axis of the mutilated pinion and project the said head at one side of the mutilated pinion. The head *l'* constitutes one of the starting-teeth. Between lugs *q q*, projecting from the case I, is pivoted a bell-crank L or L', one arm of which bears against the head *l* of the sliding bar or bolt H. The opposite arm of the bell-crank projects toward the axis of rotation of the mutilated pinion, and its rounded extremity *r* is located substantially in line with the said axis. When bell-crank L or L' is turned upon the pivot connecting it with lugs *q q* by pressure applied to the extremity *r*, the starting-tooth carrier H is moved in opposition to the action of the spring J to move the head *l* away from the axis of the mutilated pinion and project said head at the corresponding side of the pinion. The head *l* constitutes the other starting-tooth with which the carrier H is furnished. For the action of the bell-cranks L L' of the respective mutilated pinions D D' fingers K K' are employed. Finger K coöperates with the bell-crank L of one mutilated pinion D. It is fast upon a rod or rock-shaft *m*, which is mounted in bearings *n n*, that are provided upon the loom-frame. The said rod or rock-shaft also has fast thereon an arm *o*, with which is joined one extremity of a spring *p*, forming portion of connections extending to the pattern mechanism by which the operation of the shuttle-box-operating mechanism is controlled. Finger K', coöperating with the bell-crank of the other mutilated pinion D', is mounted loosely upon the rod or rock-shaft *m* and is provided with an arm *o'*, that has joined thereto one extremity of a spiral spring *p'*, forming part of connections extending to the said pattern mechanism. The pattern mechanism may be of any usual or preferred construction and is not necessary to be shown for an understanding of the invention.

The master-gear C is furnished in connection with each toothed segment *e e'* thereof with a starting-flange *k* or *k'*, projecting laterally from the outer face of the said master-gear into position for engagement of the leading end of the said starting-flange with an inwardly-projected starting-tooth of the starting-tooth carriers H H of the mutilated pinions. The starting-flanges *k k'* are of sufficient length to project at opposite ends of the toothed segments *e e'* in order that they may act through engagement with the starting-teeth of the mutilated pinions when the loom is reversed, as well as during the regular running of the loom.

For the purpose of arresting the rotation of a mutilated pinion at the end of a half-rotation of the same to prevent overrunning and holding it locked until further actuation of the same by the master-gear is called for by the pattern a locking-lever M is provided in connection with each mutilated pinion, this lever having a recess *s* to receive the starting-tooth *l* or *l'* of such pinion which is presented at the outer side of the latter and being acted upon by a contracting spiral spring M', which tends to draw it toward the periphery of the mutilated pinion.

In operation when the starting-tooth carrier H of either of the mutilated pinions stands in a position in which the starting-tooth thereof which for the time being is near the master-gear is at the outside of the path of rotation of the starting-segments *k k'*, as is the case at the left-hand side in Fig. 3, the said mutilated pinion will be permitted to remain at rest. In this position of the starting-tooth carrier the starting-tooth which is projected at the side of the said pinion that is remote from the master-gear will occupy the recess *s* of the corresponding locking-lever M, and thereby accidental shift or change of position on the part of the mutilated pinion will be prevented. Movement of the starting-tooth carrier diametrically of the mutilated pinion toward the axis of the master-gear will withdraw the outer starting-tooth from the recess *s* of the locking-lever and project the inner starting-tooth into the path of rotation of the starting-segments of the master-gear, as at the right-hand side in Fig. 3. In Fig. 3 the starting-tooth carrier of the right-hand mutilated pinion has been thus moved, and the starting-tooth *l* thereof is about to be engaged by the leading end of the starting-segment *k*. When the engagement occurs, the said pinion D will thereby be turned around its axis sufficiently far to present teeth of the upper segment *g* of such pinion in position for engagement by the lead-

ing teeth of the toothed segment *e* of the master-gear, whereupon through the engagement of the toothed segments *e* and *g* with each other the pinion D will be rotated until the said segments run out of mesh with each other at the opposite side of the mutilated pinion, and the locking-segment *f* on the master-gear following the toothed segment *e* seats itself against the concaved bottom of the vacant space at the periphery of the pinion D, which then is presented to the master-gear. As the half-revolution of the pinion D is completed the starting-tooth *l* will enter the recess *s* of the adjacent locking-lever M, and thereby the pinion D will be arrested and locked.

In order that the toothed segment *e* may act only in connection with the mutilated pinion D and the toothed segment *e'* in connection with only the mutilated pinion D' and for the purpose of preventing misengagement of the said toothed segments of the master-gear with the respective mutilated pinions D D' in consequence of faulty putting together of the pattern-chain or of accidental disarrangement of the pattern mechanism, I provide safety devices embracing the opposite guard-levers N N'. The said levers are pivoted upon the studs *t t* on the loom-frame, and their upper extremities are connected together by means of a contracting spiral spring O. The said guard-levers coöperate with the starting-tooth carriers H H of the mutilated pinions D D'. For the purpose of actuating the said levers to cause them to engage at the proper times in the working of the loom with the starting-tooth carriers the master-gear is provided with the cam-surface *b*, which is formed in the peripheral wall of the recess P of the master-gear, and the lever N is provided with an antifriction-roller *u* to rest against the said cam-surface, the said lever N being also provided with a projecting stud *w*, upon which an arm *x* of the lever N' rests. The spring O draws the levers N N' toward each other and acts to hold the arm *x* in contact with the stud *w*, so that both the levers N N' move upon their respective pivots in unison. By means of the cam-surface *v* the levers N N' are operated to press back the starting-tooth carriers H H beyond the path of rotation of the starting-segments *k k'*, except as the toothed segments *e* and *e'* of the master-gear draw near the appropriate mutilated pinions. Thereby the improper engagement of a starting-segment of the master-gear with a starting-tooth of the wrong mutilated pinion is prevented.

I claim as my invention—

1. In a shuttle-box motion for looms the combination of the master-gear, the mutilated pinion, the diametrical sliding bolt, the spring actuating the bolt in one direction, the lever directly actuating the bolt in the opposite direction, pattern connections arranged to operate the lever, and the locking-lever for holding the mutilated pinion in its resting position, substantially as described.

2. In a shuttle-box motion for looms, the combination with the master-gear, of the mutilated pinion, a diametrically-movable starting-tooth carrier in connection with the said pinion, a spring in direct connection with the carrier to actuate the said carrier in one direction into engagement with the master-gear, a lever acting directly to actuate the carrier in the opposite direction for such engagement, and pattern connections to operate the said lever, substantially as described.

3. In a shuttle-box motion for looms, the combination of the master-gear, the mutilated pinion, the diametrical sliding bolt, the spring directly actuating the bolt to engagement in one direction, the lever directly actuating the bolt to engagement in the opposite direction, and pattern connections arranged to operate upon the lever, substantially as described.

4. In a shuttle-box motion for looms, the combination of the master-gear provided with starting means for the mutilated pinion, with the mutilated pinion, the diametrical sliding bolt, the spring directly actuating the bolt in one direction to engagement with the starting means, and the lever directly actuating the bolt in the opposite direction, to engagement with the starting means, and pattern connections arranged to operate upon the lever, substantially as described.

5. In a shuttle-box motion for looms, the combination with the master-gear having a plurality of toothed segments, of a corresponding plurality of mutilated pinions, and guard devices to prevent untimely engagement between the respective mutilated pinions and other than the predetermined toothed segments of the master-gear.

6. In a shuttle-box motion for looms, the combination of the master-gear provided with starting means for the mutilated pinion, with the mutilated pinion, the diametrical sliding bolt, the spring for actuating the bolt in one direction to engagement with the starting means, the lever for actuating the bolt in the opposite direction to engagement with the starting means, the pattern connections arranged to operate upon the lever, and the guard-lever actuated by the master-gear, to prevent the engagement of the sliding bolt with the starting means of the master-gear upon the occurrence of a derangement of the pattern connection, substantially as described.

7. In a shuttle-box motion for looms, the combination of the master-gear provided with a plurality of toothed segments, and starting devices in connection with such segments, of a corresponding number of mutilated pinions, a starting-tooth carrier in connection with each of such pinions, operating

devices for the said starting-tooth carriers, the guard-levers to prevent untimely engagement of the starting-teeth by the starting devices of the master-gear, and means to actuate the said guard-lever.

8. In a shuttle-box motion for looms, the combination of the master-gear, the mutilated pinion, the diametrical sliding bolt, the spring directly actuating the bolt in one direction, the lever directly actuating the bolt in the opposite direction, pattern connections arranged to operate upon the lever, and the locking-lever for holding the mutilated pinion in its resting position, substantially as described.

9. In a shuttle-box motion for looms, the combination of the mutilated pinion provided with the sliding bolt arranged diametrically across its face, with the master-gear provided with a pinion-starting means, projecting from its side, and adapted for engagement with the projecting head of the sliding bolt, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

ALONZO R. PATTEN.

Witnesses:
CHAS. F. RANDALL,
WILLIAM A. COPELAND.