(No Model.)

G. W. STAFFORD.

SHUTTLE BOX OPERATING MECHANISM FOR LOOMS.

No. 521,576. Patented June 19, 1894.

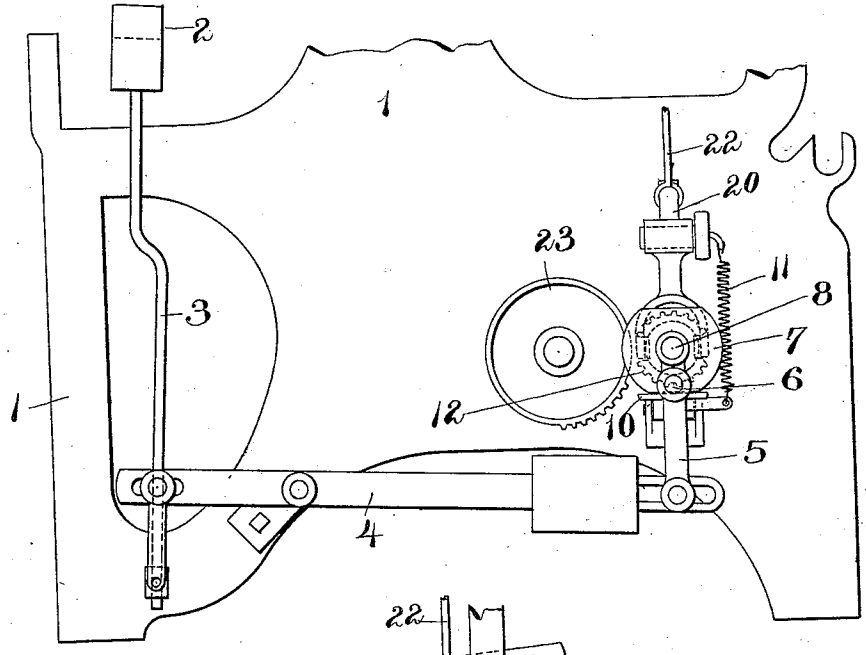

FIG. 1.

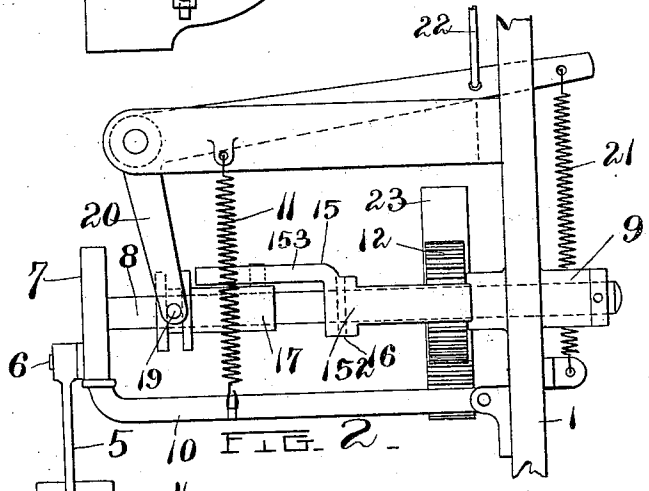

FIG. 2.

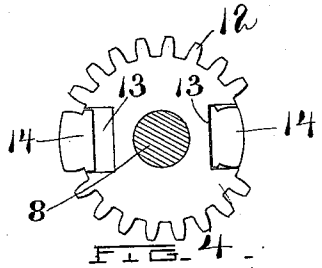

FIG. 4.

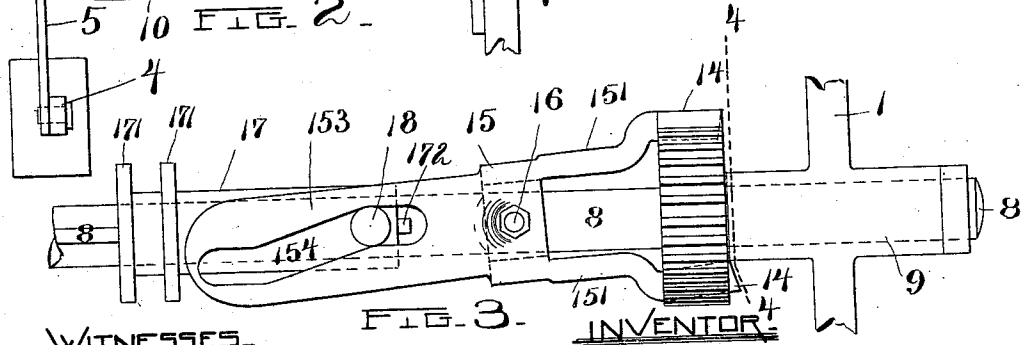

FIG. 3.

WITNESSES.

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SHUTTLE-BOX-OPERATING MECHANISM FOR LOOMS.

SPECIFICATION forming part of Letters Patent No. 521,576, dated June 19, 1894.

Application filed October 13, 1893. Serial No. 488,037. (No model.)

To all whom it may concern:

Be it known that I, GEORGE W. STAFFORD, a citizen of the United States, residing at Providence, in the county of Providence and State of Rhode Island, have invented certain new and useful Improvements in Shuttle-Box-Operating Mechanism for Looms, of which the following is a specification, reference being had therein to the accompanying drawings.

My invention is designed principally as an improvement in mechanism for operating the shifting or change-shuttle-boxes of looms, although certain of the essential features thereof are capable of being employed in other connections. It is applicable mainly to box-motions of the class in which the shuttle-boxes are in operative connection with one or more cranks or eccentrics, each of the latter having imparted to it at predetermined times a movement of semi-rotation for the purpose of moving the shuttle-boxes in one direction or the other and changing the cell thereof which is presented in line with the shuttle-raceway on the lathe. Certain types of box-motions pertaining to the class just mentioned have the crank or eccentric aforesaid arranged in operative connection with a toothed gear or pinion, which last, at certain times, that is when it is desired to impart movement of partial rotation to the crank or eccentric, is caused to become engaged by a moving toothed surface, the latter being constituted sometimes by what is known as a master-gear, and thereby the said toothed gear or pinion is rotated, usually through a semi-rotation, to the extent necessary to shift the connected crank or eccentric sufficiently to produce the required change in the position of the shuttle-boxes.

The invention is serviceable when embodied in box-motions of these types.

It consists in an improved construction and combination of parts, which first will be described with reference to the accompanying drawings, and then will be particularly pointed out and distinctly defined in the claims at the close of this specification.

In the drawings, Figure 1 is a view in side elevation of one of the side-frames of a loom having applied thereto a simple form of box-motion embodying my invention. Fig. 2 is a view showing the said box-motion as it appears when viewed from the right-hand side in Fig. 1, that is to say, from the rear of the loom. Fig. 3 is a view in plan of certain parts involved in my invention. Fig. 4 is a view of the same in vertical section on line 4—4 in Fig. 3, looking toward the left-hand side of the latter figure.

At 1 in the drawings is the loom-frame, at 2 the shuttle-boxes, at 3 the shuttle-box-rod, at 4 a box-operating lever having the forward arm thereof connected with the box-rod 3, at 5 a connecting-rod having one end thereof joined to the rear arm of the lever 4, at 6 a crank-pin to which the other end of such connecting rod is joined, at 7 a disk on which the said crank-pin is mounted, at 8 a short shaft on which the disk 7 is secured, and at 9 a bearing for the said shaft provided on the framing. The edge of the disk 7 is flattened at opposite sides of the center, and against the said edge bears the squaring lever 10, acted upon by the spring 11, whereby the disk and shaft are held stationary in definite positions after each semi-rotation thereof until again acted upon positively and given a further movement of semi-rotation.

The foregoing parts are representative of the devices with which may be associated the improved devices in which my invention more immediately resides. I will now proceed to disclose the character of the latter. On the shaft 8 is fixed the gear or pinion 12, which is mutilated by the omission of teeth at diametrically opposite portions thereof, as is most clearly indicated in Fig. 4. At the places where such omission of teeth occurs the periphery of the gear 12 is recessed as shown at 13, 13, Fig. 4, for the play of teeth 14, 14, which are made separate from the rest of the gear, and are movable on radial lines into and out of the recesses 13, 13, so as to enable them to be projected or retracted as required. The teeth 14, 14, move in unison, and when either of them is caused to project on its side of gear 12 the other thereof is made to recede into its recess on the opposite side of the said gear. For simplicity of construction, the teeth 14, 14, are located at the opposite sides of a tooth-carrier 15 which

is made movable diametrically with relation to the shaft 8 and gear 12. The said teeth 14, 14 are spaced apart a distance less than the diameter of the gear 12. In the illustrated embodiment of the invention, the teeth 14 are at the ends of opposite arms 151, 151, on the tooth-carrier, and the latter is shown pivoted to the shaft 8, it having a hub-portion 152 formed with an opening therethrough to permit it to be slipped upon shaft 8, and a pivotal pin or bolt 16 being passed through the said hub-portion and the said shaft. For the purpose of moving the tooth-carrier diametrically of the shaft and gear as aforesaid, the tooth-carrier is provided with a tail 153 having therein a cam-slot 154 formed with an inclined middle portion and straight ends, and on the shaft is mounted a sleeve 17 provided with a pin 18 that plays in the said slot. The said sleeve is movable endwise along the shaft, it being splined thereto by a spline 172, and when thus moved its pin 18, acting in the slot 154, causes the tooth-carrier to shift its position, the direction of the movement of the tooth-carrier depending upon the direction in which the sleeve 17 moved lengthwise of the shaft. To enable the sleeve to be moved, it is provided with collars 171, 171, between which play pins 19 in the forked end of a bell-crank 20, the said bell-crank having connected therewith a spring 21, which acts with a tendency to move it in one direction, and a wire or rod 22 which, in practice, is connected with one of the fingers or levers that are acted upon by the usual pattern-chain of the box-motion of a loom, the said wire, &c., acting to move the said sleeve in the other direction. The toothed surface with which the gear 12 engages at intervals is represented by the segmental gear 23, which latter is rotated at required speed. Normally, as will be understood, the gear 12 stands in a position of rest with one of its toothless spaces presented next the gear 23, the tooth-carrier being held in a position which withdraws the corresponding tooth 14 into the depths of the recess at such space. When it is desired to communicate a movement of partial rotation to the gear 12 and connected parts, and change the position of the shuttle-boxes, the sleeve 17 is caused to move endwise of the shaft 8 in a manner to move the tooth-carrier so as to project the tooth 14 which is on the side next the gear 23. Thereupon in the movement of the gear 23, when the teeth thereon come around, the first one strikes against the projected tooth 14 and turns the gear 12 until the teeth of one of the segments on the latter come into mesh with those of gear 20, this causing the gear 12 to be rotated until the teeth of gear 23 run out of mesh with those of gear 12 at the opposite blank or toothless space. In consequence of the tooth 14 at the latter space having been retracted by the action which projected the opposite tooth 14, the gear 12 will remain unengaged by gear 23 until the tooth-carrier is again moved.

What I claim is—

1. The combination with a moving toothed surface, constituting a driver, a driven gear having toothless spaces on opposite portions thereof, operating connections intermediate such gear and the shuttle-boxes, and the said shuttle boxes, of movable teeth at the said toothless spaces of the gear spaced less than the full diameter of said gear apart, and means for shifting said teeth simultaneously to project one of the same at one side of the gear into position for being engaged with the said toothed surface and withdraw the other at the other side out of position for engagement, and for locking the said teeth in the new position relatively to the gear until a subsequent rotation of the gear is required.

2. The combination with a driver constituted by a moving toothed surface, a driven gear having toothless spaces on opposite portions thereof, operating connections intermediate such gear and the shuttle-boxes, and the said shuttle-boxes, of a tooth-carrier movable diametrically of said gear and provided with teeth at the said toothless spaces, and means for moving the said tooth-carrier and thereby radially shifting the said teeth, to project one of the same at one side of the gear into position for being engaged with the said toothed surface and withdraw the other at the other side out of position for engagement and also hold the said toothed carrier locked in the said position relatively to the gear until a subsequent rotation of the gear is required, substantially as described.

3. The combination with a driver constituted by a moving toothed surface, a driven gear having blank or toothless spaces on opposite portions thereof, a shaft on which said gear is mounted, operating connections intermediate said shaft and the shuttle boxes, and the said shuttle-boxes, of the tooth-carrier pivoted to the said shaft and provided with teeth at the said toothless spaces of the gear, the sleeve engaging with said tooth-carrier to move the same and change the position of its teeth, and means to move the sleeve, substantially as described.

4. The combination with the gear having blank or toothless spaces at opposite points among the teeth thereof, of the tooth-carrier provided with teeth at the said toothless spaces, and means for moving said tooth-carrier diametrically of the gear, to project one of the teeth at one side of the gear to fill the toothless space at that side and withdraw the other tooth at the opposite side of the gear out of the toothless space at that side of the gear, and also hold the said tooth carrier

locked in its new position relatively to the gear until a subsequent shift is required, substantially as described.

5. The combination with the gear having blank or toothless spaces at opposite points among the teeth thereof, and its shaft, of the tooth-carrier pivoted to said shaft and provided with teeth at the said toothless spaces, and the sleeve on said shaft engaging with the tooth-carrier to swing the same, substantially as described.

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

GEORGE W. STAFFORD.

Witnesses:
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CHAS. F. RANDALL.