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Loom.

No. 211,208.

Patented Jan. 7, 1879.

Fig. 1.

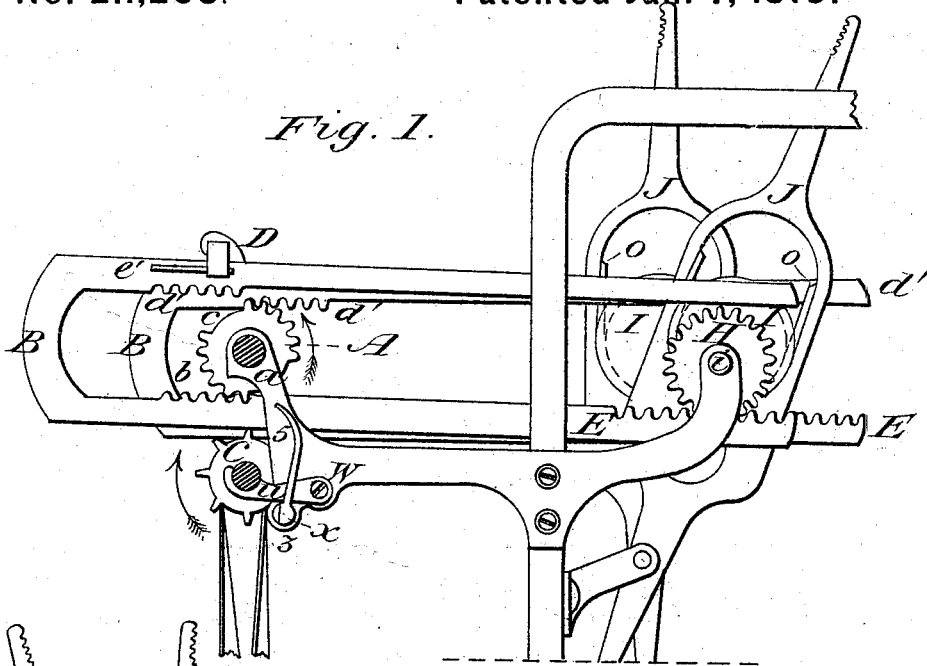
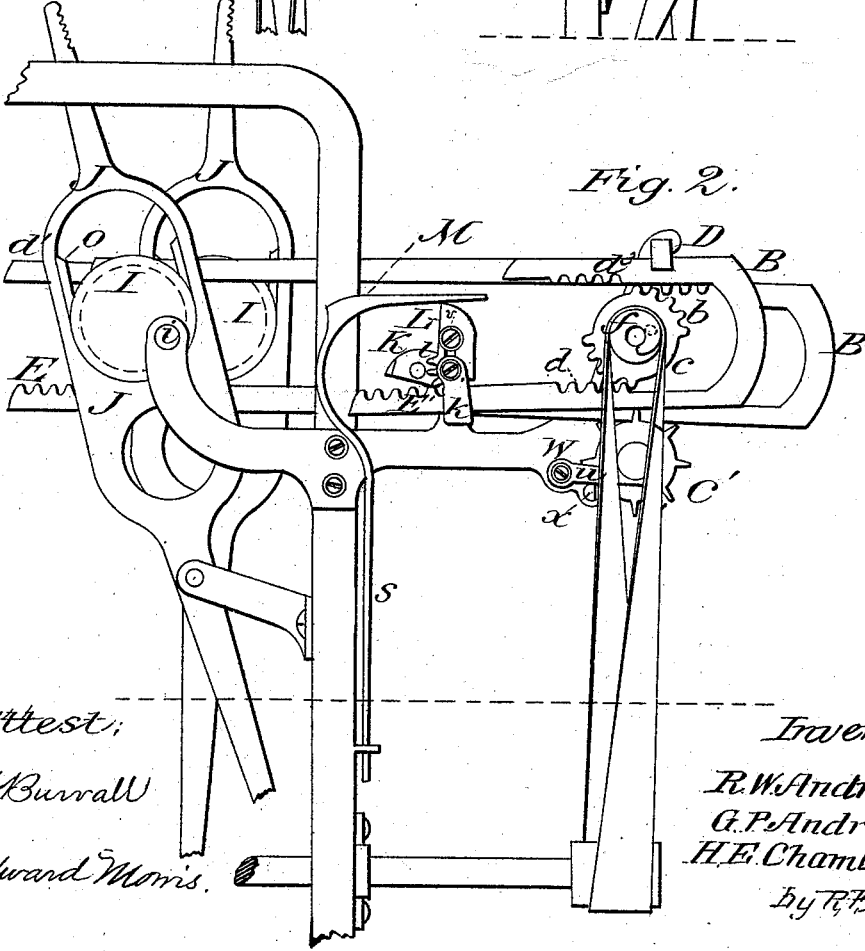


Fig. 2.



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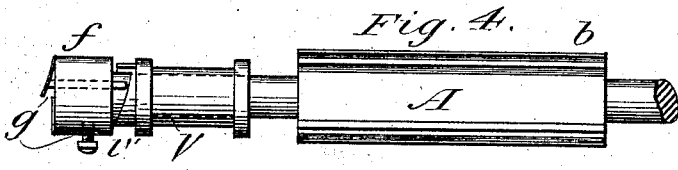
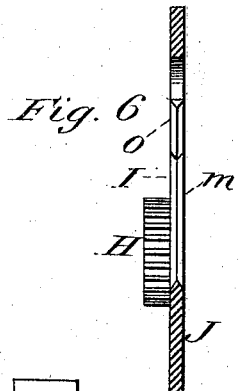
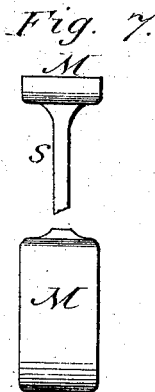
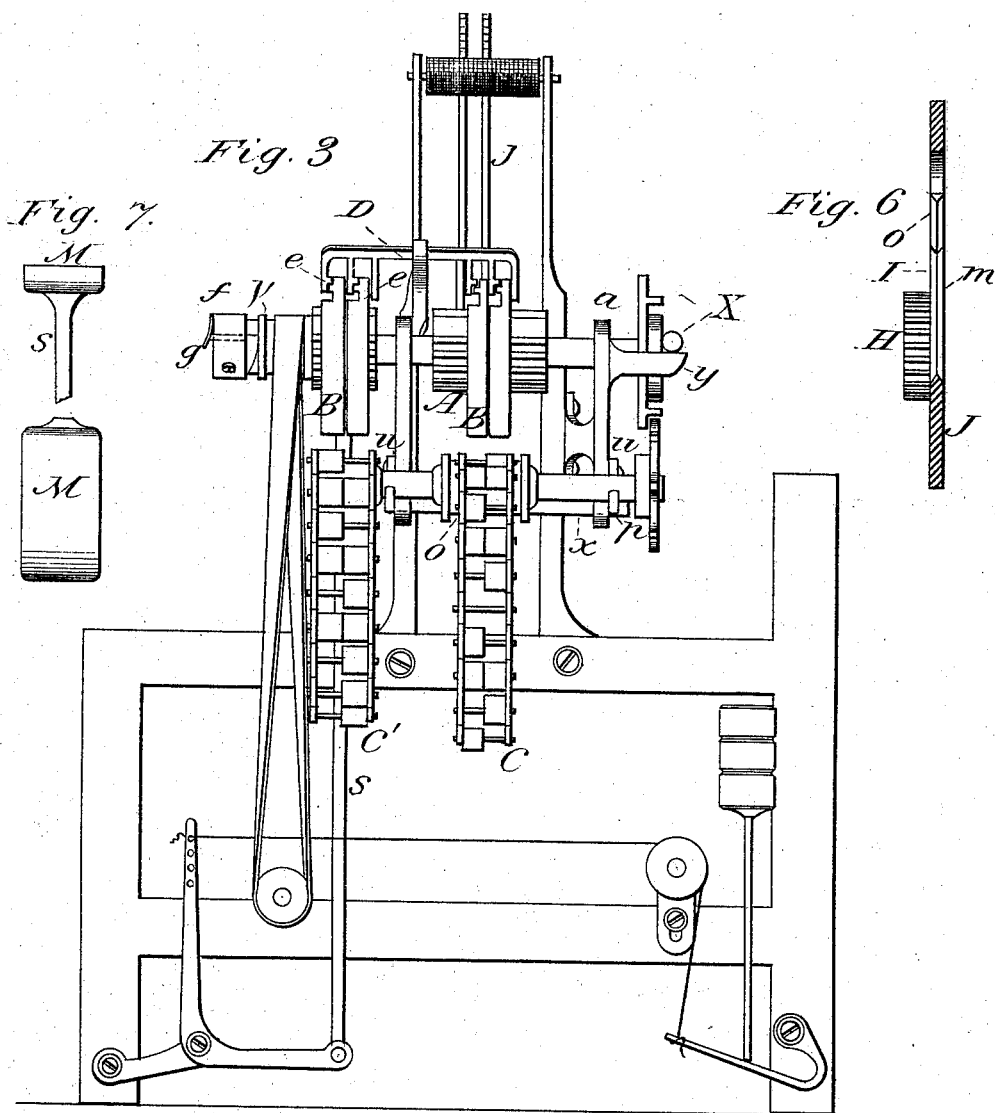
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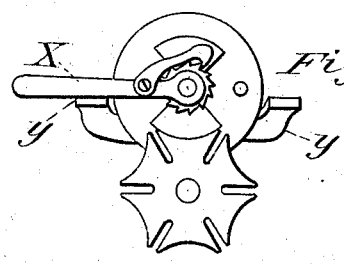
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# UNITED STATES PATENT OFFICE.

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## IMPROVEMENT IN LOOMS.

Specification forming part of Letters Patent No. **211,208**, dated January 7, 1879; application filed  
April 20, 1878.

*To all whom it may concern:*

Be it known that we, ROBERT W. ANDREWS and GEORGE P. ANDREWS, of Staffordville, Connecticut, and HENRY E. CHAMBERLIN, of Westerly, Rhode Island, have invented an Improvement in Looms, of which the following is a specification:

The first part of our invention relates to the construction of a new mechanical motion equally well adapted for operating the harness and drop-box of a loom.

The second part relates to the operation of the drop-box.

The third part relates to the arrangement of the pattern-chain, and the fourth to details connected with the arrangement of the jacks to insure a smooth and positive action.

The nature and objects of our invention are fully illustrated in the accompanying drawings and following description.

In the drawings, Figure I is a side elevation, in partial section, of our harness-motion as applied to a loom. Fig. II is an elevation in reverse of Fig. I, showing the drop-box motion. Fig. III is an end view of our mechanism; and Figs. IV, V, VI, VII, VIII are detail views.

The driver A, receiving its motion from the main shaft of the loom and revolving in bearings *a a* from the frame of the loom, is formed, as shown in Fig. IV in cross-section, and in Fig. V longitudinally, as a roller having segments of flutes or teeth *b* raised from its surface *c*, and alternating with the spaces left blank.

The driver A is inclosed by the jacks, constructed each, as shown in Fig. I, in the form of a frame having parallel and reverse counterpart racks *d d'*, to correspond with the segmental gearing *b* on the driver A, and the racks *d d'* are at such distance apart that when the teeth of the driver engage with one they clear the other.

The jacks B are made in the form of oblong frames, having both or only one end closed. Their under sides are made smooth to rest upon the pattern-drum, while the rear ends of the frames rest upon the pinions gearing with the jacks as upon pivots when raised or lowered by the pattern.

The jacks rest upon the pattern-chain C,

which determines the reciprocation necessary to each harness to raise or lower its warp, as well as limits the time which each warp shall remain up or down, as is common.

The toothed segments *b* upon driver A are counterparts upon opposite sides of the cylinder, and consequently also leave the blank surfaces *c* counterparts; and the segments *b* and racks *d d'* bear such relation that the driver A can, in one revolution, give a reciprocation to a jack by engaging alternately with its upper and lower rack, and that with an even motion and without jar, as the blank spaces *c* give time and room for the changes to be made in the harness.

The chain-drum and the driver A are so geared that the jack commences its upward movement when raised, or downward one when released, by a spur or button on the chain C at the moment when the teeth *b* are clear of a rack, and at a time when a continuation of the teeth, as in a spur-wheel, would not admit of the easy release of the racks, nor of their being caught again easily and smoothly, but at a time in the case of this driver when nothing opposes any vertical movement of the jack, so that when any change is completed by the chain a rack is brought directly opposite to and in the most favorable position to be operated by the driver.

In Fig. III a guide-comb, D, is shown as fixed to the frame of the loom, so that the jacks reciprocate between its dependent teeth.

The teeth are provided with the cleats *e*, and cleats *e'* are arranged on the sides of the jack, so that as a jack is raised or lowered by the chain C the cleat *e'* is thrown to bear against the upper or lower surface of cleat *e*, and the jack, being guided between two adjacent teeth, is held by the cleat *e*, to have its racks always bear uniformly against the teeth *b* of the driver, which insures uniformity of action, and renders it certain that the driver when geared to one rack shall clear the other. The comb D and cleat *e'* upon the jack are also shown in Fig. I.

Fig. I shows the sides of the jack having the racks *d d'* prolonged—the one *d* to form the part E, while the one *d'* rests upon the spur H, and holds it always in place on the rack.

The spur-wheels H are hung loosely upon

the shaft *i*, and are provided each with the eccentric *I*, working in an oval loop in its heddle-lever *J*, so that the oscillation of the eccentric, by means of the jack and spur, will, through the vibration of the heddle-levers, supply the proper shedding motion.

We are aware that the combination, broadly, of spur, eccentric, and looped heddle-lever, as above described, is not new; but in practice we have found that the heddle-lever cannot be kept in its proper place relative to the bearing-surface of the eccentric, owing to the thinness of the heddle-lever, and its liability consequently to leave the eccentric, that cannot well be made of greater thickness than the heddle-lever itself, so that, in a position where it is impossible to obtain wide bearing-surfaces to eccentric and heddle-levers, we have found that by forming a deep groove, *m*, in the periphery of the eccentric *I*, to receive a corresponding tongue, *o*, in the oval loop of the heddle-lever, the eccentric *I* is not only kept in its proper position, but that the heddle-lever is also braced laterally, so that it cannot be sprung out of position by the weight of its shed. To these specific features, however, we make no claim.

If desired, the positions of groove *m* and tongue *o* may be reversed, so that the groove would be in the heddle-levers.

The drop-box mechanism shown in Fig. II is, in respect to the driver *A*, frame or jack *B*, having racks *d*<sup>2</sup> *d*<sup>3</sup> *E'*, and chain or pattern drum *C'*, substantially the same as the harness-motion hereinbefore described; but the motion conveyed to the rack *E'* through the driver *A* is converted to the mechanism for immediately shifting the shuttle-boxes through cams *K L*, hung in bearings from the frame of the loom at *k*, and provided on their ends concentric to their axes with spur-gearing *l*, which engages with the racks *E'*, so as to form rockers for the cams.

It will be seen that the shoe or plate *M*, resting upon these cams *K L* and free to move, will be lifted upon the rocking of either cam to a vertical position, and the cams, being of different lengths, will be raised a distance proportioned to the length of the cam raising it.

The plate *M* is connected, by a rod, *s*, to the rock-shaft, or other means employed to transfer the motion to the bottom of the stem commonly employed to raise or lower the boxes.

In the drawing two cams are shown as operating to govern the shuttles, and which would do for three shuttle-boxes, though, of course, the number, as in the case of the harness shown in the drawing, can be increased, as desired, to fulfill all of the requirements of a "fancy-loom."

The length of each cam is made adjustable by means of the plate forming the cam proper being slotted, and secured to the section having the rocker by the set-screw *v*, as shown in the drawing.

The chain-drum *O* hangs in bearings at *p* in one end of levers *u*. The levers *u* are hinged to the frame of the loom at *w* at their other ends, and bear intermediately upon the rod *x*, hung transversely in the loom-frame, as shown in Fig. III.

The rod *x*, at its bearings 3 3, is cut away on one side, so that when, by means of the handle 5, the rod *x* is revolved on its reduced bearings 3 3 to lower the levers *u*, following thereon, the drum *O* is lowered out of gear with the driver *A*, and from contact with the harness; and when in this position, without stopping the loom or throwing anything out of gear, the pattern upon the drum *O* may be reversed to the point at which a pick was dropped before being lifted up again by the handle 5 to be thrown in gear with the driver *A*, which is a great saving in time and labor over the method in common use, in which it is necessary to stop the loom and entirely remove the heavy pattern-chain from its journals before replacing it in the desired position.

Furthermore, by means of the pulley *V* upon the driver being made to clutch in only one direction with the driver-shaft through the ratchet *v'* on the side of pulley *V*, and spring-pawl *g* in the collar *f*, made fast to the driver-shaft, as shown in enlarged detail, Fig. IV, we are able to reverse the pattern at random beyond the point at which a pick is to be taken up, and when the loom is stopped, by means of the lever-handle *X* upon shaft *A*, we can manually move the harness until the proper warp is tightened before starting the loom again.

The lever-handle *X* serves also the purpose of showing, by its revolution, how many picks have been made; and we, in practice, connect the handle by a ratchet to the end of the shaft of the driver, and arrange stops *y y* from the frame upon a horizontal line, to limit its movement to a semicircle, so that in operating the harness by hand the number of times the handle is thrown from stop to stop gives accurate information to the operator.

Now, having described our invention, what we claim is—

1. The driving-roll *A*, having two equal segmental gears and two equal smooth surfaces thereupon, and mechanism, as described, for actuating said roll continuously in one direction, in combination with jacks *B*, having internal racks *d d*, and the pattern-chain and mechanism, as described, for operating the same, substantially as and for the purpose set forth.

2. The combination of the jacks *B*, provided with the lugs or cleats *e*, and mechanism, as described, for reciprocating the same, with the pattern-chain and its operative mechanism, and the guide-comb *D*, provided with the lugs or cleats *e'*, substantially as and for the purpose specified.

3. The combination, with the driving-roll *A*, constructed as shown and described, and

mechanism for operating the same, of one or more jacks, B, having racks  $d^2$   $d^3$ , one or more rocking-cams, K L, hinged to the frame, and provided with segmental gearing  $l$ , rod  $s$ , provided with the shoe M, and pattern mechanism, as described, to raise or lower two or more shuttle-boxes a proportionate distance, as specified.

4. The combination of pattern-drum O, levers  $u$ , rod  $x$ , reduced at its bearings, as described, and handle 5, for revolving the rod  $x$ , to raise or lower the bearings of drum O, and thereby bring it into or out of operative connection with the harness-driving mechanism, substantially as shown and described.

5. The combination of driving-shaft A, pulley V, and collar  $f$ , forming a spring-pawl and ratchet upon one end of shaft A, ratchet-lever X, and stops  $y$   $y$ , substantially as and for the purpose set forth.

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