(No Model.) 4 Sheets—Sheet 1.

J. R. MacCOLL.

LAPPET LOOM.

No. 570,259. Patented Oct. 27, 1896.

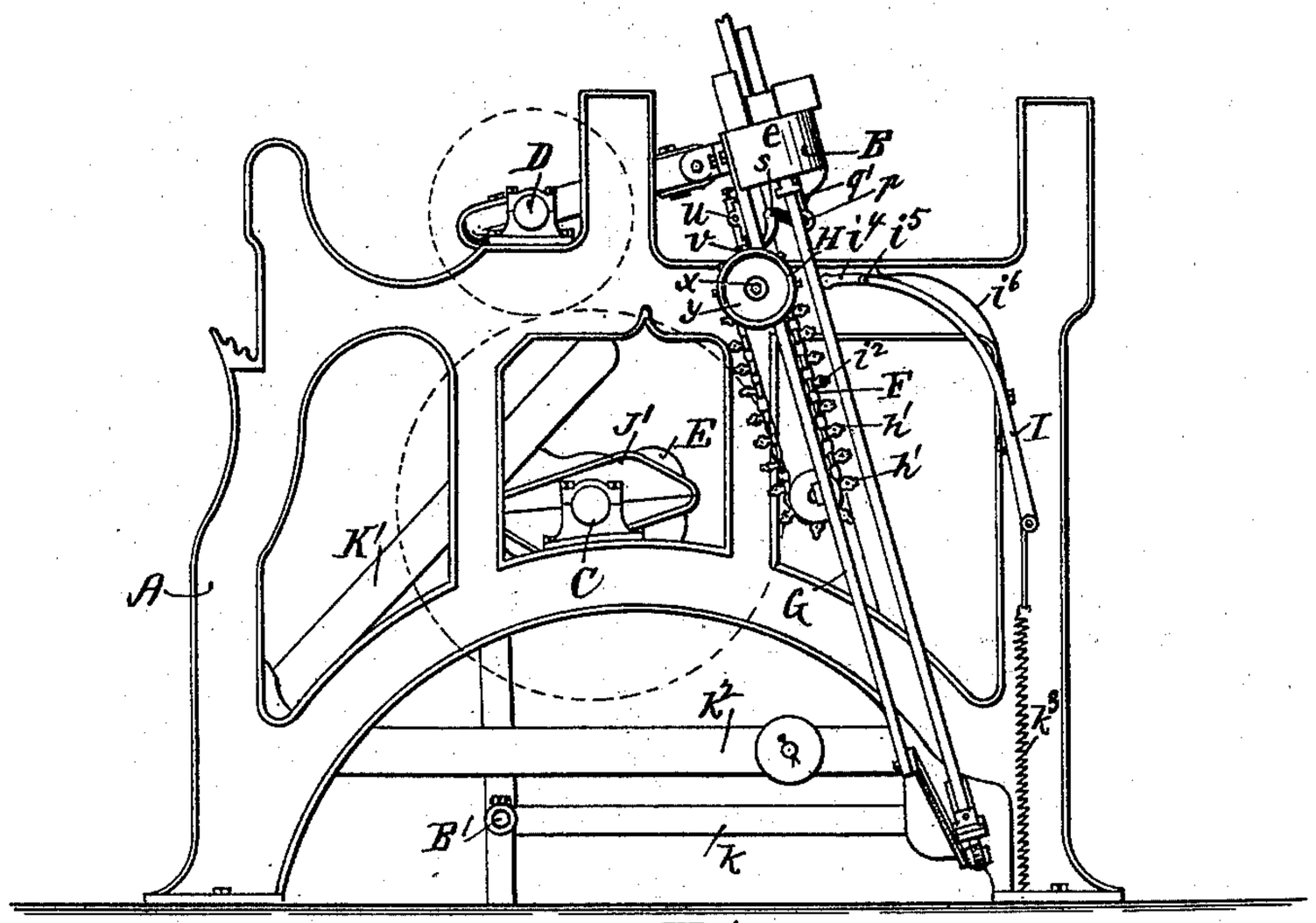

FIG. 1.

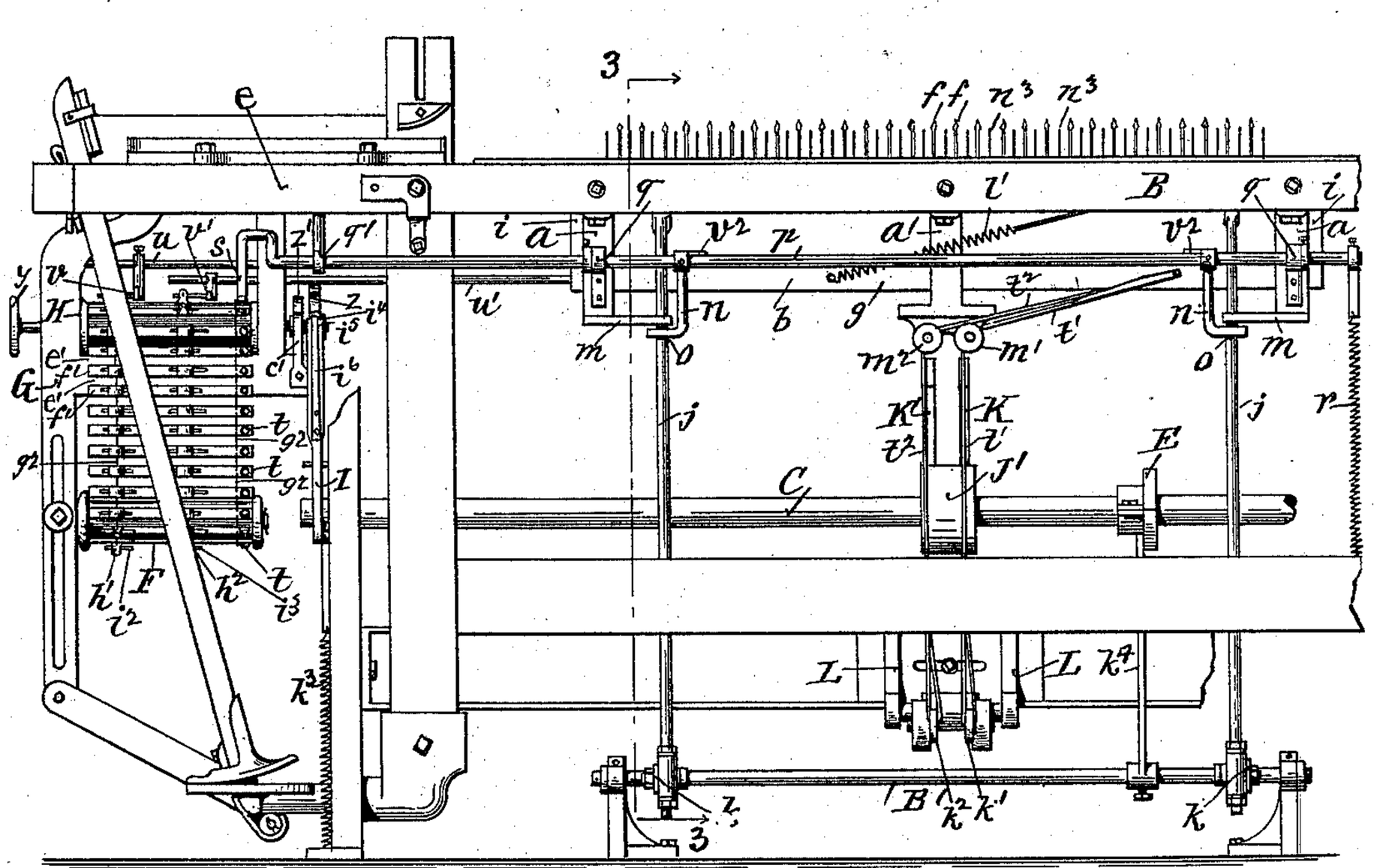

FIG. 2.

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LAPPET LOOM.

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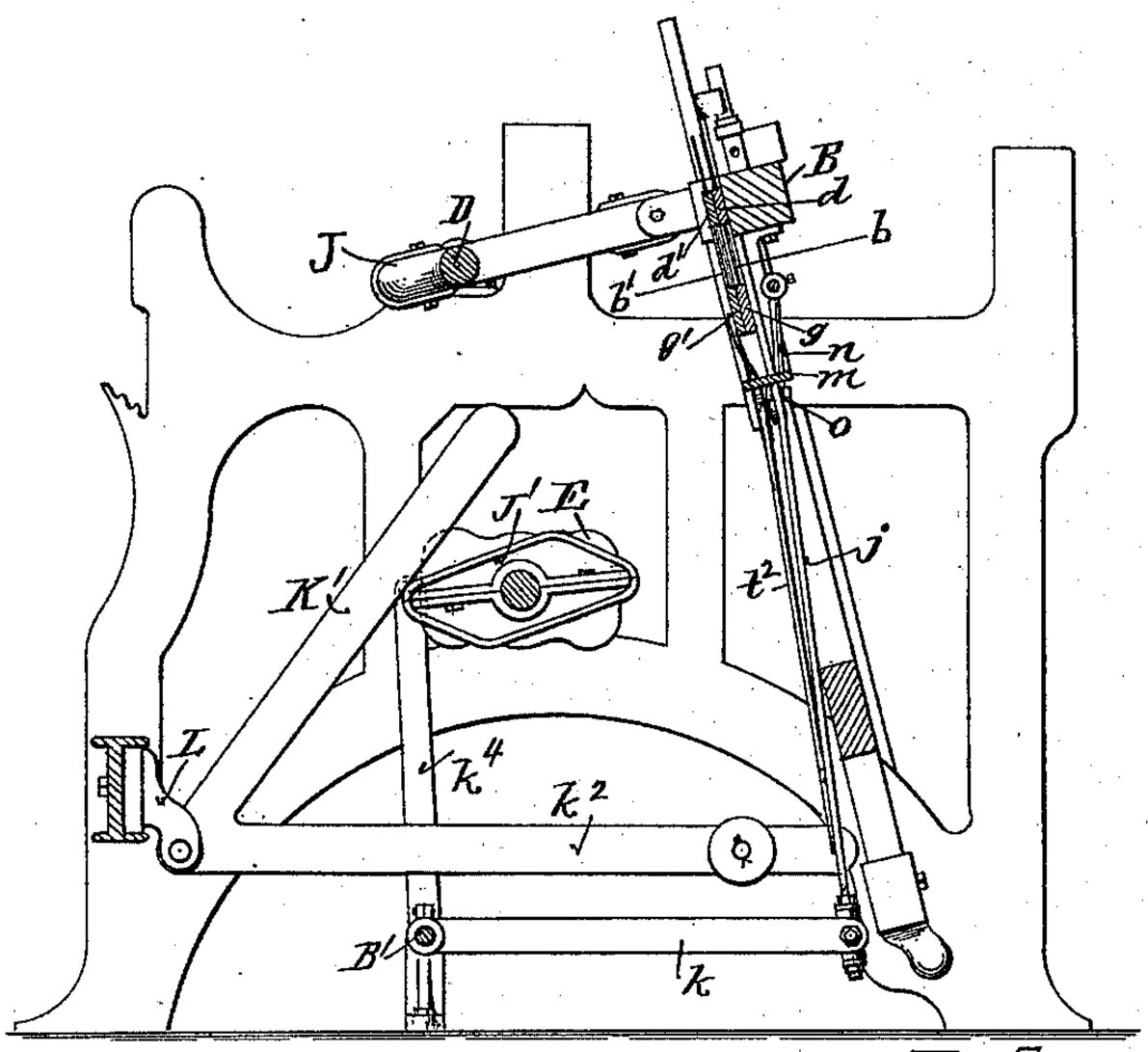

FIG. 3.

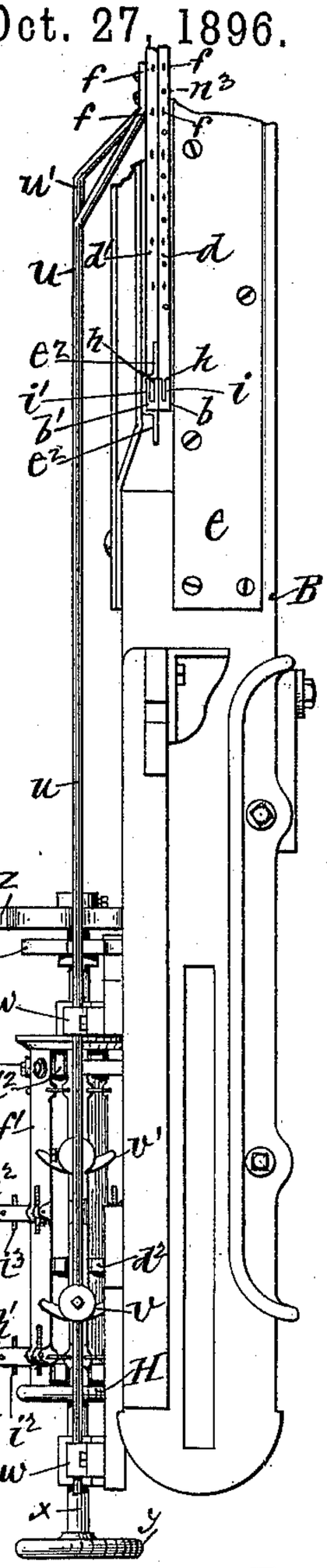

FIG. 6.

FIG. 4.

FIG. 5.

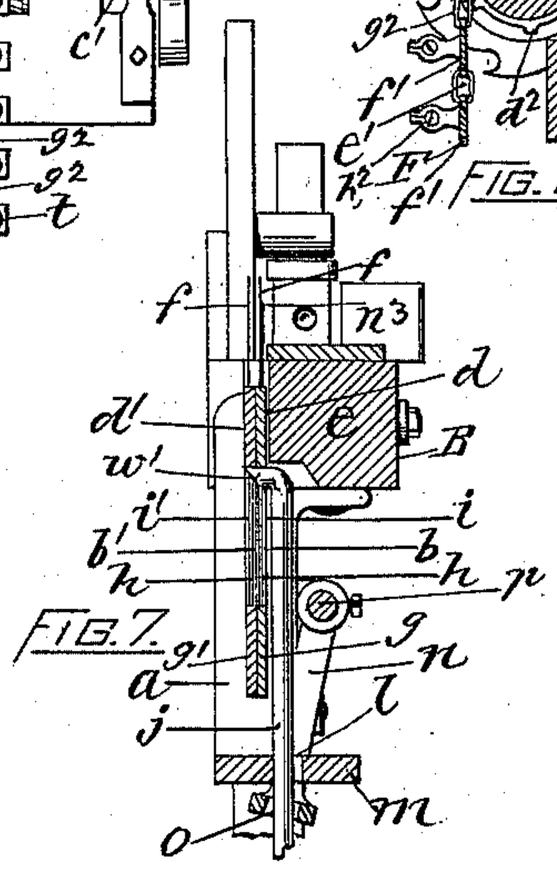

FIG. 7.

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(No Model.) 4 Sheets—Sheet 3.

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LAPPET LOOM.

No. 570,259. Patented Oct. 27, 1896.

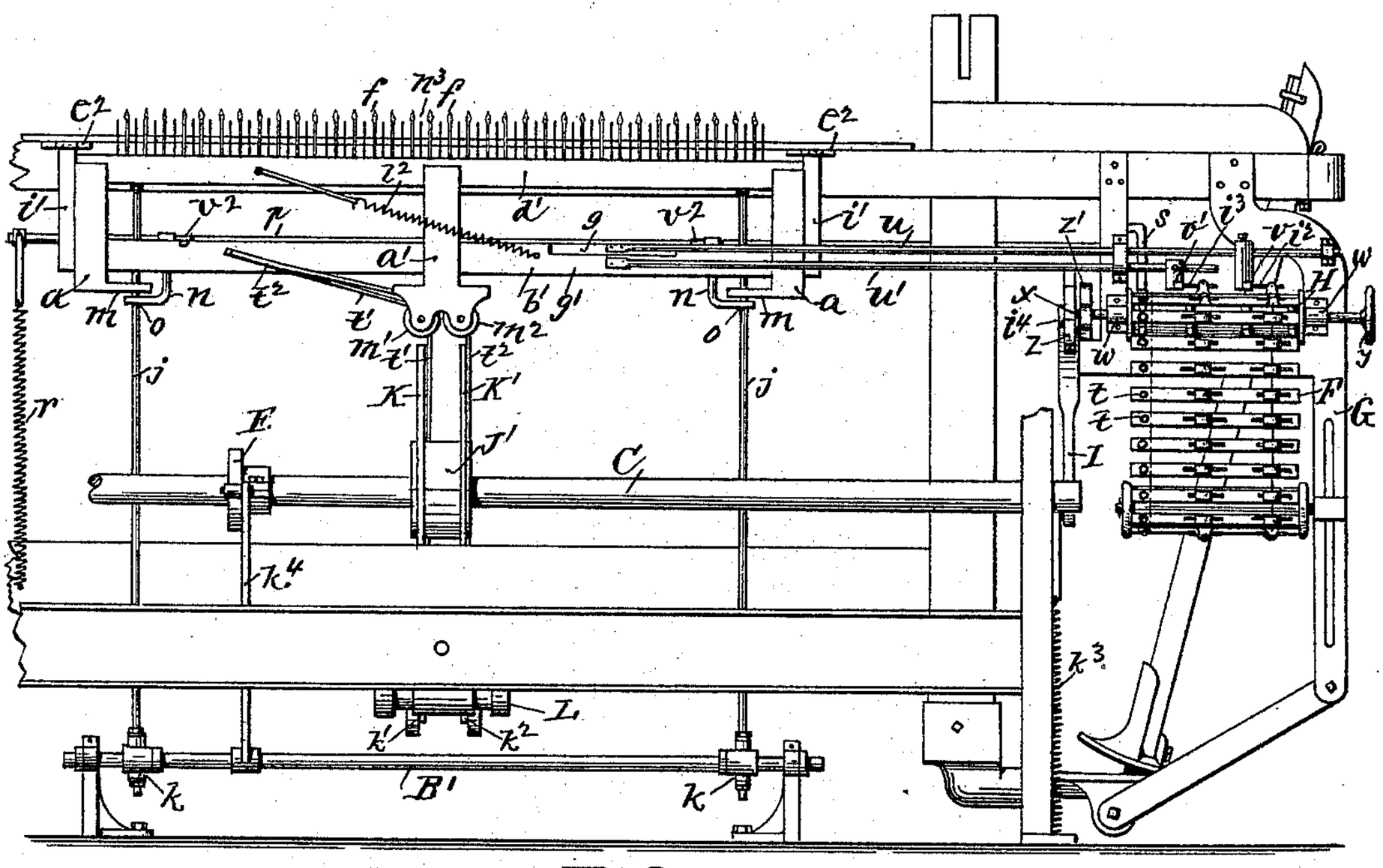
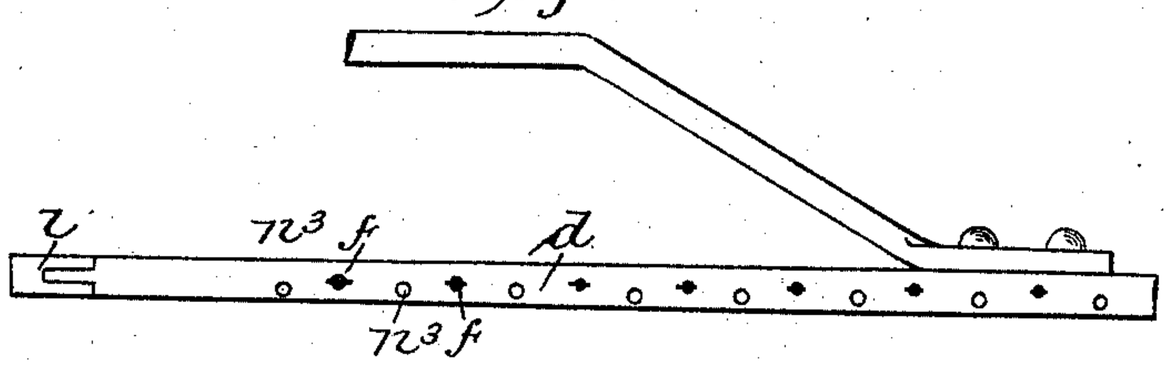


FIG. 8.

Fig. 13.



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(No Model.) 4 Sheets—Sheet 4.

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LAPPET LOOM.

No. 570,259. Patented Oct. 27, 1896.

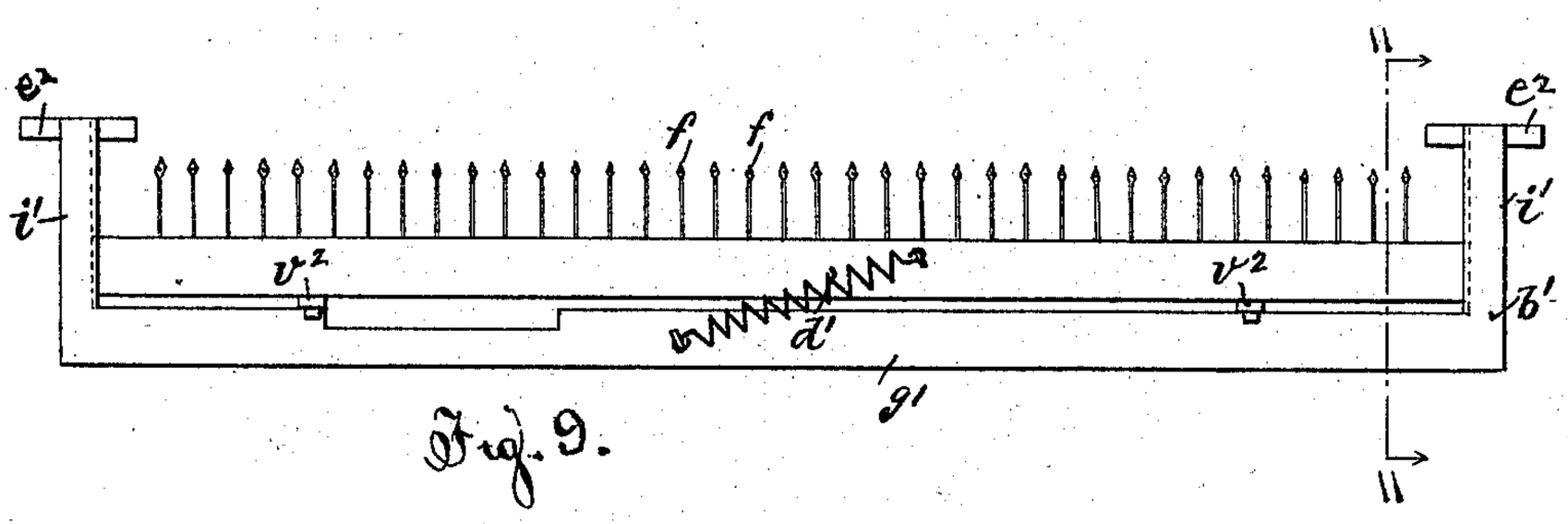

Fig. 9.

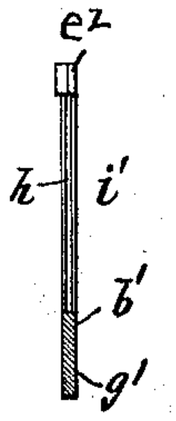

Fig. 10.

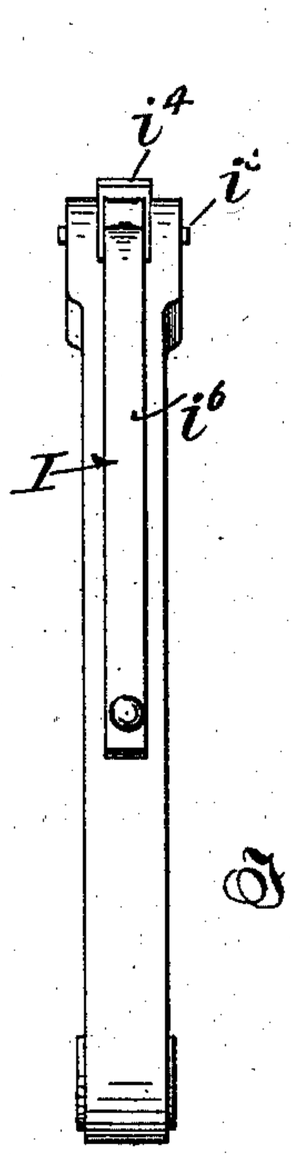

Fig. 12.

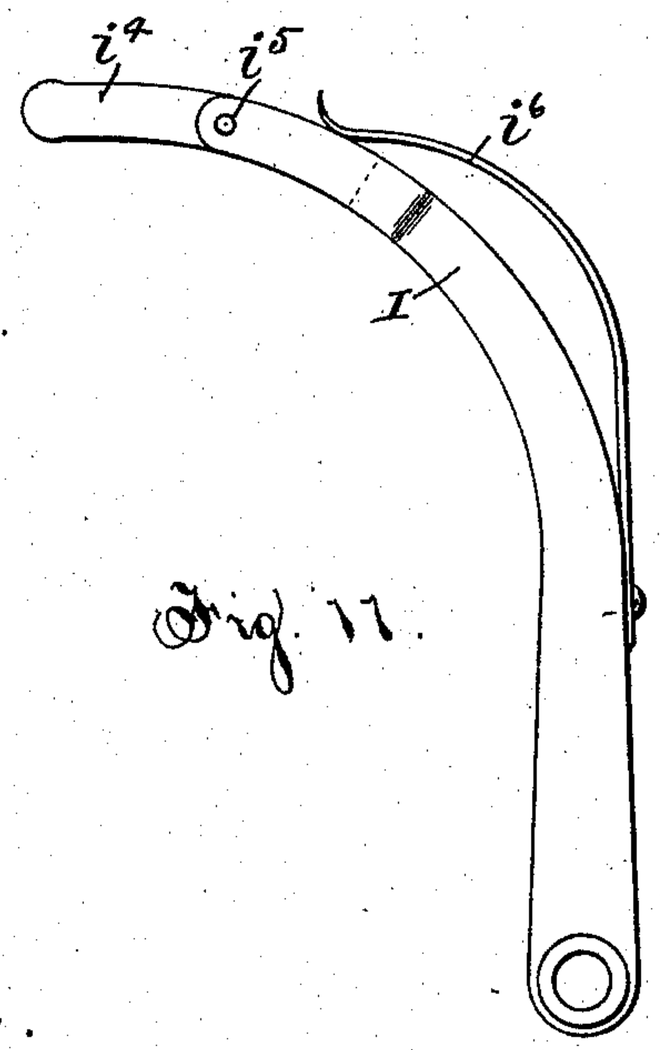

Fig. 11.

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James W. Bauman

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UNITED STATES PATENT OFFICE.

JAMES R. MACCOLL, OF PAWTUCKET, RHODE ISLAND.

LAPPET-LOOM.

SPECIFICATION forming part of Letters Patent No. 570,259, dated October 27, 1896.

Application filed October 9, 1894. Serial No. 525,425. (No model.)

To all whom it may concern:

Be it known that I, JAMES R. MACCOLL, a citizen of the United States, residing at Pawtucket, in the county of Providence and State of Rhode Island, have invented a new and useful Improvement in Lappet-Looms, of which the following is a specification.

In weaving lappet-patterns on various qualities of goods it is necessary to have the needles capable of such accurate adjustment by the pattern screws or pins that they may be raised with positive certainty through a space equal to the slight distance between the centers of the dents of the reed or an exact multiple thereof; otherwise an imperfect pattern will be produced. Heretofore it has not been deemed practicable to apply the pattern screws or pins which serve to govern the position and form of the lappet-pattern to a loosely-driven pattern-chain, owing to the apparent looseness and unreliability of the many-jointed construction for such delicate and accurate adjustment as is in the nature of the case required; but the pattern screws or pins have only been applied to the peripheries or sides of rigid disks or wheels, which are adapted by means of closely-fitting shafts and bearings for revolution in a true circle or in a fixed plane without liability of looseness or change therein. In this rigid form of construction a change and substitution of larger or smaller wheels for every change in the number of picks in the lappet-pattern is required, with resulting expense and trouble in keeping account of the necessarily great number of separate wheels, the rigid wheels thus required for forming lappet-patterns of ordinary dimensions being quite large and cumbersome. I have, however, proved that the most perfect and delicate lappet-patterns may be formed in practice by means of an adjustable pattern-chain, with the resulting great advantage that an increase or decrease in the size of the lappet-pattern may be readily produced by the simple insertion or removal of the bar-links of which the chain is composed, thus dispensing with the great number of rigid wheels or disks heretofore required to form an assortment of lappet-patterns, changes therein being almost constantly required to suit the demands of the trade for new styles of lappet ornamentation.

My improvement in lappet-looms is adapted for application to ordinary cotton and woolen looms already in use, whereby the principle of lappet-weaving may be successfully employed in such looms; and it consists in the employment of a pattern-chain provided with adjustable pattern screws or pins to govern the form and position of the lappet-pattern, and in the improved construction and arrangement of the lappet mechanism, as hereinafter set forth.

In the accompanying drawings, Figure 1 represents a partial end view of a cotton-loom provided with my improvement. Fig. 2 represents a partial front elevation of the same. Fig. 3 represents a transverse section taken in the line 3 3 of Fig. 2. Fig. 4 represents an enlarged detail front view of the chain mechanism for operating the needle-frames. Fig. 5 represents a section taken in the line 5 5 of Fig. 4. Fig. 6 represents an enlarged detail top view of the lay, the needle-frames, and the chain mechanism for operating the needle-frames. Fig. 7 represents an enlarged detail section taken in the line 3 3 of Fig. 2, showing the device for lifting the needle-frames. Fig. 8 represents a partial rear view of the lay, showing the mechanism for operating the needle-frames. Fig. 9 represents a front view of the rear needle-bar frame removed from the machine. Fig. 10 represents a vertical section taken in the line 11 11 of Fig. 9. Fig. 11 represents a face view of the pawl employed to operate the pattern-chain. Fig. 12 represents the front edge view of the same. Fig. 13 represents an enlarged detail plan view of the front needle-bar, showing the shuttle-guide pins.

In the drawings, A represents one of the end frames of the loom; B, the lay; C, the cam-shaft, and D the crank-shaft.

To the back of the lay-beam *e* are secured the pendent guides *a a' a*, which serve to hold the needle-frames *b b'* for endwise movement therein.

The needles *f* are attached to the needle-bars *d d'*, which slide up and down in the grooves *h* of the upright end pieces *i i i' i'* of the needle-frames *b b'*, and the said needle-

bars are forced upward in timely relation to the backward movement of the lay by the action of the lifting-rods *j j*, which are operated in their up-and-down movement by means of the cam E upon the shaft C, operative connection being made with the said cam by means of the lever-arms *k k*, which are loosely jointed to the lower ends of the said lifting-rods *j j*, the said arms being secured to the rock-shaft B', from which connection is made with the cam E by means of the upright arm k^4.

The lifting-rods *j j* are guided at their upper ends in a slot *l*, made in the laterally-extending foot *m* of the needle-frame guides *a a*, and the said rods, at their forwardly-projecting ends *w'*, are adapted for engagement with the under side of the needle-bars *d d'* in order to raise the needles to make the figure in the web, the said lifting-rods being always held in engagement with the forward needle-bar *d* and operated for engagement or disengagement with the rear needle-bar *d'* by means of the arms *n n*, which loosely embrace the lifting-rods *j j* at the points *o* and are attached to the rock-shaft *p*, which is held in the bearings *q q* at the side of the guides *a a* and in the bearing *q'*, the said arms being operated to carry the lifting-rods backward for disengagement from the rear needle-bar *d'* by means of the spring *r*, which operates to turn the rock-shaft *p* in the proper direction, and are caused to carry the lifting-rods forward to engagement with the said needle-bar *d'* by means of the screw-pins *t* upon the forward edge of the pattern-chain F, which pins engage with the curved arm *s* of the rock-shaft *p* to cause the proper movement of the same for effecting the required engagement with either one or both of the needle-bars.

When in their lower position, the needle-bars *d d'* will rest on the supports v^2 v^2, which are attached to the upper edges of the bars *g g'*, which form the lower portion of the needle-frames *b b'*, so that sufficient space will be left between the upper edges of the bars *g g'* of the needle-frames and the lower edges of the needle-bars *d d'* for the forwardly-projecting end *w'* of the lifting-rods *j j*.

To the bar *g* of the needle-frame *b* is attached the rod *u*, to the outer end of which is secured the cam *v*, and to the bar *g'* of the needle-frame *b'* is attached the rod *u'*, to the outer end of which is attached the cam *v'*.

To the back of the outer end of the lay-beam *e* is attached the frame G, which serves to support the pattern-chain F, the said frame being provided with the bearings *w w* for the shaft *x* of the sprocket-roll H, which carries the pattern-chain, the outer end of the shaft *x* of the said sprocket-roll being provided with the hand-wheel *y* for turning the sprocket-roll by hand when desired, and the inner end of the said shaft is provided with the ratchet-wheel *z*, by means of which the sprocket-roll is operated.

Upon the shaft *x* of the roll H, at the inner side of the ratchet-wheel *z*, is placed the notched wheel *z'*, adapted for engagement with the spring-pawl *c'*, attached to the frame G, the said spring-pawl serving to prevent the backward movement of the sprocket-roll H. The sprockets d^2 d^2 of the sprocket-roll enter the vacant spaces *e' e'* between the parallel bar-links *f' f'* of the pattern-chain, the said bar-links being connected to each other by means of the wire links g^2 g^2. The bar-links *f' f'* are provided with the screw-threaded split lugs *h' h²*, in which are inserted the pattern-screws i^2 i^3, the said screws being clamped in their proper position by means of the tightening-screws *j'*, which operate to draw the sides of the split lugs together against the sides of the screws, and the pattern to be formed in the woven web by the action of the needles will be governed by the relative positions of the forward ends of the pattern-screws of the chain, the said forward ends coming successively into engagement with the cams *v* and *v'*, which are connected by means of the rods *u* and *u'* with the needle-frames *b b'*, as before described.

To the side of the end frame A is pivoted the pawl I, which is drawn toward the ratchet-wheel *z* by means of the spring k^3, so that when the lay B is thrown forward by the action of the crank J the resulting movement of the ratchet-wheel *z* against the pawl I will serve to turn the sprocket-roll H for the space of one tooth of the ratchet-wheel, thus bringing the succeeding pattern-screws of the chain F into engagement with the cams *v v'* to effect the required endwise movement of the needle-frames *b b'*.

In order to prevent accident, the pawl I is made yielding, so that in case the ratchet-wheel *z* is prevented from turning by any disarrangement of the pattern-chain mechanism the end piece i^4, which is pivoted to the end of the pawl I at the point i^5 and is held in position by the flat spring i^6, will yield, and thus prevent the breaking or bending of the parts of the mechanism.

In order to facilitate the action of the pattern-screws upon the cams *v v'*, the needle-frames *b b'* are relieved from pressure during the forward beating movement of the lay B and the consequent rotation of the sprocket-roll H, this result being effected by means of the cam J' upon the shaft C, the said cam being caused to raise the separate bell-crank levers K K', which are pivoted to the bracket L and are provided with the weighted arms *k' k²*, which serve to carry the needle-frames forward against the ends of the pattern-screws of the chain, the said weighted arms being loosely connected with the needle-frames by means of the flexible straps *t' t²*, connected to the needle-frames, the arm *k'* being connected by the strap *t'* with the needle-frame *b*, and the arm *k²*, by means of the strap *t²*, with the needle-frame *b'*, said straps being made to pass over the rollers *m' m²* at the lower end of the middle needle-frame guide *a'*, and when

the pattern-screws have been brought to their proper position opposite the highest point of the cams *v v'* the continued rotation of the cam J' will cause the tightening of the straps *l' l²* and the release of the bell-crank levers K K' from the cam J', so that thereafter the weight of the arms *k' k²* will serve to press the said cams firmly against the ends of the pattern-screws, the rear ends of the bar-links being supported against backward movement and held in the same plane by means of the head f^4 of the sprocket-wheel.

The springs *l' l²* are provided in order to force the needle-bars tightly against the upright end pieces *i i'* of the needle-frames *b b'*, in order to prevent backlash, which would tend to disarrange the position of the needles in the warp-threads of the fabric, the spring *l'* being attached at one end to the bar *g* of the needle-frame *b* and at the other to the needle-bar *d*, and the spring *l²* attached at one end to the bar *g'* of the needle-frame *b'* and at the other to the needle-bar *d'*.

Upon the needle-bar *d*, next to the shuttle-race and intermediate between the needles *f f*, are placed the shuttle-guide pins n^3, which may be either made of greater diameter than the needles, or set in a line slightly in front of the same, the said shuttle-guide pins passing into the shed with the needles and serving to prevent injury to the needles from contact with the traveling shuttle.

Heretofore the shuttle-guiding pins n^3 have been carried upon a separate bar, thus causing the needle-bars to be located farther back from the shuttle-race, whereas they should be held as close thereto as possible, but this improvement is only adapted to lappet-looms in which the needles of the forward needle-bar are moved upward into the shed at each beat of the lay, and in such looms one of the bars heretofore required is dispensed with.

In order to prevent the accidental locking and interference of the upright end pieces *i i'* of the needle-frames *b b'* when one of the frames is being moved endwise without the other, the said needle-frames are provided at the top of the upright end pieces *i i i' i'* with the guard-arms e^2, extending each way from the said end pieces, so as to prevent the detrimental engagement of the same with each other during such movement.

I claim as my invention—

1. In a pattern-chain for lappet-looms, the combination of the bar-links, with adjustable pattern screws or pins, the varying positions of which relatively to the bar-links govern the form and position of the lappet-pattern, substantially as described.

2. In a pattern-chain for lappet-looms, the combination of the bar-links, with screws or pins adjustable longitudinally of said bar-links to form the pattern, and screw-pins arranged at right angles to the said bar-links, to govern the lifting of the needles, substantially as described.

3. In a lappet-loom, the combination of the front needle-bar, and the attached needles, with the row of shuttle-guide pins arranged between and slightly in front of the line of the needles, substantially as described.

4. In a lappet-loom, the combination of a pattern-chain, with a needle-bar, an intermediate connection between the needle-bar and pattern-chain, means for holding the intermediate connection against the pattern-chain and means for withdrawing said holding means, from its action upon the intermediate connection, preparatory to the forward movement of the pattern-chain, substantially as described.

5. In a lappet-loom, the combination of a pattern-chain, with a needle-bar, a cam connected with the needle-bar and bearing against the pattern-chain, means for holding the cam against the pattern-chain, and means for withdrawing said holding means from its action upon the cam, preparatory to the forward movement of the pattern-chain, substantially as described.

6. In a lappet-loom, the combination of a needle-bar, and pattern-chain mechanism, with intermediate engaging mechanism for causing the desired movement of the needles into the shed, the pattern-chain mechanism being adapted to govern the longitudinal position of the needle-bar, and control the operative connection of the needle-bar with the engaging mechanism, whereby the said engaging mechanism may be caused to remain inoperative at any desired point in the pattern, substantially as described.

7. In a lappet-loom, the combination of the needle-bar, with the lifting-rod for raising the needle-bar, the cam for vertically operating the lifting-rod, and the pattern-chain operatively connected with the lifting-rod to cause the engagement or disengagement with the needle-bar, substantially as described.

8. In a lappet-loom, the combination of a pattern-chain with the needle-bar, and the needle-bar frame, spring means for forcing the end of the needle-bar against the needle-bar frame, to prevent backlash, the connections intermediate of the needle-bar frame, and the pattern-chain, and yielding pressure means for holding the intermediate connections against the pattern-chain, substantially as described.

9. In a lappet-loom, the combination of the lay, with the sprocket-roll having its axis directed lengthwise of the lay, the pattern-chain upon the sprocket-roll, the ratchet-wheel for actuating the sprocket-roll, and the pawl provided with a yielding end piece adapted to impart a progressive forward movement to the pattern-chain, substantially as described.

10. In a lappet-loom, the combination of a needle-bar, and a vibrating lever for causing the movement of the needles into the shed, with pattern-chain mechanism adapted to govern the longitudinal position of the needle-bar and control the operative connection of the needle-bar with the vibrating lever, and

a bar provided with the shuttle-guide pins, arranged in continuous operative connection with said lever, substantially as described.

11. In a lappet-loom, the combination of a needle-bar frame connected with the lay, and adapted for movement longitudinally of the lay, with a needle-bar adapted for sliding up-and-down movement in the guides of the needle-bar frame, pattern-chain mechanism for imparting direct movement to the needle-bar and frame in one direction longitudinally of the lay, reacting means for imparting movement to the needle-bar and frame in the opposite direction, and engaging means controlled by the pattern-chain mechanism for causing the desired movement of the needle-bar for carrying the needles into the shed, substantially as described.

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