No. 656,199. Patented Aug. 21, 1900.

J. R. MacCOLL.

LAPPET LOOM.

(Application filed Jan. 28, 1898.)

(No Model.)

7 Sheets—Sheet 1.

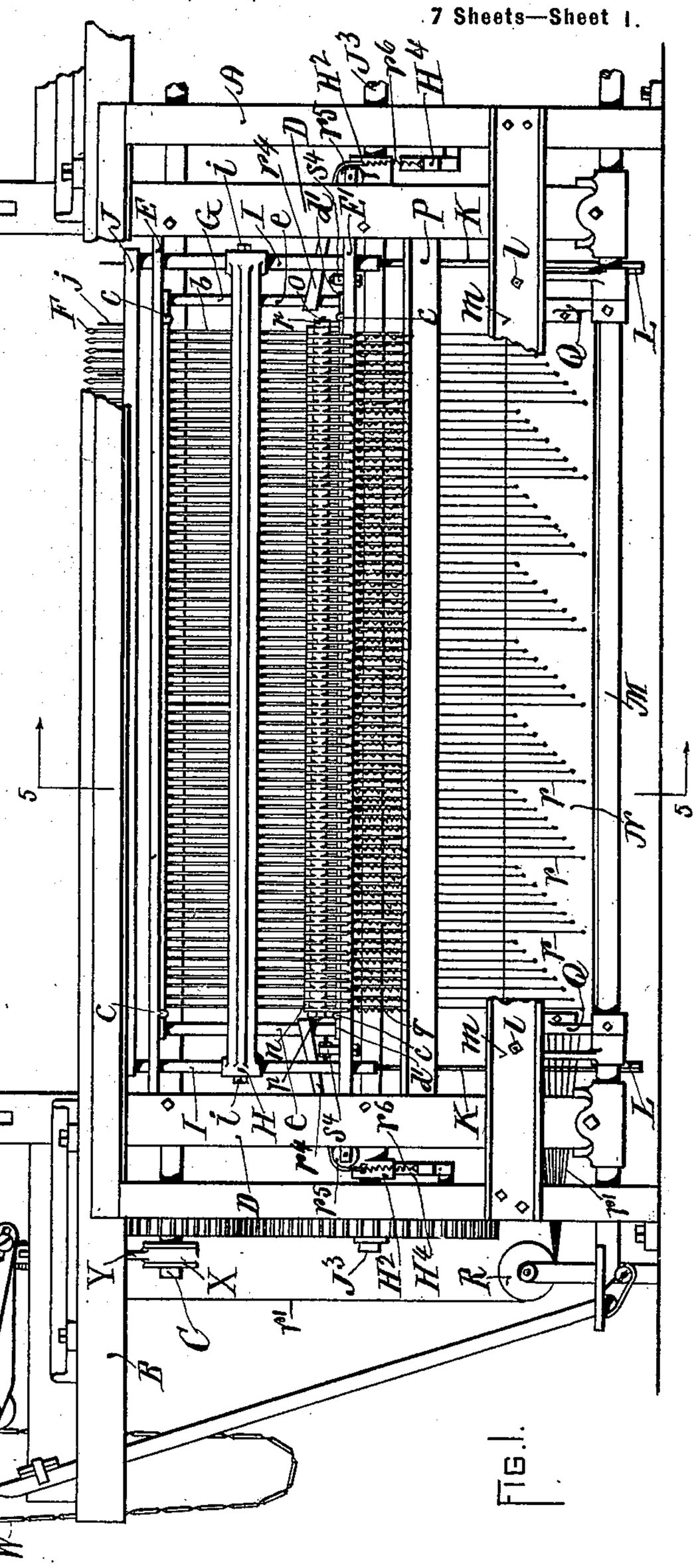

FIG. 1.

WITNESSES:

Harry J. Garrigan

John D. Lynch

INVENTOR;

James R. MacColl.

BY A. Schofield.

ATTY.

No. 656,199. Patented Aug. 21, 1900.

J. R. MacCOLL.

LAPPET LOOM.

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(No Model.) 7 Sheets—Sheet 2.

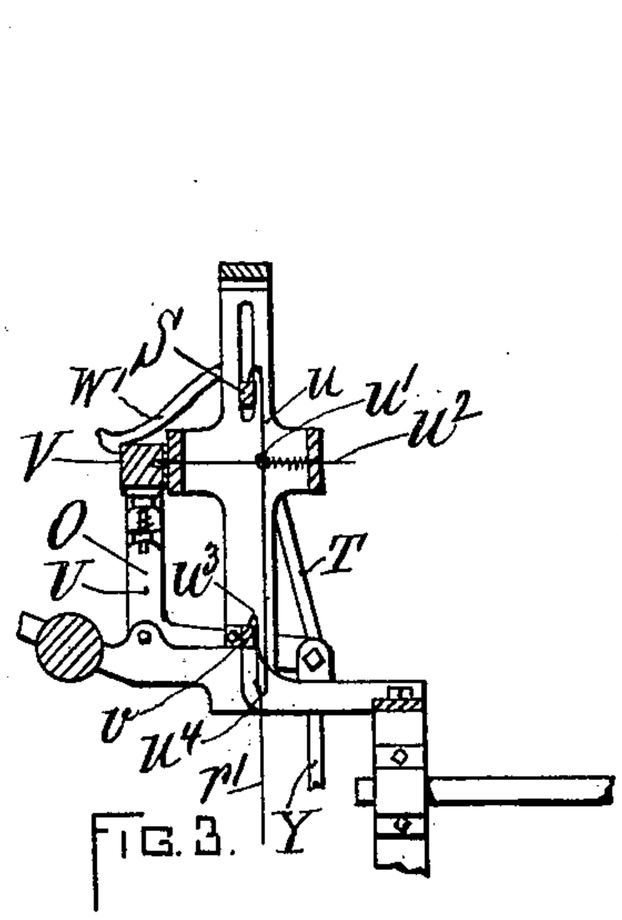

FIG. 3.

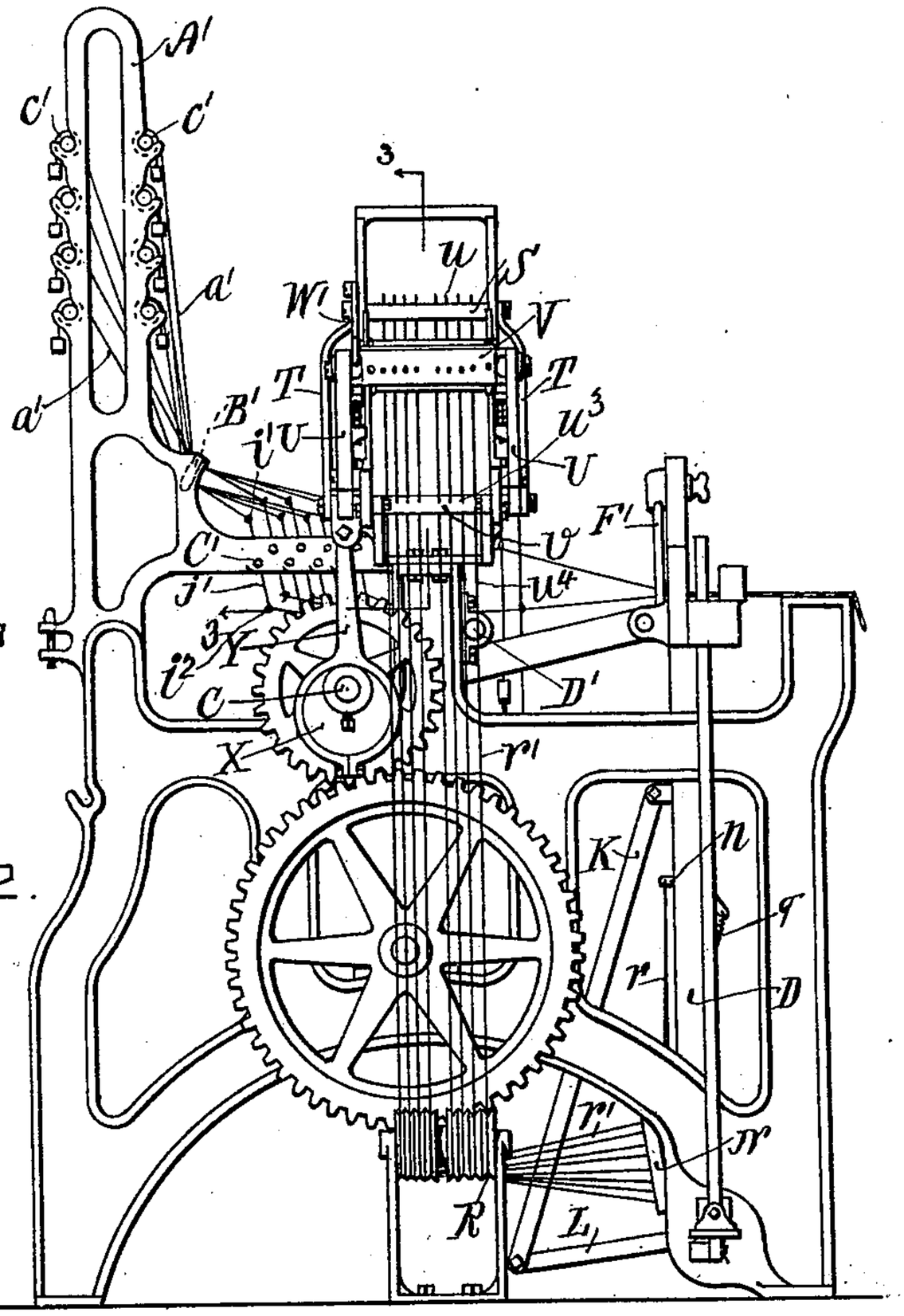

FIG. 2.

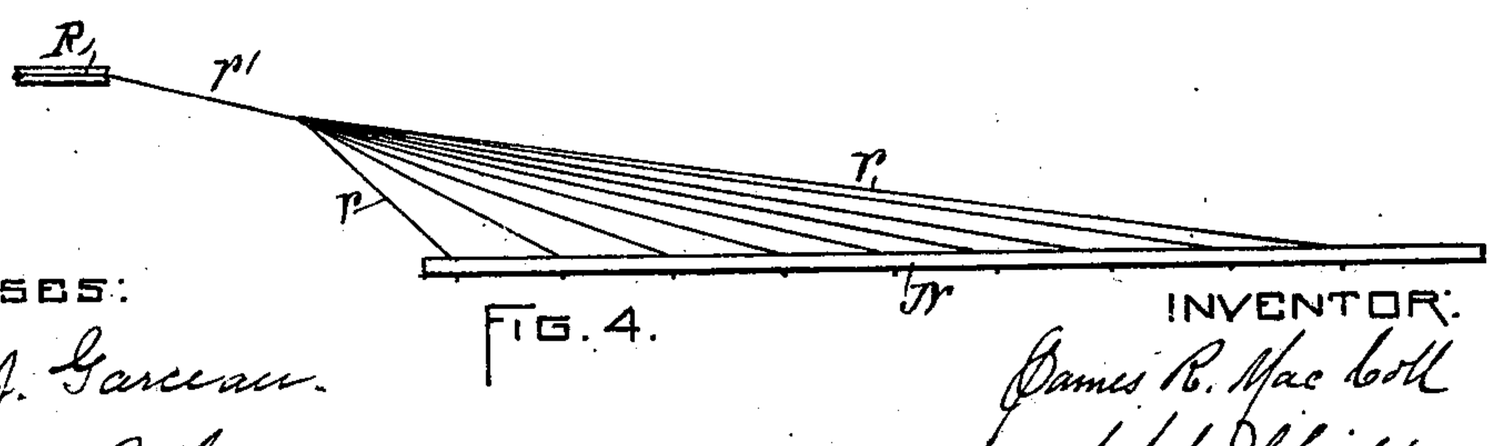

FIG. 4.

WITNESSES:

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No. 656,199. Patented Aug. 21, 1900.

J. R. MacCOLL.

LAPPET LOOM.

(Application filed Jan. 28, 1898.)

(No Model.) 7 Sheets—Sheet 3.

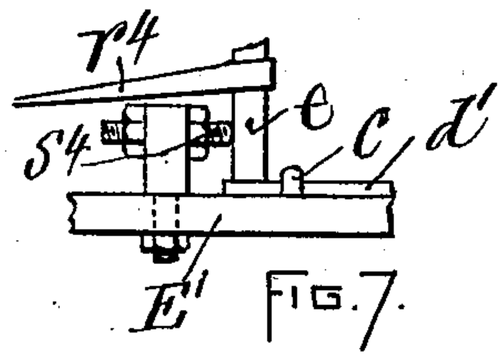

FIG. 7.

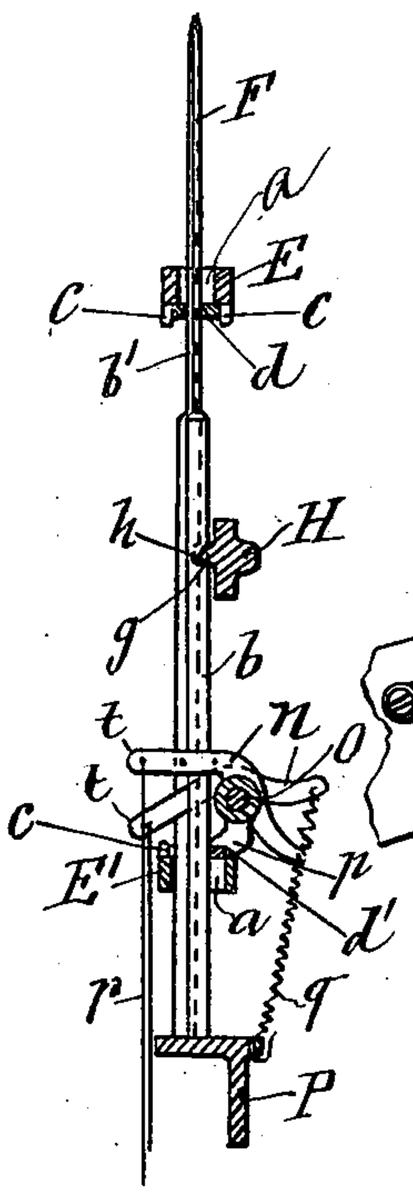

FIG. 6.

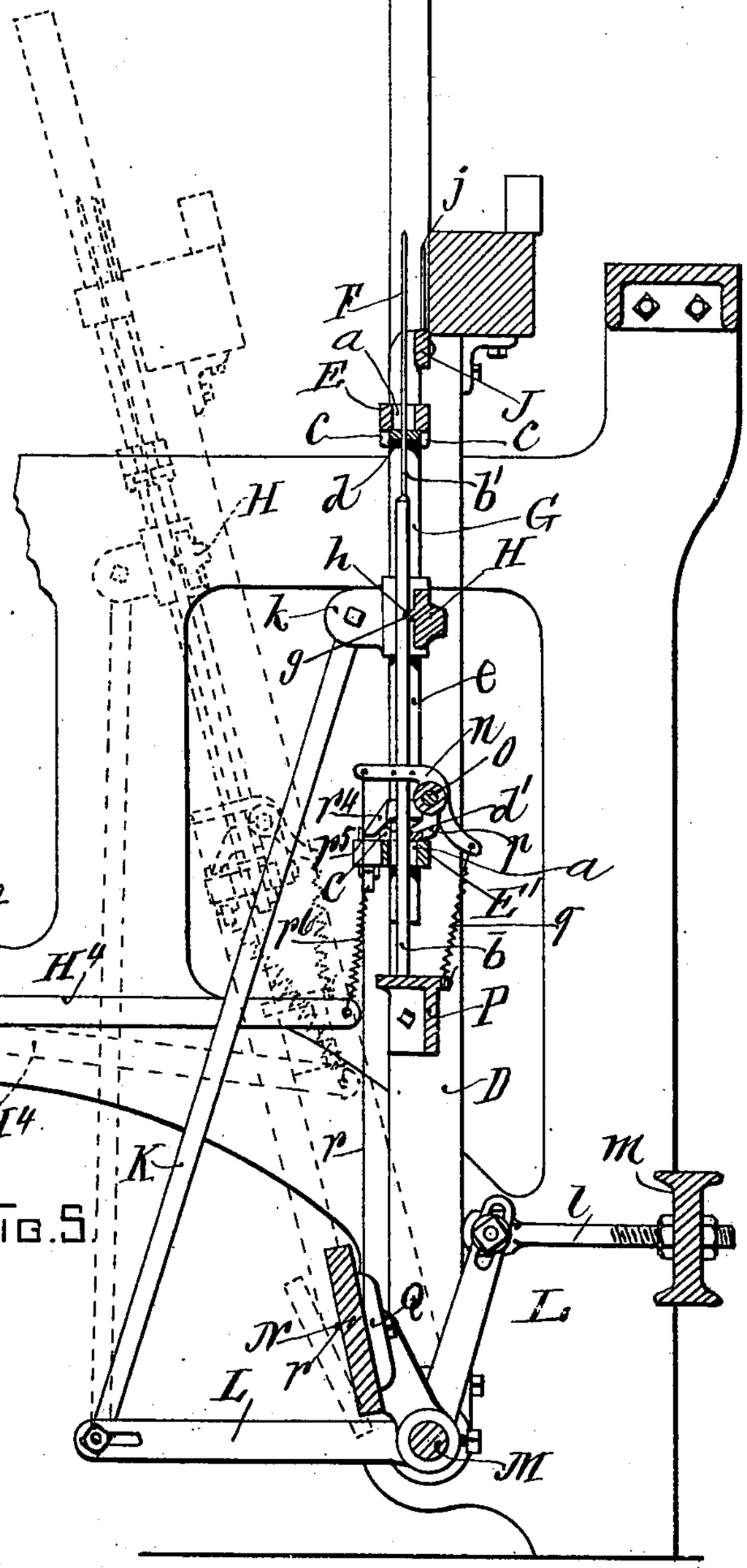

FIG. 5.

WITNESSES:

Harry J. Garceau.

John S Lynch

INVENTOR:

James R. MacColl

BY J. Scholfield

ATT'Y.

No. 656,199. Patented Aug. 21, 1900.

J. R. MacCOLL.

LAPPET LOOM.

(Application filed Jan. 28, 1898.)

(No Model.) 7 Sheets—Sheet 4.

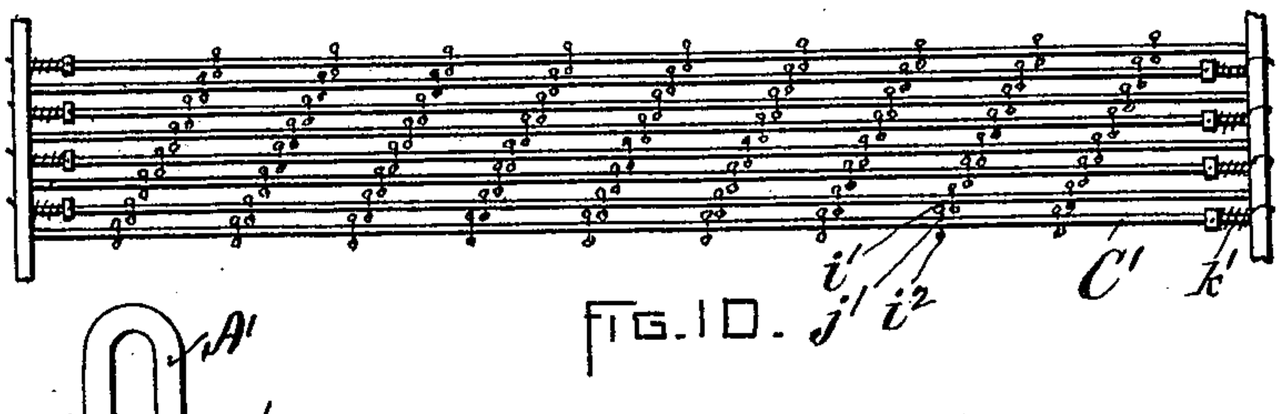

FIG. 10.

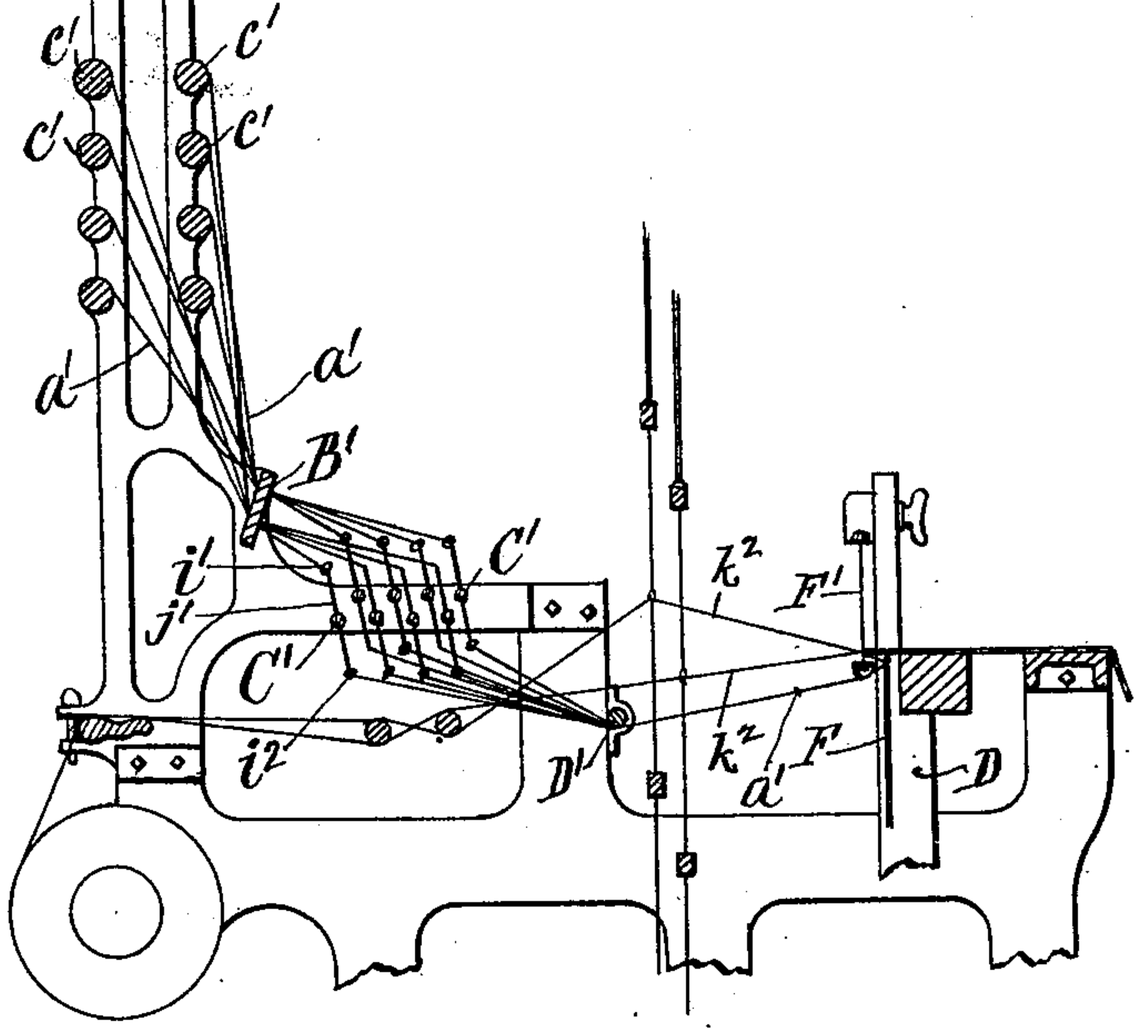

FIG. 8.

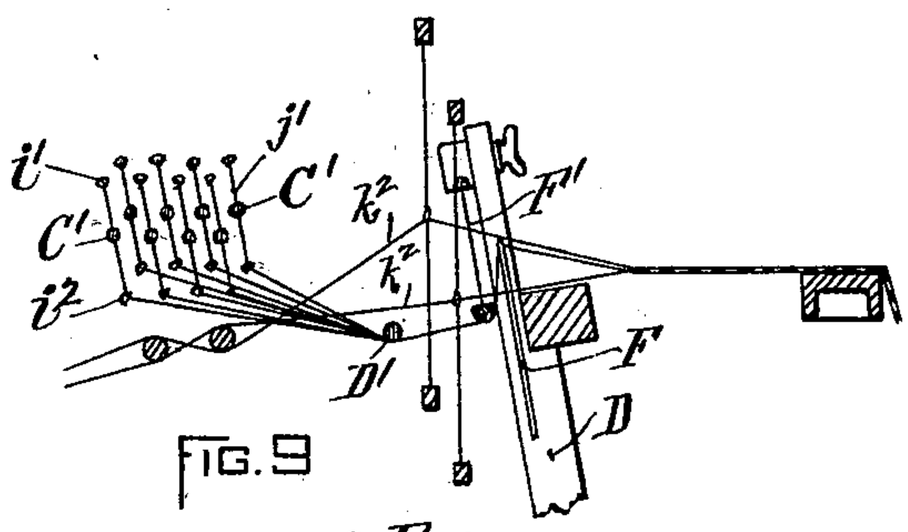

FIG. 9.

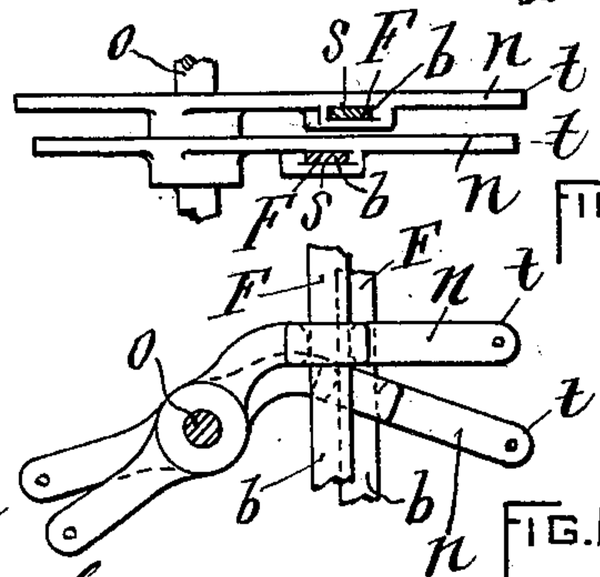

FIG. 11.

FIG. 12.

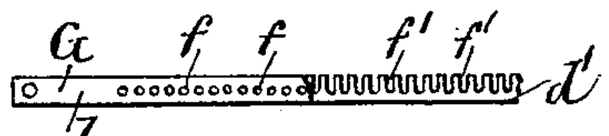

FIG. 13.

WITNESSES:
Harry J Carman
John S Lynch

INVENTOR:
James R. MacColl
S. Schofield
ATTY.

No. 656,199. Patented Aug. 21, 1900.

J. R. MacCOLL.

LAPPET LOOM.

(Application filed Jan. 28, 1898.)

(No Model.) 7 Sheets—Sheet 5.

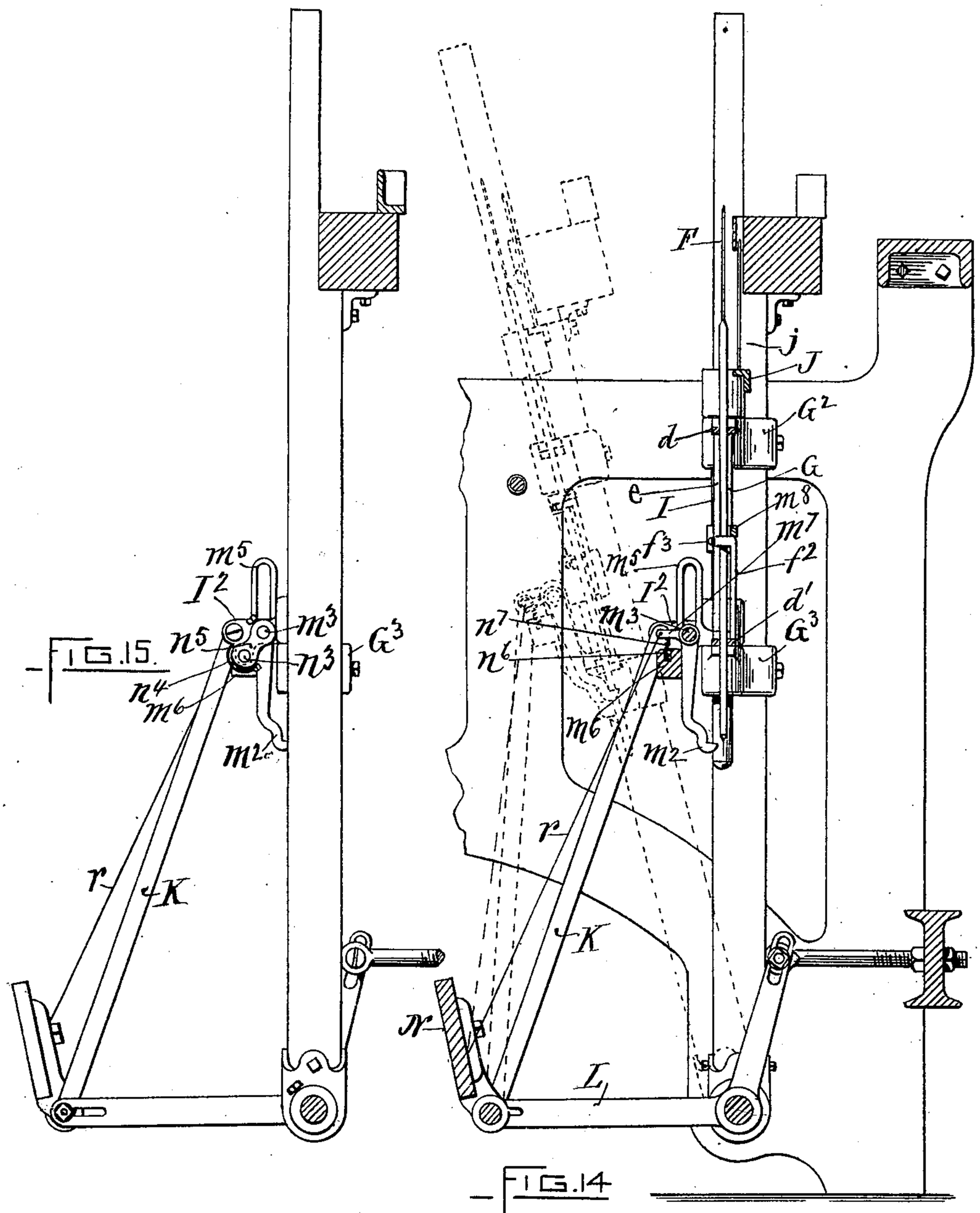

FIG. 14

FIG. 15

WITNESSES:

Harry J. Garrigan.

Joseph S. Lynch

BY.

INVENTOR:

James R. MacColl

L. Schofield

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No. 656,199. Patented Aug. 21, 1900.

J. R. MacCOLL.

LAPPET LOOM.

(Application filed Jan. 28, 1898.)

(No Model.) 7 Sheets—Sheet 6.

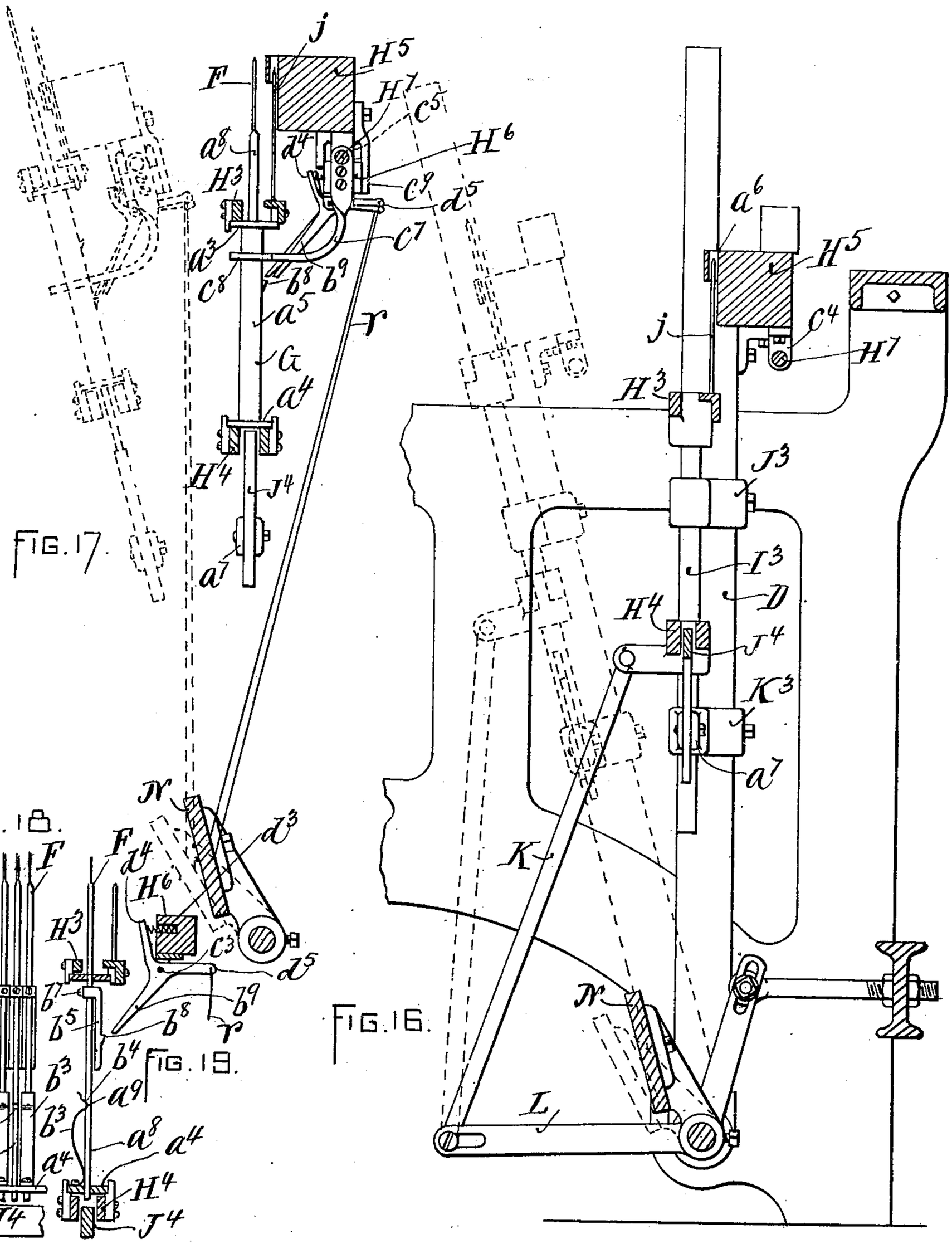

FIG. 17.

FIG. 18.

FIG. 19.

FIG. 16.

WITNESSES:

Henry J. Garceau

J. Fisher S. Lynch

INVENTOR:

James R. MacColl

By S. Scholfield

ATT'Y.

No. 656,199. Patented Aug. 21, 1900.

J. R. MacCOLL.

LAPPET LOOM.

(Application filed Jan. 28, 1898.)

(No Model.) 7 Sheets—Sheet 7.

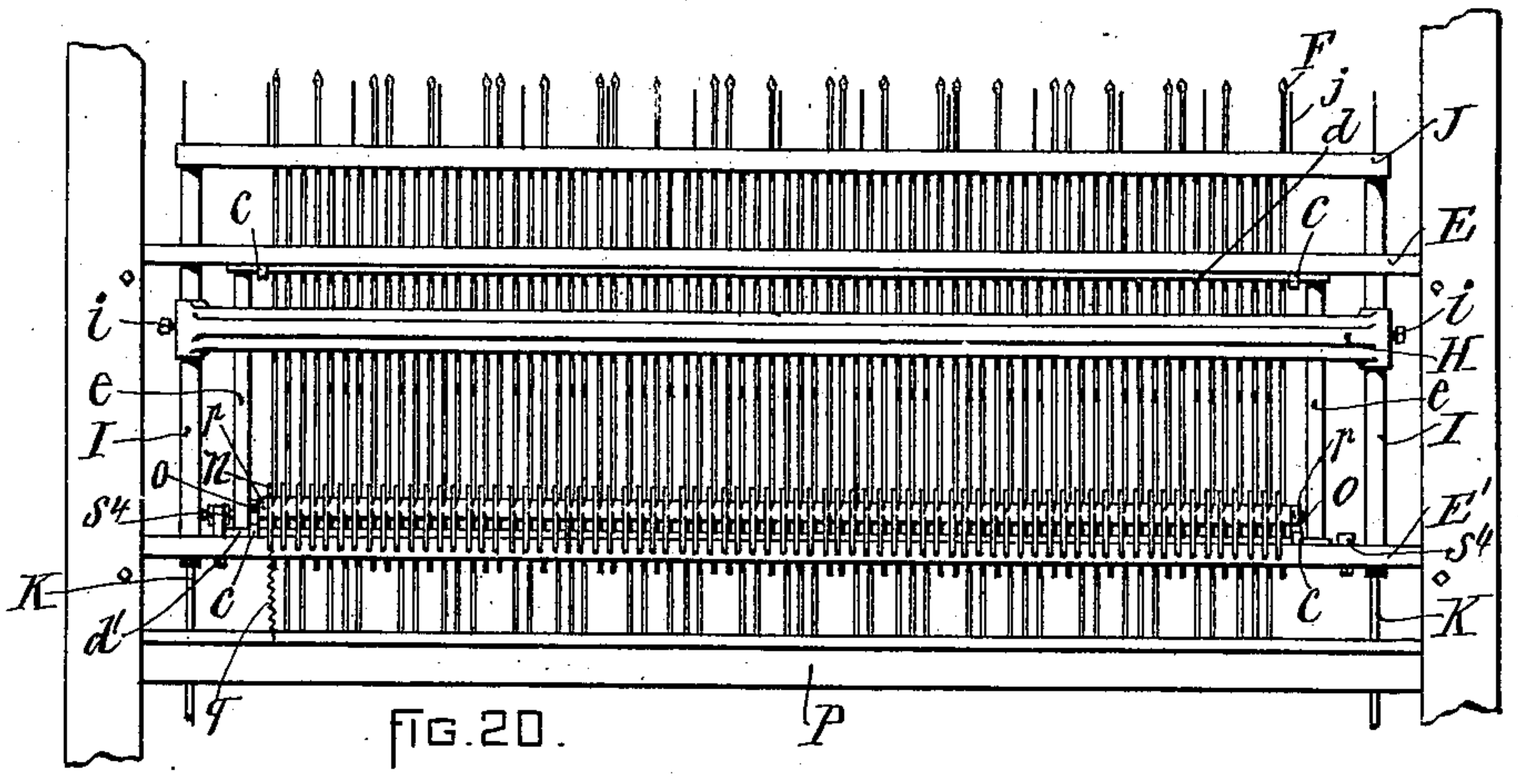

FIG. 20.

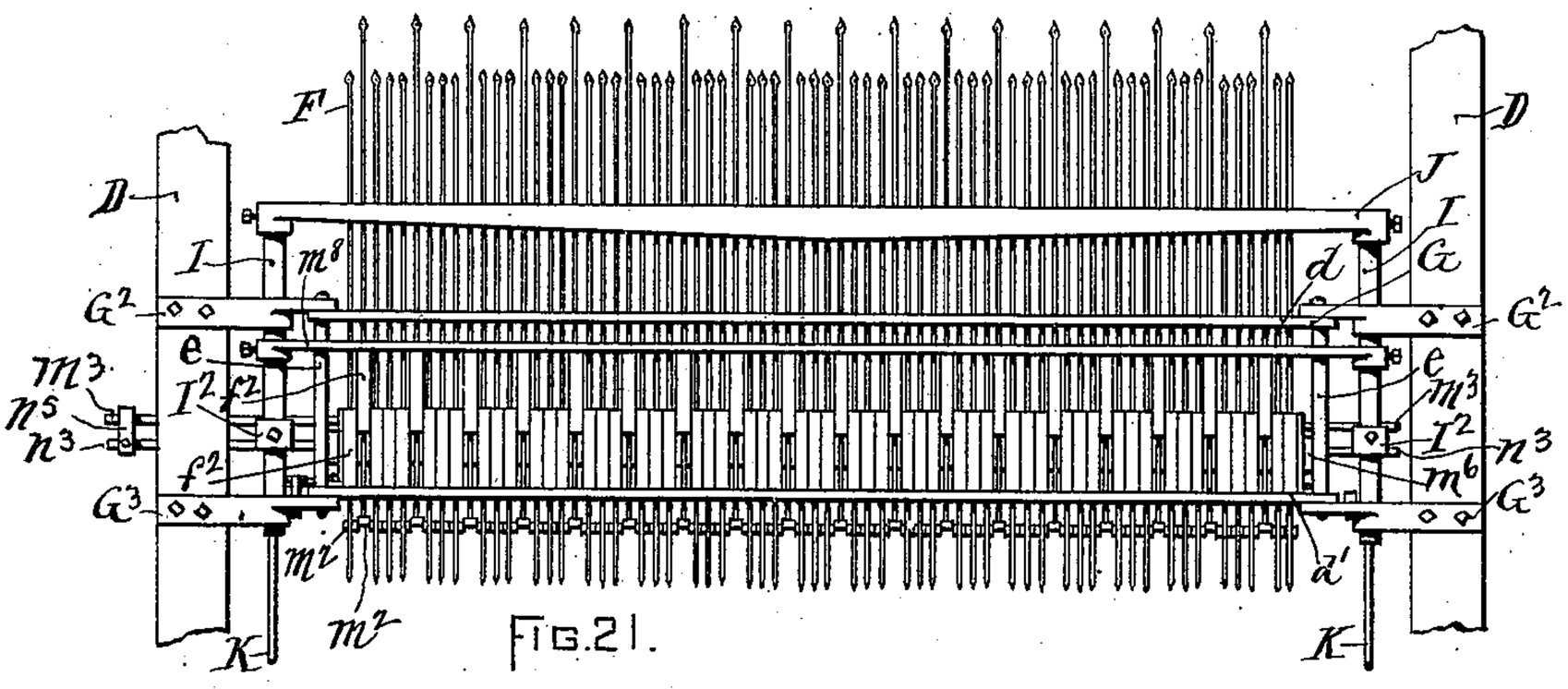

FIG. 21.

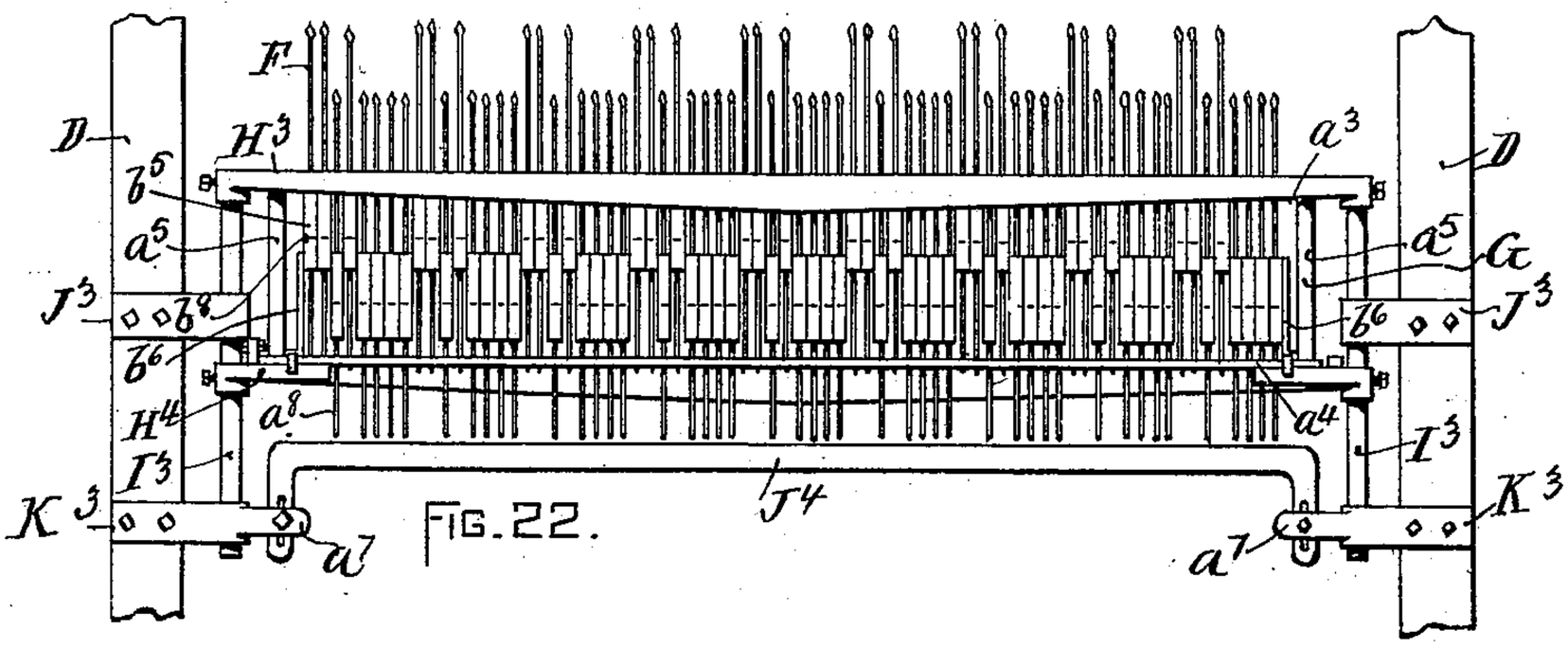

FIG. 22.

WITNESSES:
Harry J. Garrean
John D. Lynch

INVENTOR:
James R. MacColl
By S. Schofield
ATTY.

UNITED STATES PATENT OFFICE.

JAMES R. MACCOLL, OF PAWTUCKET, RHODE ISLAND.

LAPPET-LOOM.

SPECIFICATION forming part of Letters Patent No. 656,199, dated August 21, 1900.

Application filed January 28, 1898. Serial No. 668,323. (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 State of Rhode Island, have invented a new and useful Improvement in Lappet-Looms, of which the following is a specification.

My invention relates to that class of lappet-looms in which the needles are mounted in a frame or needle-carrier which carries them crosswise of the warp to form the stitches, but in which the needles are individually inserted into the shed to form the figure; and it consists in combining the needle frame or carrier and means for vibrating it crosswise of the warp with means connected with the lay for moving the needles individually endwise and a selecting pattern mechanism which controls the operation of the means connected with the lay for moving the needles endwise, and thereby determines the figure.

Heretofore the pattern mechanism pulled the needles into the shed against the force of the weights or springs which pulled them out; but in my improved loom the needles are moved either into or out of the shed, or both, by means other than the selecting pattern mechanism, and the new result is that my improved loom can be operated at a much higher speed than any other loom of this class and with much less liability of defective goods.

In the best form of my invention the means for moving the needles endwise operate to move the needles in both directions; but it will be obvious that the pattern mechanism may retain the function of moving the needles toward the shed, and the other means for moving the needles endwise will then operate only to move the needles away from the shed; but this will be a practical embodiment of my invention for the reason that the selecting pattern mechanism will not be required to move the needles against the force of weights or springs or the like operating to move the needles away from the shed.

Another feature of my invention relates to means for connecting the pattern mechanism with the individual needles and consists in using flexible connecting means to connect the needles with the selecting pattern mechanism. One advantage of this feature of my invention is that these connections may be collected in groups at one or both sides of the warp and may be carried in groups through the warp. The main purpose of this feature of my invention is to get rid of the objection of the individual needle connections passing through the warp, which exists when the selecting pattern mechanism acts directly upon the needles. When flexible connections are used between the needles and the selecting pattern mechanism, the latter may be placed wherever most convenient, as will be clear from the drawings, while if the selecting pattern mechanism acted directly or through rigid connections to determine which of the needles should be operated there would be much less freedom as to the location of the selecting pattern mechanism.

A third feature of my invention consists in improved means for applying yielding tension to lappet-threads to compensate for the movement of the needles.

In the accompanying drawings, Figure 1 represents a front elevation of the loom with a portion of the frame and the lay-beam broken away. Fig. 2 represents an end elevation of the loom. Fig. 3 represents a vertical section of the selective jacquard mechanism, taken on the line 3 3 of Fig. 2. Fig. 4 represents a detail top view showing the hole-board and a portion of the grouped cord connection for causing the engagement of the needles. Fig. 5 represents an enlarged detail section taken in the line 5 5 of Fig. 1, showing the needle in its engaged position. Fig. 6 represents a detail section showing the engaged and disengaged positions of the needle. Fig. 7 is an enlarged detail view showing the adjustable stop for limiting the endwise movements of the needle-carrying frame. Fig. 8 represents a vertical section showing the position of the warp-threads at the forward beat of the lay. Fig. 9 represents the same at the backward position of the lay. Fig. 10 represents a top view of the yielding tension-rods for the lappet-threads. Figs. 11 and 12 are enlarged views of the levers for causing the independent engagement and disengagement of the needles. Fig. 13 represents a detail top view showing one end of the needle-carrying frame. Figs. 14 and 15 are detail sectional views illustrating a modification in the means for causing the selective engagement of the needles.

Figs. 16 and 17 are enlarged detail sectional views showing another modification. Fig. 18 represents a back view of the needles employed in the modification shown in Figs. 16 and 17. Fig. 19 represents a section of the needle-frame, showing side view of the needle. Fig. 20 represents a detail front view showing the needles and needle-carrying frame for the construction shown in Fig. 1. Fig. 21 represents the same for the modification shown in Figs. 14 and 15. Fig. 22 represents the same for the modification shown in Figs. 16 and 17.

In the drawings, A represents the frame of the loom, B the lay, and C the crank-shaft for operating the lay. To the back of the swords D D of the lay are secured the ends of the bars E E′, which are each provided with a longitudinal slot *a*, through which the shanks of the needles F pass, and between the bars E and E′ is placed the horizontal sliding frame G for holding the needles, the said frame being held in proper sliding connection with the said bars E E′ by means of the guide-lugs *c c*, which hold the opposite edges of the upper and lower bars *d d′* of the frame, the said bars *d d′* being connected to each other by means of the end posts *e e*. The upper bar *d* is provided with a series of holes *f*, as shown in Fig. 13, adapted to loosely receive the cylindrical portion *b′* of the needles F, and the lower bar *d′* is provided at one side with the notches *f′* to receive the flattened portion *b* of the needle-shanks. The needle will thus be prevented from turning, and the lower end of the needle-shank may be moved inward and outward to cause the engagement of the needle with the engaging catch-rib *g* of the rising and falling bar H, the said rib being caused to engage with the notch *h* made in the edge of the flattened portion *b* of the shank of the needle to carry the engaged needle positively up and down therewith, thus allowing the loom to be driven at the proper rate of speed without liability to accident, the engagement and disengagement of the needles being effected at their extreme downward position in the needle-carrying frame. The bar H is secured at its opposite ends to the guide-rods I I by means of the screws *i*, the said guide-rods being adapted for up-and-down sliding movement in suitable perforations made in the bars E E′, and at the upper end of the guide-rods I I is secured the bar J, which carries the shuttle guide-pins *j*, and the proper up-and-down movement is imparted to the bar H by means of the inclined links K K, which are pivoted at their upper ends to the ears *k k* at the rearward side of the bar H and at their lower ends to the bell-crank levers L L, which are loosely held on the pivot-rod M of the lay and made capable of adjustment by means of the bolts *l*, which serve to connect the upper ends of the bell-crank levers L L with the tie-beam *m* of the loom-frame. The movement of the lay to its backward position, as shown by the dotted lines in Fig. 5, operates to cause the proper raising of the bar H, whereby the needles engaged therewith will be properly raised into the shed. The shuttle guide-pins *j* will also be carried upward with the upward movement of the bar H and the engaged needles. The needles F are actuated to engagement and disengagement with the catch-rib *g* of the bar H by means of a series of levers *n*, loosely held upon the pivoting-rod *o*, which is supported by means of the brackets *p*, secured to the lower bar *d′* of the needle-carrying frame G, the said levers *n* being held in their raised position in which the notch *h* of the needle will be engaged with the catch-rib *g* by means of the spiral spring *q*, the lever *n* being actuated downwardly against the resilience of the spring *q* to release the needle from the catch-rib *g* of the bar H by means of the cord *r*, which passes downward to the hole-board N and thence to the selecting mechanism O for the needles. The flattened portion *b* of the shank of the needle passes loosely through a slot-opening *s* at one side of the lever *n*, the said slot-opening being so arranged relatively to the pivoting-rod *o*, as shown in Figs. 11 and 12, that the downward movement of the end *t* of the lever *n* will cause the movement of the notch *h* away from the catch-rib *g*, as shown by the dotted line in Fig. 6, and when the needles are thus disengaged from the rib *g* of the bar H the lower end of the shank of the needle will be caused to rest upon the top of the angle-iron P, which is attached at its ends to the swords D D of the lay. The hole-board N is attached to suitable arms Q, secured to the pivot-rod M of the lay, and the cords *r* after passing from the levers *n* through the hole-board N are collected in groups to single cords *r′*, as shown in Fig. 4, the said cords *r′* passing under the scored pulleys R and thence upward outside of the end of the loom-frame to the lower ends of the hooks *u* of the jacquard selecting mechanism O. The hook *u* is loosely held in the eye *u′* of the spring-actuated wire u^2, the lower end of the hook *u* being bent upward and turned to a hook u^3, which by engaging with the fixed bar *v* serves to limit the downward movement of the hook *u*, the cords *r′* being attached to the hook *u* at the bight u^4. The lifting knife S, which serves to carry the hooks upward, is caused to move up and down by means of the links T T, jointed to the bell-crank levers U U, which form the bearings for the square turning block V, by means of which the chain of pattern-cards W is brought forward for action upon the ends of the spring-actuated wires u^2 to cause the disengagement of the hooks *u* with the lifting knife, the said knife being actuated up and down and the turning block V vibrated back and forth by means of the eccentric X on the crank-shaft C and the connecting-link Y, the block V being turned at each backward movement by means of the hook W′, and by means of the holes

made in the pattern-cards W the proper needles or groups of needles will be selected to form the pattern, the hooks u, which are pressed back by the action of the pattern-cards upon the wires u^2, being prevented from engagement with the lifting knife S.

Endwise movement is imparted to the needle-holding frame G to form the stitch by means of the opposite cams H^2 H^2 upon the lower shaft J^3, the said cams being arranged to act upon the levers H^4 H^4, from the outer ends of which yielding connection is made with the opposite ends of the needle-carrying frame by means of the leather straps r^4 r^4, attached to the end posts e e of the frame, the said straps passing over the pulleys r^5 r^5 and being connected to the ends of the levers H^4 H^4 by means of the spiral springs r^6 r^6, and adjustable stops s^4 s^4 are provided to limit the movement of the needle-holding frame to the desired length of stitch. The lappet-threads a' are wound upon the rolls c', arranged in two parallel series in the upright standards A' A', and from the said rolls the threads are passed through the hole-board B', and thence to the upper eye i' of the cross-wires j' of the tension-rods C', the said tension-rods being loosely journaled in the frame and actuated in the proper direction by means of the torsion-springs k'. The threads a' after being passed through the upper eyes i' are passed downward along the side of the cross-wires j' and through the lower eyes i^2, thence under the guide-rod D', and under the reed F' to the eye of the needle F, the position of the warp-threads k^2 k^2 and the lappet-threads at the forward position of the lay being shown in Fig. 8 and at the backward position in Fig. 9.

In the operation of the loom the selecting pattern mechanism O operates, by means of the reciprocating knife S to cause the engagement or disengagement of the needles with the catch-rib g of the needle-operating bar H, and the action of a selecting mechanism in connection with a separate needle-actuating mechanism by means of which the needles are moved individually endwise either into or out of the shed, or both, is an important feature of my invention, which is entirely distinct from a construction in which the needles are actuated endwise by the direct action of the knife S of the selecting mechanism, as heretofore.

A modification of my invention is shown in Figs. 14, 15, and 21, in which the needles are caused to rise into the shed by means of a series of rising and falling catches m^2, which are caused to engage with the shanks of the needles at the backward movement of the lay, the engagement of the said catches with the shanks of the needles being controlled by the selective pattern mechanism, with which the said catches are in operative connection. The needle-holding frame G is guided for sliding endwise movement by means of the brackets G^2 and G^3, attached to the swords of the lay, and the shuttle guide-pins j are attached to the bar J, as before described, so as to have a movement into and out of the shed in timely relation to the backward-and-forward movement of the lay, the said bar J being attached to the upper ends of the sliding guide-rods I I, which are held for up-and-down movement in suitable perforations made in the brackets G^2 G^3, the proper up-and-down movement being imparted to the said guide-rods by means of the inclined links K K, which are pivoted at their upper ends to the bracket-pieces I^2, secured to the said sliding rods, and at their lower ends to the bell-crank levers L L, as before described. The needles F are guided for up-and-down movement in suitable perforations made in the upper and lower bars d d' of the needle-holding frame G, the said needles being prevented from dropping away from the said frame by means of the stop-pieces f^2, attached to the shanks of the needles by means of screws f^3, the lower ends of the said stop-pieces engaging with the upper side of the lower bar d' of the needle-holding frame G when the needles are in their lower position, as shown in Fig. 14. The lifting catches m^2 are pivotally held upon a rod m^3, which is adapted at each end to slide endwise in suitable perforations made in bracket-pieces I^2, and the required endwise movement is imparted to the rod m^3 in order to preserve the proper relative position of the lifting catches with their respective needles by means of the slotted arm m^5, attached to the lower bar d' of the needle-holding frame, so as to move therewith, and suitable collars arranged upon the said sliding pivot-rod m^3 at each side of the said slotted arm, and by this means the lifting catches m^3 and their respective needles F will be moved in unison transversely of the warp by the action of the stitch mechanism. The lifting catches m^2 are adapted for engagement with the lower ends of the shanks of the needles F, the said catches being carried upward with the upward movement of the bracket-pieces I^2 at the backward movement of the lay, thus causing the movement of the selected needles into the shed in accordance with the requirements of the pattern, the pivot-rod m^3 being caused to move up and down in the slot of the arm m^5. In order to cause the required automatic backward movement of the lifting catches from their engagement with the lower ends of the shanks of the needles, a wooden bar m^6 is employed, provided at its ends with rods n^3, which slide loosely in a perforation made in the downwardly-extending ears n^4 of the bracket-pieces I^2, the said rods n^3 being connected to the pivot-rod m^3 by means of the connecting-arms n^5, whereby the bar m^6 will partake of the endwise movement of the rod m^3. The wooden bar m^6 is provided with perforations n^6, adapted to receive spiral springs n^7, which by acting against the under side of the rearwardly-extending arm m^7 of the lifting catch m^2 will serve to cause the automatic disengagement of the lifting catch from its en-

gagement with the shank of the needle F. Suitable connection is made between the arms m^7 of the lifting catches and the selecting mechanism O by means of cord connections r, which pass through the perforations of the hole-board N, arranged at the ends of the bell-crank levers L, and thence to the selecting mechanism, as before described. In the operation of a loom embodying this modification the selecting mechanism O operates, by means of the reciprocating knife S upon the hooks u, to cause the required engaging movement of the individual lifting catches m^2 of the needle-operating mechanism at the backward movement of the lay, and the selected needles when raised into the shed are brought with certainty back to their normal position (shown in Fig. 14) by means of the bar m^8, secured at its opposite ends to the sliding guide-rods I I and moving therewith, the said bar at its downward movement being caused to engage with the upper ends of the stop-pieces f^2 of the raised needles.

Another modification of my invention is shown in Figs. 16, 17, 18, and 22, in which the needle-holding frame G has an up-and-down movement, the said frame consisting of the upper perforated bar a^3, the lower perforated bar a^4, and the connecting end posts a^5 a^5, the cylindrical shanks of the needles F being loosely held in the perforations made in the said upper and lower bars. The needle-holding frame G is held in suitable upper and lower guide-bars H^3 H^4, extending longitudinally of the lay, the said guide-bars being connected to each other by the upright sliding rods I^3 I^3, to which the said guide-bars are securely attached, the said sliding rods being held for up-and-down movement by means of the brackets J^3 J^3 and K^3 K^3, attached to the swords D D of the lay, and the proper up-and-down movement is imparted to the said guide-bars and the needle-holding frame, as shown by the full and dotted lines in Fig. 16, by means of inclined links K, which are pivoted at their upper ends to the rearward side of the lower guide-bar H^4 and at their lower ends to the bell-crank levers L, as before described, the movement of the lay to its backward position, as shown by the dotted lines, operating to cause the proper raising of the guide-bars and the needle-holding frame, whereby the needles may be properly raised into the shed. The shuttle guide-pins j are attached to the upper guide-bar H^3 and pass upward into the shed through the guide-opening a^6 at the back of the lay-beam H^5 at each backward movement of the lay. The bar J^4, which serves to return the needles to their normal position for the entrance of the needles into the shed, is turned downwardly at its ends and secured to the prolongations a^7 of the brackets K^3, whereby the said bar will be held in a fixed position, while the guide-bars H^3 H^4 and the needle-holding frame will receive an up-and-down movement relatively to the lay-beam at the backward-and-forward movement of the same. The shanks a^8 of the needles F are provided with a notch a^9, adapted for the engagement of the frictional catch-spring b^3 therewith, the said spring being attached to the lower bar a^4 of the needle-holding frame G, as shown in Figs. 18 and 19, one of the said needles being shown in Fig. 18 without its retaining-spring in order to show the notch a^9 made in the shank of the needle to receive the frictional engaging bend b^4 at the upper end of the said spring, whereby the needle will be carried upward with the frame G. The needles F are provided with the catch-pieces b^5, held between the upright guides b^6 b^6, which serve to prevent the needles from turning, the said catch-pieces being secured to the shanks of the needles by means of the screws b^7. The catch-pieces b^5 extend downward parallel with the side of the shanks of the needles and are provided with the projecting catch b^8, which at the upward movement of the needle-holding frame G and the guide-bars H^3 H^4 may come in contact with the catch-pawl b^9, which is pivoted at c^3 to the bar H^6, the said bar being secured to the under side of the lay-beam H^5 for sliding movement by means of the fixed guide-rod H^7, which is secured to the lay-beam by means of the brackets c^4 c^4, the said bar H^6 being secured to the guide-rod for sliding movement thereon by means of the perforated hanger c^5, which is secured by means of screws to one end of the said bar H^6, and the perforated hanger and guide-arm c^7, which is secured by means of screws to the other end of the said bar and is forked at its outer end c^8 to receive the post a^5 of the needle-holding frame G, whereby the said bar H^6, which carries the catch-pawls b^9, will be caused to move back and forth longitudinally in connection with the needle-holding frame G, so that the said catch-pawls will be uniformly maintained in line with their respective catches b^8 while the needles are being moved back and forth transversely of the warp by suitable mechanism, and a guide c^9, attached to the lay-beam H^5, is provided to prevent the swinging movement of the bar H^6 upon the guide-rod H^7. The catch-pawls b^9 are actuated for automatic disengagement from the catch b^8 by means of the spiral spring d^3, arranged between the arm d^4 of the catch-pawl b^9 and the side of the sliding bar H^6, to which the said catch-pawl is pivoted. The connecting-cords r are attached to the outer ends of the projecting arms d^5 of the catch-pawls b^9 and pass downward to the hole-board N, and thence to a selecting mechanism, as shown in Fig. 1. In the operation of the loom the backward movement of the lay will serve to cause the needles to rise into the shed, except when they are inhibited from upward movement with the needle-frame by the engagement of the catch-pawls b^9 with the catches b^8, the said engagement being effected by means of the cords r and the selecting mechanism, and when the upward movement of the nee-

dle has been so inhibited the said needle will be subsequently carried back to its normal position relatively to the needle-holding frame G by the engagement of the lower end of the shank of the needle with the upper surface of the bar J^4 upon the downward movement of the needle-holding frame at the beating-up forward movement of the lay, the needle being carried upward into the shed of the warp with the upward movement of the needle-holding frame G by the frictional engagement of the catch-spring b^3 with the notch a^9 of the shank of the needle. In the operation of a loom embodying this modification the needle-holding frame G has an up-and-down reciprocating movement, while the needles are moved endwise in the needle-holding frame by means of the stationary catch-pawls b^9, which are acted upon by the reciprocating knife S of the selecting mechanism O through the engaging hooks u and their cord connections, so that the needles F are not in this case moved into the shed by the direct action of the selecting mechanism thereon, as heretofore.

The several drawings illustrate the invention as applied to a loom in which the lappet-stitch is made of uniform length throughout the pattern; but the well-known means for automatically varying the length or both the length and position of the stitch may be employed, as shown, for instance, in my Letters Patent of the United States No. 570,259.

I claim as my invention—

1. In a lappet-loom the combination of needles adapted for independent movement into the shed, means for moving the needles laterally of the warp, means connected with the lay for moving the needles endwise, and a pattern mechanism for selecting the needles to be moved endwise, substantially as described.

2. In a lappet-loom the combination of needles adapted for independent movement into the shed, means for moving the needles laterally of the warp, means connected with the lay for moving the needles endwise, a pattern mechanism for selecting the needles to be moved endwise, and flexible connections between the pattern mechanism and the means for moving the needles endwise, substantially as described.

3. In a lappet-loom the combination of needles adapted for independent movement into the shed, means for moving the needles laterally of the warp, means connected with the lay for moving the needles positively in both directions endwise, and a pattern mechanism for selecting the needles to be moved endwise.

4. In a lappet-loom, the combination of needles adapted to be controlled individually as to their movement into the shed, means for moving the needles laterally of the warp, means connected with the lay for moving the needles endwise, a pattern mechanism for selecting the needles to be moved endwise, and flexible connections between the needles and the pattern mechanism, said connections being grouped together at that side of the warp from which the needles enter and thence operated in groups by means of leading connections to the pattern mechanism.

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Witnesses:
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