

No. 656,198.

Patented Aug. 21, 1900.

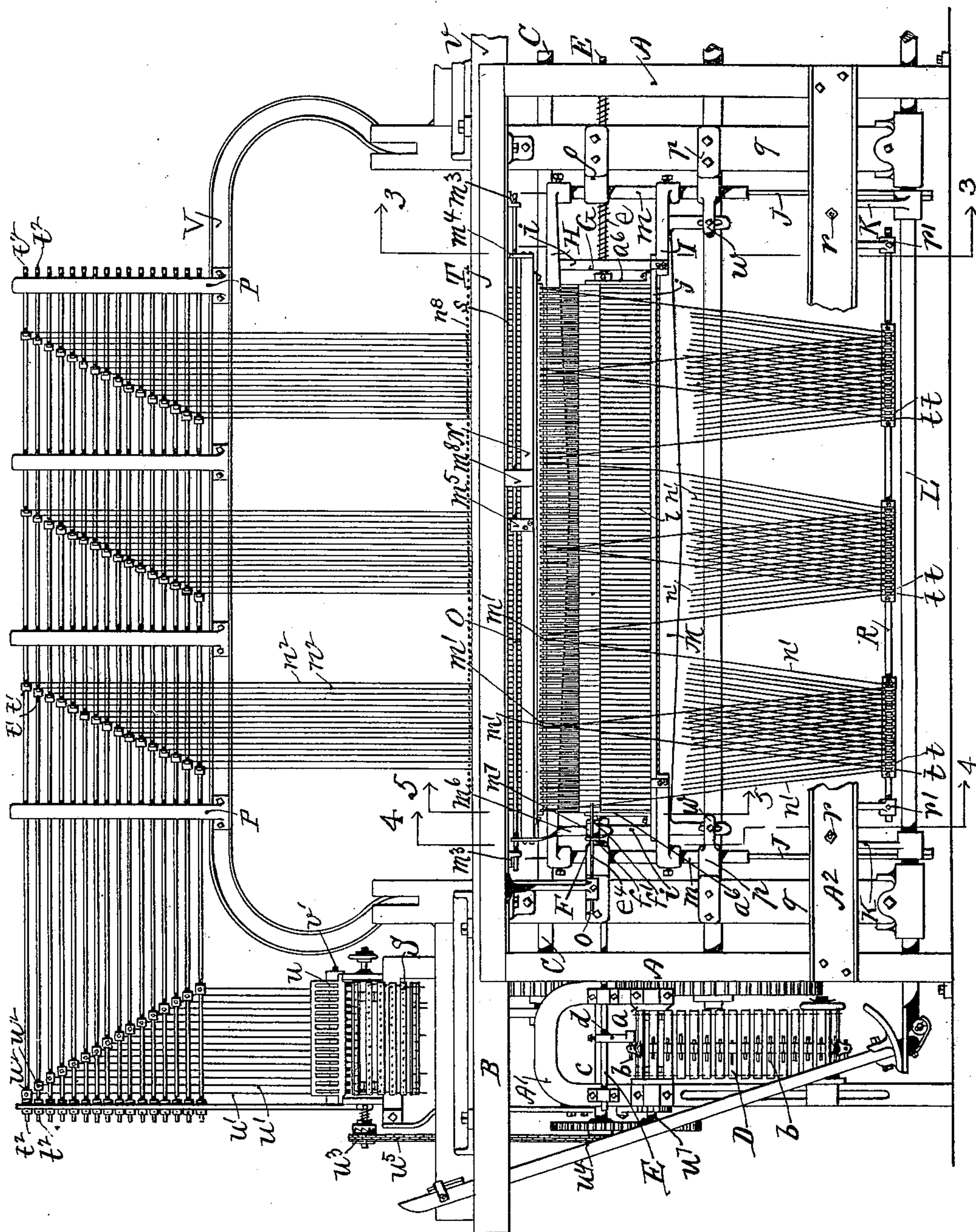
J. R. MacCOLL.

LAPPET LOOM.

(Application filed Mar. 10, 1897.)

(No Model.)

5 Sheets—Sheet 1.



WITNESSES:

Harry J. Garceau.
James W. Bruman

INVENTOR:

James R Maclell

BY

S. Schofield ATTY.

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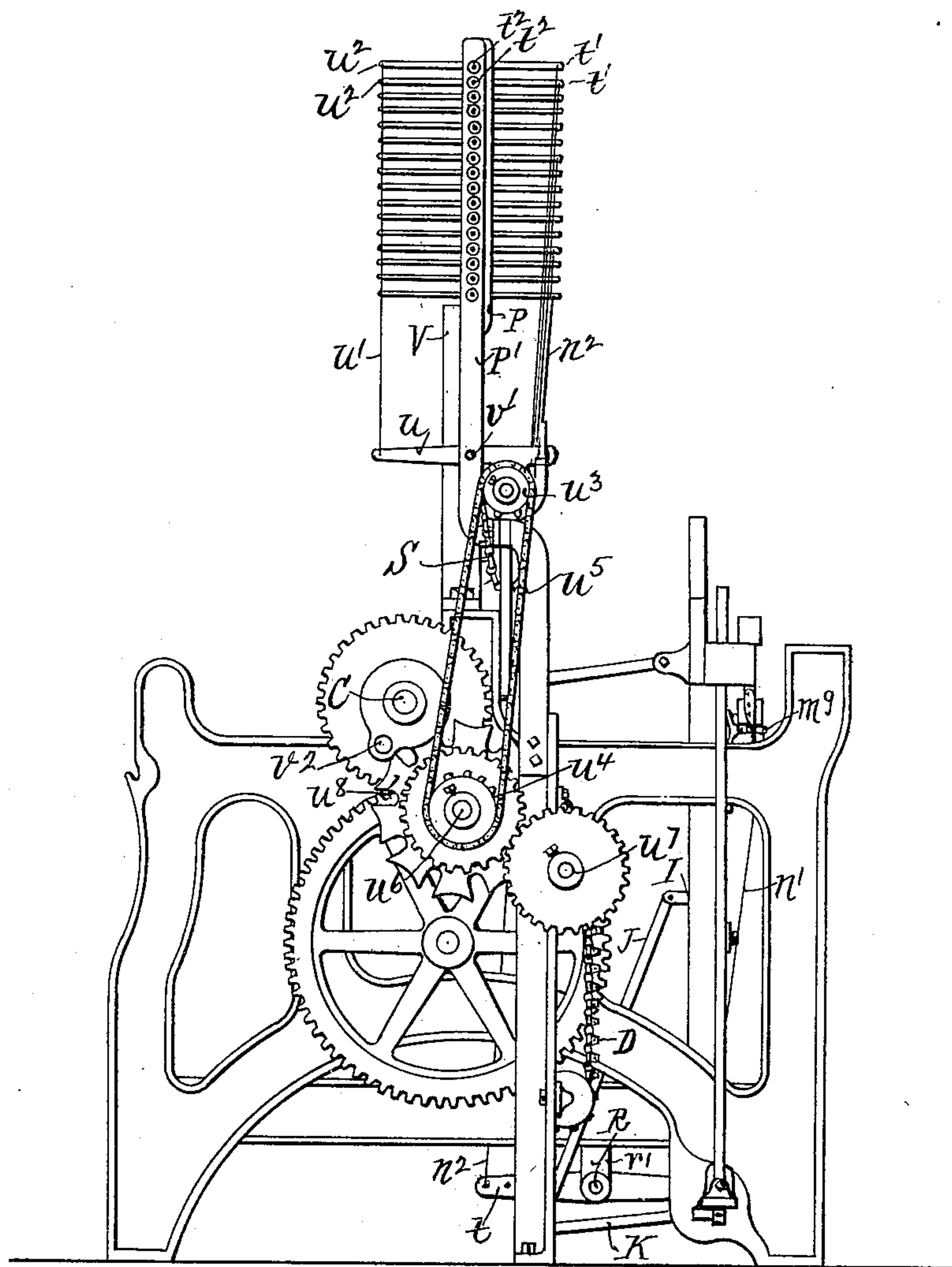
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(No Model.)

5 Sheets—Sheet 2.



WITNESSES:

FIG. 2.

INVENTOR:

Harry J. Gorman
James W. Brumby

James R. MacColl.

BY

L. Scholfield

ATTY

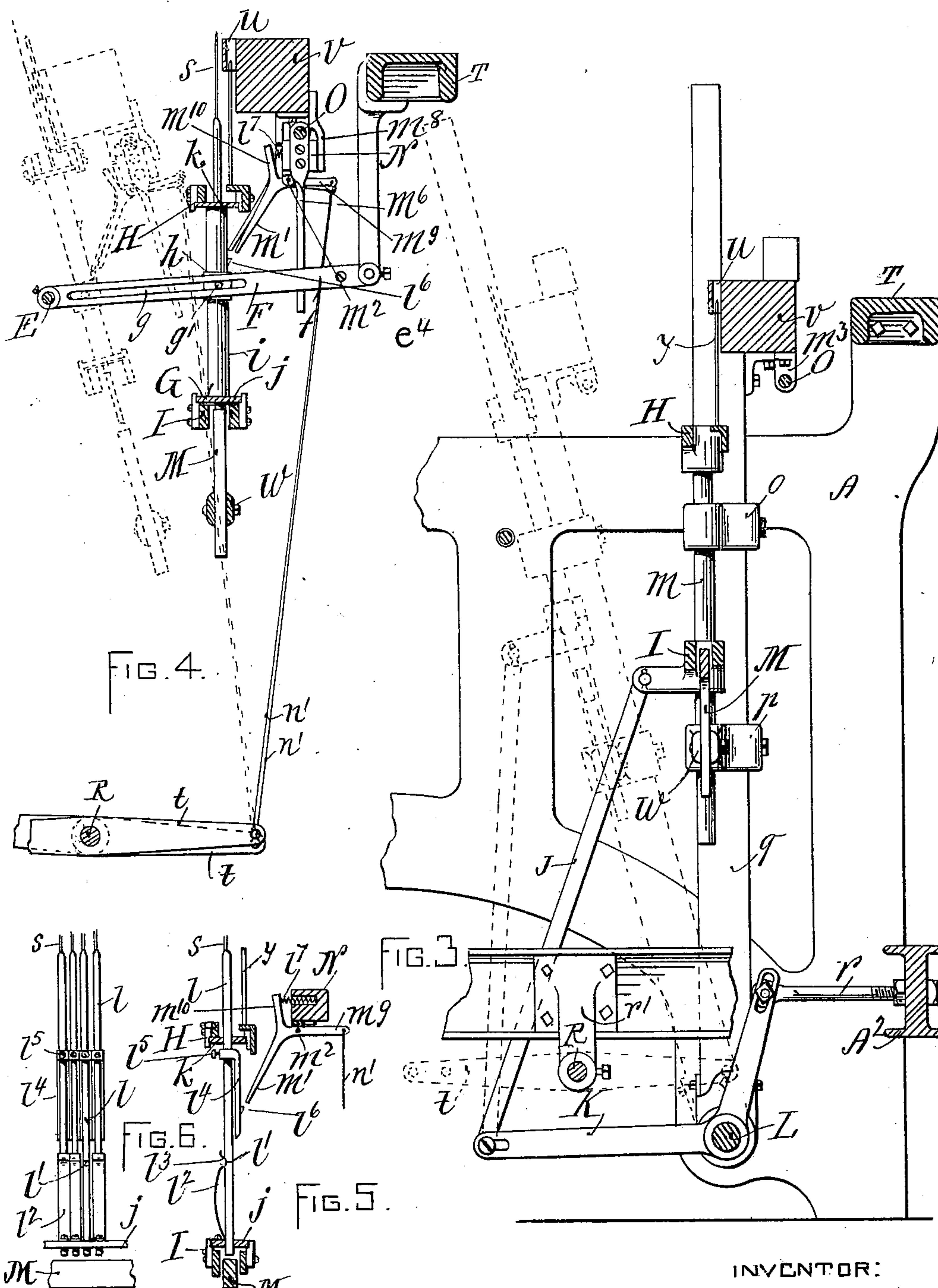
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WITNESSES:
Henry J. Garman
James W. Beaman

INVENTOR:

James R. MacColl
L. Scholfield
 ATTY.

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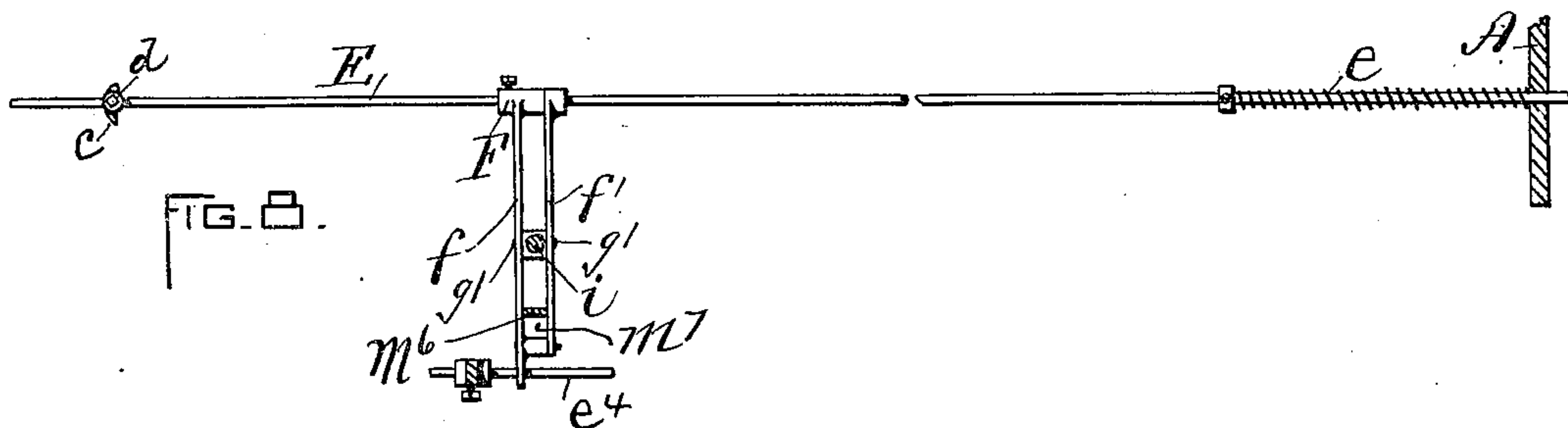
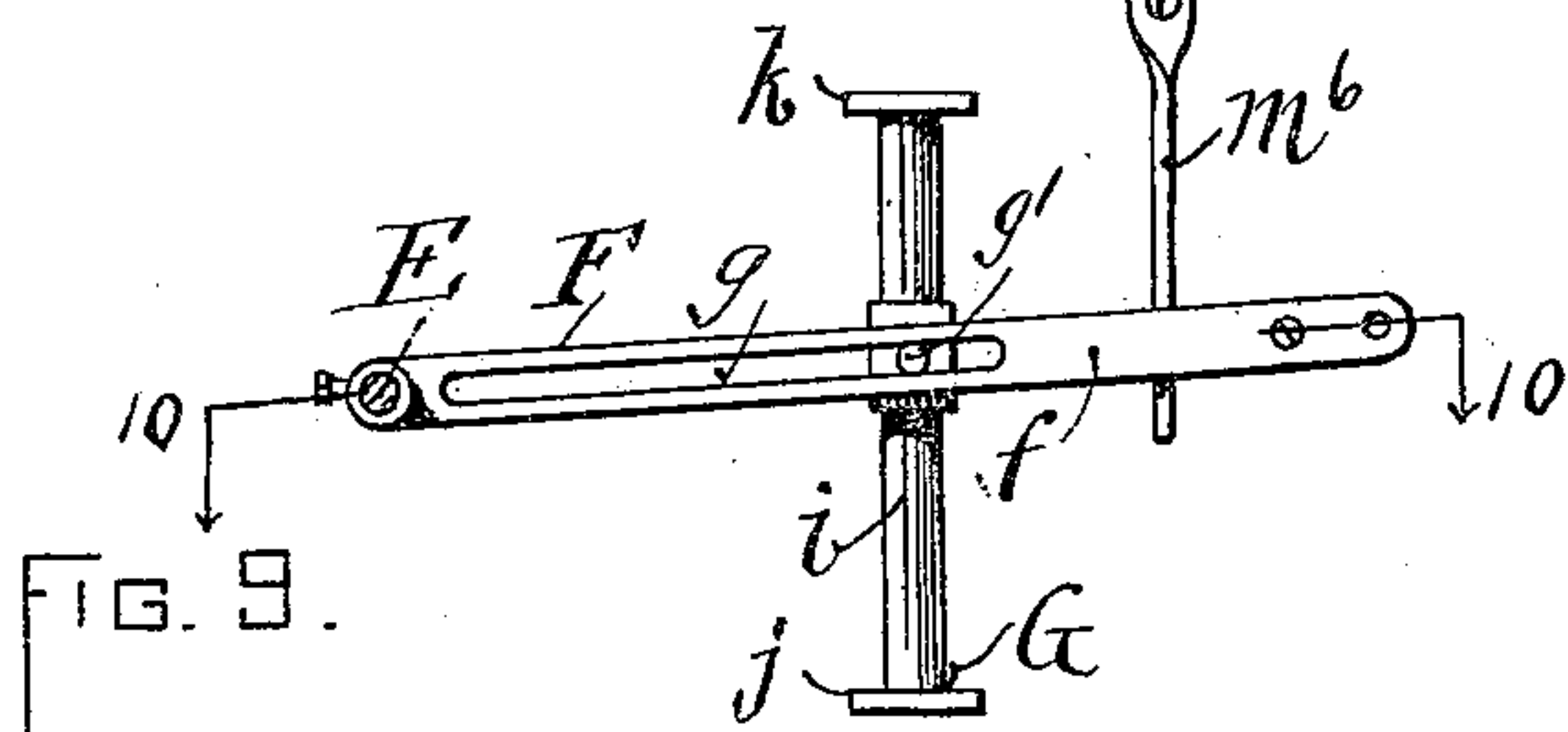
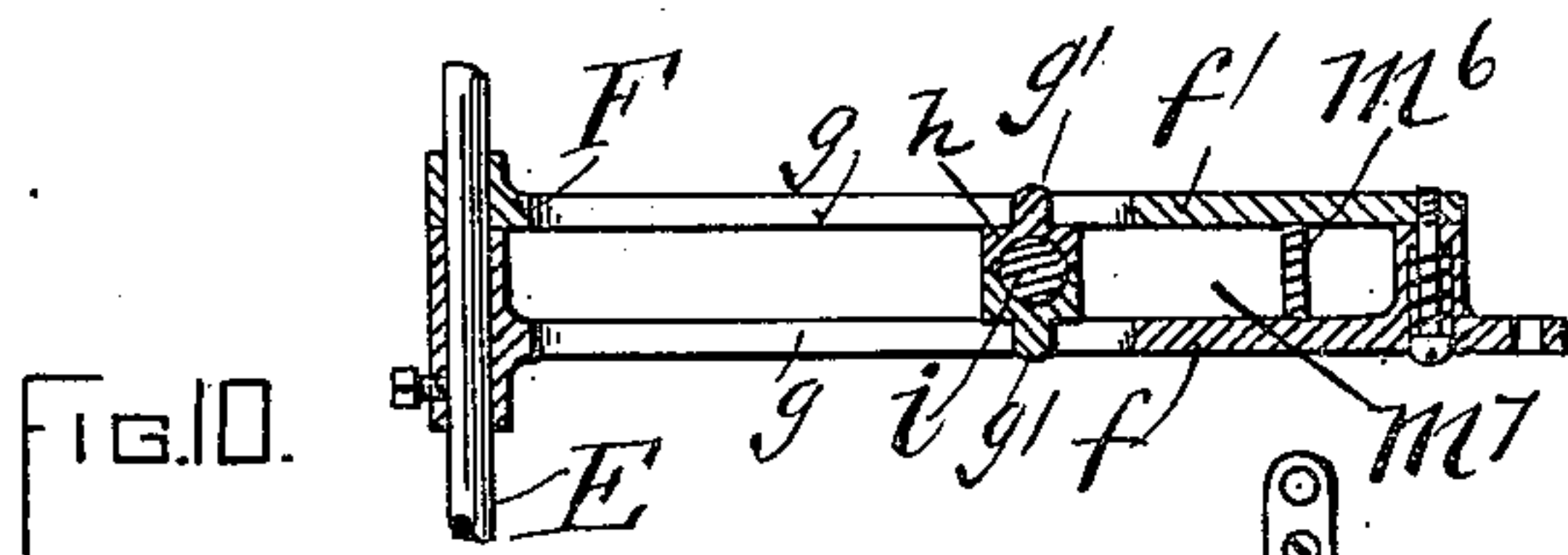
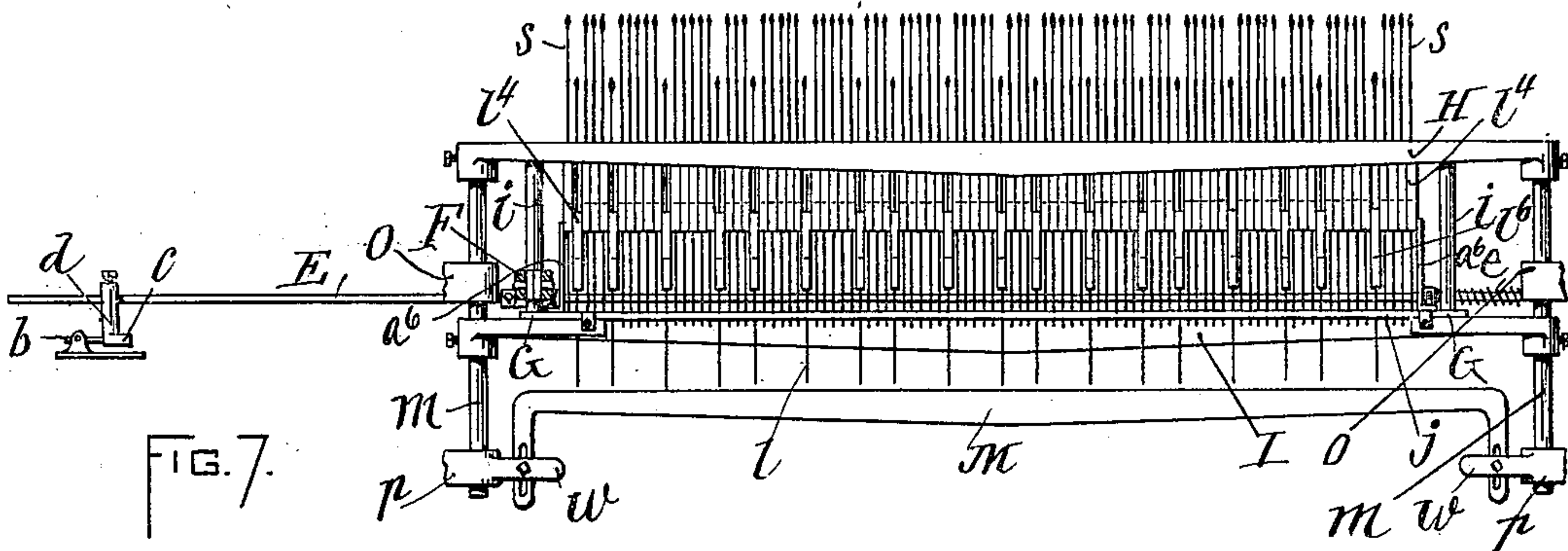
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(Application filed Mar. 10, 1897.)

(No Model.)

5 Sheets—Sheet 4.



WITNESSES:

Henry J. Garceau
James W. Beaman

INVENTOR:

James R. MacColl

BY

I. Scholfield

ATTY.

No. 656,198.

Patented Aug. 21, 1900.

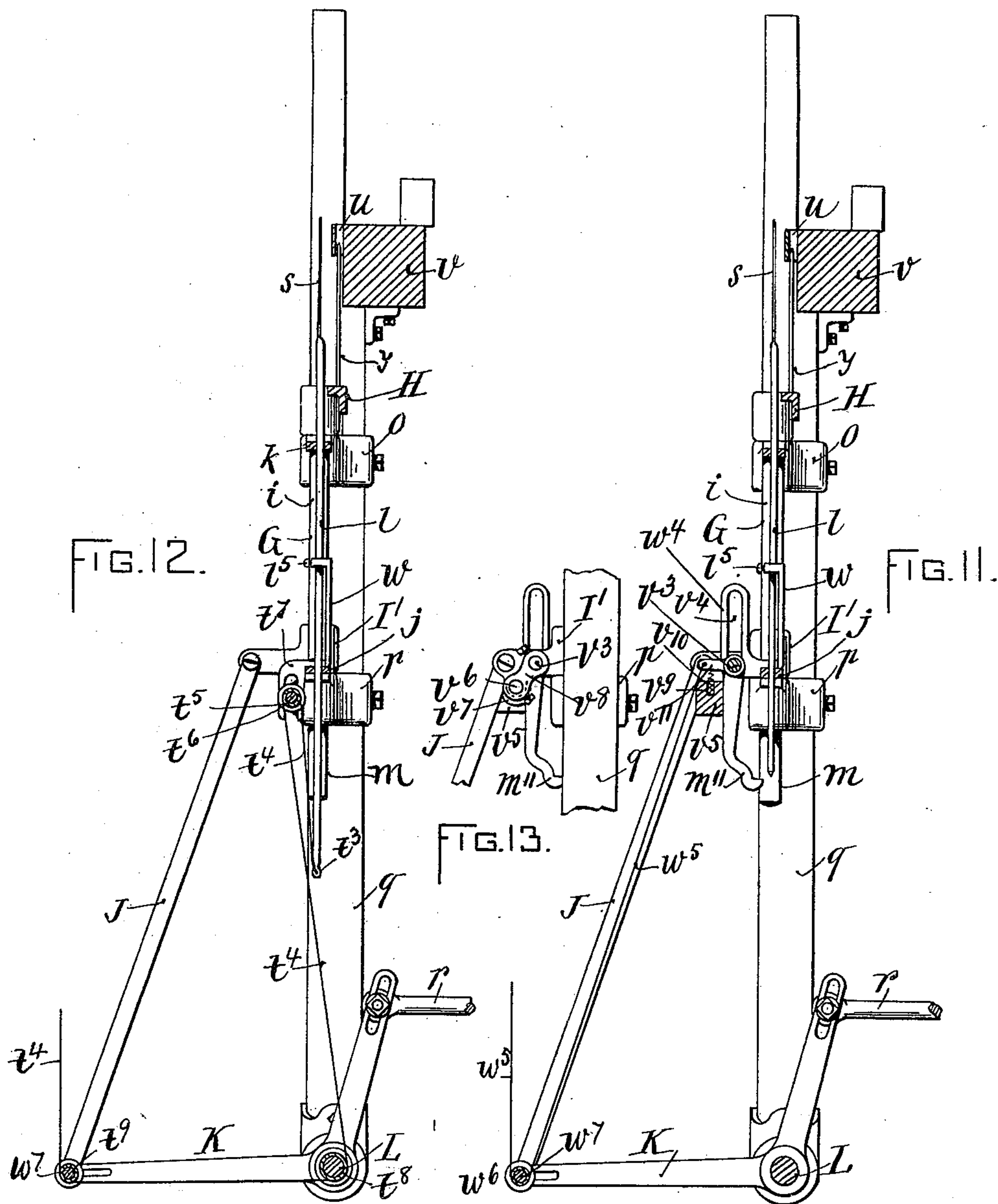
J. R. MacCOLL.

LAPPET LOOM.

(Application filed Mar. 10, 1897.)

(No Model.)

5 Sheets—Sheet 5.



WITNESSES:

Henry J. Garceau.
James W. Brumman

INVENTOR:

James R. MacColl

BY

A. Schofield

ATTY.

UNITED STATES PATENT OFFICE.

JAMES R. MACCOLL, OF PAWTUCKET, RHODE ISLAND.

LAPPET-LOOM.

SPECIFICATION forming part of Letters Patent No. 656,198, dated August 21, 1900.

Application filed March 10, 1897. Serial No. 626,838. (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
5 invented a new and useful Improvement in Lappet-Looms, of which the following is a specification.

My invention consists in the combination of a needle-bar, a plurality of needles carried
10 by said bar, pattern mechanism for moving the needle-bar transversely of the warp to determine and vary the length and position of the stitches made by the needles, and selecting mechanism to determine which of the needles shall carry their threads into the shed,
15 the new result being that I can produce not only all that class of patterns which can be produced in the lappet-loom described in my Patent No. 570,259, dated October 27, 1896,
20 but practically unlimited variations of such patterns, for in my present invention the needles are always under control of both the pattern mechanism and the selecting mechanism, which is the distinguishing characteristic of my invention.

In the accompanying drawings, Figure 1 represents the front view of a loom provided with my improvement. Fig. 2 represents an end view of the same. Fig. 3 represents an enlarged detail section taken in the line 3 3
30 of Fig. 1. Fig. 4 represents an enlarged detail section taken in the line 4 4 of Fig. 1. Fig. 5 represents an enlarged detail section taken in the line 5 5 of Fig. 1. Fig. 6 represents an enlarged back view of the needle-carrying rods. Fig. 7 represents a detail front view showing the needle-carrying rods and the frame in which they are held for independent action. Fig. 8 represents a top view
40 of the slotted arm and the spring-actuated sliding rod, which serves to operatively connect the needle-carrying frame with the pattern-chain. Fig. 9 represents an enlarged side view of the slotted arm for connecting the needle-carrying frame with the sliding
45 rod. Fig. 10 represents a section taken in the line 10 10 of Fig. 9. Fig. 11 is a sectional view illustrating a modification in which the catch-pawls have an up-and-down movement and serve to impart upward movement to the needle-holding rods. Fig. 12 is a similar sectional view illustrating the direct connection

of the needles with the needle-selecting mechanism. Fig. 13 represents a detail end view of the construction shown in Fig. 11.

In the accompanying drawings, A represents the frame of the loom, B the lay, and C the crank-shaft for operating the lay. To the projecting frame A' at the end of the frame A is journaled the sprocket-roll *a*,
60 which carries the pattern-chain D, the said chain being provided with the pattern-pins *b*, which are adapted to act against the inclined surface *c* of the arm *d* to cause the proper movement of the sliding rod E in accordance with the requirements of the pattern, the said arm *d* being carried forward to engagement with the pattern-pins *b* of the chain D by means of the spiral spring *e*, acting through the rod E. Upon the spring-actuated rod E, which is held for sliding movement in the frame A of the loom, is secured the slotted arm F, which at its outer end slides upon the fixed guide-rod *e*⁴, connected with the breast-beam T and is formed of the two
75 parts *f* and *f'*, each of the said parts being provided with a slot *g*, adapted to receive one of the opposite studs *g'* *g'* of the sliding box *h*, which is made in two parts and adapted to slide upon the end post *i* of the
80 needle-holding frame G, the said frame consisting of the lower perforated bar *j*, the upper perforated bar *k*, and the connecting end posts *i*, the needle-carrying rods *l* being loosely held in the perforations made in the said upper and lower bars *k* and *j*. The needle-holding frame G is held in suitable upper and lower guide-bars H and I, extending longitudinally of the lay, the said guide-bars being connected to each other by the upright sliding rods *m* *m*, to which the said guide-bars are securely attached. The sliding rods *m* *m* are held for up-and-down movement by means of the brackets *o* *o* and *p* *p*, attached to the swords *q* *q* of the lay, and the proper
95 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. 3, by means of the inclined links J J, which are pivoted at their upper ends to the rearward side of the lower guide-bar I and at their lower ends to the bell-crank levers K K, which are loosely held on the pivot-rod L of the lay and made capable of adjustment by means of

the bolts r r , which serve to connect the upper ends of the bell-crank levers K K with the tie-beam A^2 of the loom-frame A , the movement of the lay to its backward position, as shown by the dotted lines in Fig. 3, operating to cause the proper raising of the said guide-bars and the needle-holding frame, whereby the needles s will be properly raised into the shed.

The shuttle guide-pins γ are attached to the upper guide-bar H , as shown in Figs. 4 and 5, and pass upward through the guide-opening u at the back of the lay-beam v . The said shuttle guide-pins will thus be carried upward at each backward movement of the lay to guide the shuttle in its passage through the shed.

The bar M , which serves to return the needle-carrying rods to their normal position for the entrance of the needles into the shed, is turned downwardly at its ends and secured to the prolongations w of the brackets p p , which are attached to the swords of the lay, whereby the said bar M will be held in uniform relation to the lay, while the guide-bars H and I and the needle-holding frame will receive an up-and-down movement relatively to the lay at the backward-and-forward movement of the same.

The needle-carrying rods l are each provided with a notch l' , adapted for the engagement of the frictional catch-spring l^2 therewith, the said spring being attached to the lower bar j of the needle-holding frame G , as shown in Figs. 5 and 6, one of the said needle-carrying rods being shown in Fig. 6 without its retaining-spring in order to show the notch l' made in the side of the said rod to receive the frictional engaging bend l^3 at the upper end of the said spring, whereby the needle-holding rod will be carried upward with the frame G .

The needle-carrying rods l are provided with the catch-pieces l^4 , held between the upright guides a^6 , which serve to prevent the said rods from turning and are secured to the said needle-carrying rods by means of the screw l^5 . The said catch-pieces extend downward parallel with the side of the needle-carrying rods and are provided with the projecting catch l^6 , which at the upward movement of the needle-holding frame G and the guide-bars H and I may come in contact with the catch-pawl m' , which is pivoted at m^2 to the bar N , the said bar being secured to the under side of the lay-beam v for sliding movement by means of the fixed rod O , secured to the lay-beam by the brackets m^3 m^3 , the said bar N being secured to the guide-rod O for said sliding movement thereon by means of the perforated hanger m^4 , which is secured by means of screws to the end of the said bar, the intermediate hanger m^5 , secured to the side of the bar N at its middle portion, and the perforated hanger and guide-arm m^6 , which is secured by means of screws to the end of the said bar and extends downward

into the opening m^7 between the two parts ff' of the slotted arm F , whereby the said bar N , which carries the catch-pawls m' , will be caused to move back and forth longitudinally in connection with the needle-holding frame G , so that the catch-pawls m' will be uniformly maintained in line with their respective catches l^6 while the needles are being moved back and forth by the action of the pattern-chain D , and a suitable guide m^8 , attached to the lay-beam v , is provided to prevent the swinging movement of the bar N upon the guide-rod O .

The catch-pawls m' are actuated for automatic disengagement from the catch l^6 by means of a spiral spring l^7 , arranged between the arm m^{10} of the catch-pawl m' and the side of the sliding bar N , to which the said pawl is pivoted.

Upon the pivot-rod R , supported in the hangers r' , attached to the frame of the loom, are pivoted the levers t , shown as arranged in three sets with sixteen levers in each set, the number of needles s and needle-carrying rods l in the needle-holding frame G being preferably either made equal to the number of the said levers or to a multiple of the same, a series of ninety-six needles being shown in the drawing Fig. 1, which number is equal to twice the whole number of levers t employed in the several sets, so that in order to form an operative connection between the outer ends of the levers t and the catch-pawls m' , which serve to inhibit the upward movement of the needles into the shed with the upward movement of the needle-holding frame G , two sets of connections n' are made to the ends of the said levers—that is, from each of the said levers a cord connection is made to two inhibiting catch-pawls m' , which pawls operate each upon an individual one of the needle-holding rods in the adjoining sets of sixteen, the connecting-cords n' being shown in Fig. 1 as broken away in order to avoid the otherwise resulting confusion of lines over the needle-carrying rods l in the drawings. The connecting-cords n' are attached to the outwardly-projecting arms m^9 of the catch-pawls m' , and from the inner ends of the levers t connection is made to the outer ends of the lever-arms t' , secured to the rock-shafts t^2 by means of the wire connections n^2 passing between the warp threads, which threads are indicated by the row of dots n^8 in Fig. 1, the said rock-shafts being sixteen in number and supported by means of the bearing-standards P , which are secured to the arch-beam V of the frame of the loom, and the standard P' , the said rock-shafts t^2 being operated to cause the engagement of the inhibiting-pawls m' with the catches l^6 of the catch-pieces l^4 by means of the pattern-chain S , arranged to operate upon a series of sixteen levers u , which are pivoted at v' , connection being made between the said levers and the rock-shafts t^2 by means of the wire connections u' and the series of

lever-arms u^2 . The pattern-chain S is actuated by means of the sprocket-wheels u^3 u^4 and the sprocket-chain u^5 , the shaft u^6 of the sprocket-wheel u^4 being in gear engagement with the shaft u^7 of the sprocket-roll a , which carries the pattern-chain D, as shown in Figs. 1 and 2, and both pattern-chains S and D are operated from the crank-shaft C by means of the gear u^8 upon the shaft u^6 of the sprocket-wheel u^4 and the single tooth v^2 , which engages with a tooth of the gear u^8 at each revolution of the crank-shaft C.

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 by the selective engagement of the catch-pawls m' with the catches l^6 , the said selective engagement being effected by means of the pattern-chain S, and when the upward movement of the needle has been so inhibited the said needle will be subsequently carried back to its normal position by the engagement of the lower end of its carrying-rod l with the upper surface of the bar M 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 l^2 with the notch l' of the needle-carrying rod l .

A modification of my invention, in which the needle-holding bar or frame is adapted for endwise movement only and not for vertical movement, is shown in Fig. 11, and in this case the needles are caused to rise into the shed by means of a series of rising and falling catch-pawls m^{11} , which are caused to engage with the needle-carrying rods at the backward movement of the lay, the engagement of the said pawls with the needle-carrying rods being controlled by the selective pattern mechanism with which the said pawls are in operative connection. The needle-holding bar or frame G is guided for sliding endwise movement by means of the brackets o and p , attached to the swords of the lay, and the shuttle guide-pins y are attached to the bar H, 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 bar H, which carries the shuttle guide-pins y , is attached to the upper ends of the upright sliding rods m m , which are held for up-and-down movement in suitable perforations made in the brackets o and p , attached to the swords of the lay, the proper up-and-down movement being imparted to the said sliding rods by means of the inclined links J J, which are pivoted at their upper ends to bracket-pieces I', secured to the said sliding rods, and at their lower ends to bell-crank levers K, which are loosely held in a fixed position on the pivot-rod L of the lay by means of bolts r , connected with the tie-beam A² of the loom-frame, as before described. The needle-carrying rods l are guided for up-

and-down movement in suitable perforations made in the upper and lower bars k and j of the needle-holding frame G, the said needle-carrying rods being prevented from dropping away from the said frame by the stop-pieces w , attached to the needle-carrying rods by means of a screw l^5 , the lower ends of the said stop-pieces engaging with the upper side of the lower bar j of the needle-holding frame G when the needle-carrying rods are in their lower position, as shown in Fig. 11. The lifting pawls m^{11} are pivotally held upon a rod v^3 , which is adapted at each end to slide endwise in suitable perforations made in the bracket-pieces I', and the required endwise movement is imparted to the rod v^3 in order to preserve the proper relative position of the lifting pawls with their respective needle-carrying rods, by means of the slotted arm w^4 , attached to the lower bar j of the needle-holding frame G, so as to move therewith, and suitable collars arranged upon the said sliding pivot-rod v^3 at each side of the said slotted arm, and by this means the lifting pawls m^{11} and their respective needle-carrying rods l will be moved in unison transversely of the warp by the action of the pattern mechanism. The lifting pawls m^{11} are adapted for engagement with the lower ends of the needle-carrying rods l , the said pawls being carried upward with the upward movement of the bracket-pieces I' 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 v^3 being caused to move up and down in the slot v^4 of the arm w^4 . In order to cause the required automatic backward movement of the lifting pawls from their engagement with the lower ends of the needle-carrying rods l , a wooden bar v^5 is employed, provided at its ends with rods v^6 , which slide loosely in a perforation made in the downwardly-extending ears v^7 of the bracket-pieces I', the said rods v^6 being connected to the rod v^3 , upon which the pawls are pivoted, by means of connecting-arms v^8 , whereby the bar v^5 will be caused to partake of the endwise movement of the rod v^3 . The wooden bar v^5 is provided with perforations v^9 , adapted to receive spiral springs v^{10} , which by acting upward against the under side of the rearwardly-extending arm v^{11} of the lifting pawl m^{11} will serve to cause the automatic disengagement of the lifting pawl from its engagement with the needle-carrying rod l . Suitable connection is made between the arms v^{11} of the pawls and the needle-selecting mechanism by means of cord connections w^5 , which pass around a series of small pulleys w^6 , arranged upon a rod w^7 , which connects the opposite arms K, and by this means the forward-and-backward movement of the lay may be effected without causing a change in the relative position of the lifting pawls m^{11} with the needle-carrying rods. The cord connections w^5 are to be extended to the system of lever-arms t and

rock-shafts t^2 , (shown in Figs. 1 and 2,) thus subjecting the needles to the selective action of the pattern-chain S.

Another modification is shown in Fig. 12, in which the needle-holding frame G is adapted only for endwise movement, as in Fig. 11, and the needle-carrying rods l are connected directly with the lever-arms t' (shown in Figs. 1 and 2) without the intervention of an engaging mechanism, and in this case the needle-carrying rods are preferably provided with an eye t^3 , to which a cord t^4 is connected, the said cord passing around a pulley t^5 , arranged to turn loosely upon a rod t^6 , which is adapted to slide loosely in suitable bearings made in the brackets p , attached to the swords of the lay, whereby by means of the slotted arm t^7 , attached to the lower bar j of the needle-carrying frame G, the said pulley will partake of the movement of the said needle-carrying frame transversely of the warp, and the relative position of the pulley with the needle-carrying rod will be preserved at all positions of the needle relatively to the warp-threads. The cord t^4 after passing around the pulley t^5 passes downward around a pulley t^8 upon the pivot-rod L of the lay, thence around a pulley t^9 upon the rod w^1 , which connects the opposite arms K, and by this means the forward-and-backward movement of the lay may be effected without causing a change in the vertical position of the needles. The cord connections t^4 are to be extended to the system of lever-arms t' and rock-shafts t^2 , (shown in Figs. 1 and 2,) thus subjecting the needles to the selective action of the pattern-chain S.

An important feature of my invention resides in making the connections between the needles and the selecting mechanism movable without interfering with the warp-threads. This feature will be better understood by reference to the British patent of Hamilton, No. 407 of 1878, in which the selective connections at the needles pass through the warp, but the movement of those connections crosswise of the warp with the needles tends to displace the warp-threads sidewise, and this not only greatly limits the range of patterns, but also practically prevents the use of warp-threads each nearly in contact with its neighbors; but by arranging these connections so that no part of them which passes through the warp moves crosswise of the warp the needles may be moved to any desired extent transversely of the warp without displacing the warp-threads.

The gist of my invention consists in controlling the engagement of the needles with the shed of the warp not only by the lappet-pattern mechanism, which is adapted to vary the length of the stitches transversely of the warp, but also by a selecting mechanism for the needles, and this double control of the needles constitutes practically a new class of

lappet-looms in which the specific method of causing the selective engagement of the needles with the shed of the warp-threads may be varied without departing from the spirit of my invention; but in order to embody this the main feature of my invention with best advantage the cords or other connections through which the needles are controlled by the selecting mechanism must not displace the warp-threads when the needles are moved across the warp—that is, they must be clear of the warp in the sense that they must not be moved against the warp-threads when the needle bar or frame is moved to give the desired length or position of the stitches.

I do not herein claim, broadly, means for moving the needles toward and from the warp in combination with a selecting mechanism that determines which of the needles shall be moved by the needle-moving means, which means is actuated separately from the selecting mechanism, as that invention is fully described and claimed in my pending application, Serial No. 668,323.

It is common in lappet-looms to make the lappet-pattern on either the upper or under side of the cloth, and while I have shown a loom in which the pattern is made on the under side it will be plain to all skilled in the art that my invention is equally applicable to looms in which the pattern is made on the upper side of the cloth, in which case the needles would be located above the warp and the connections would pass directly up to the selecting mechanism.

I claim as my invention—

1. In a lappet-loom, the combination of a needle-holding bar or frame, means for giving the bar or frame its movements transversely of the warp, needles adapted for movement relatively to the needle bar or frame, needle-selecting mechanism, and connections passing between the warp-threads and held from movement with the needles transversely of the warp, to connect the needles with the needle-selecting mechanism, substantially as described.

2. In a lappet-loom, the combination of the needle-holding bar or frame, mechanism for moving the needle-holding bar or frame transversely of the warp to determine the length or position of the stitches, means for imparting movement to the needle-holding bar or frame toward and from the warp, needles adapted for movement both transversely of the warp, and toward and from the warp in connection with the needle bar or frame, and selecting mechanism for inhibiting the movement of the needles into the shed of the warp with the movement of the needle bar or frame, substantially as described.

JAMES R. MACCOLL.

Witnesses:

SOCRATES SCHOLFIELD,
ETHELBERT VOWLES.