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LOOM.

APPLICATION FILED JUNE 24, 1908.

954,450.

Patented Apr. 12, 1910.

4 SHEETS—SHEET 1.

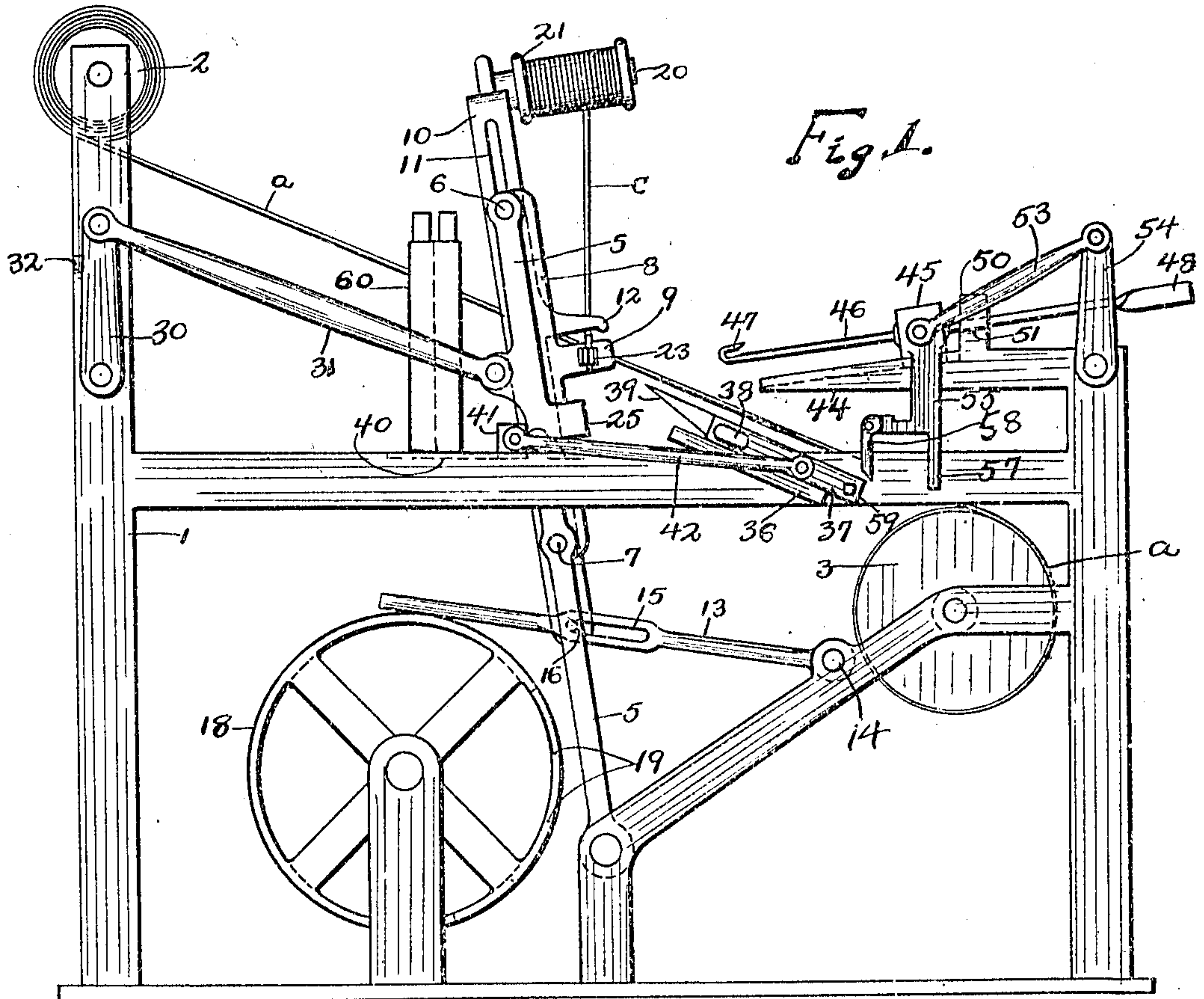
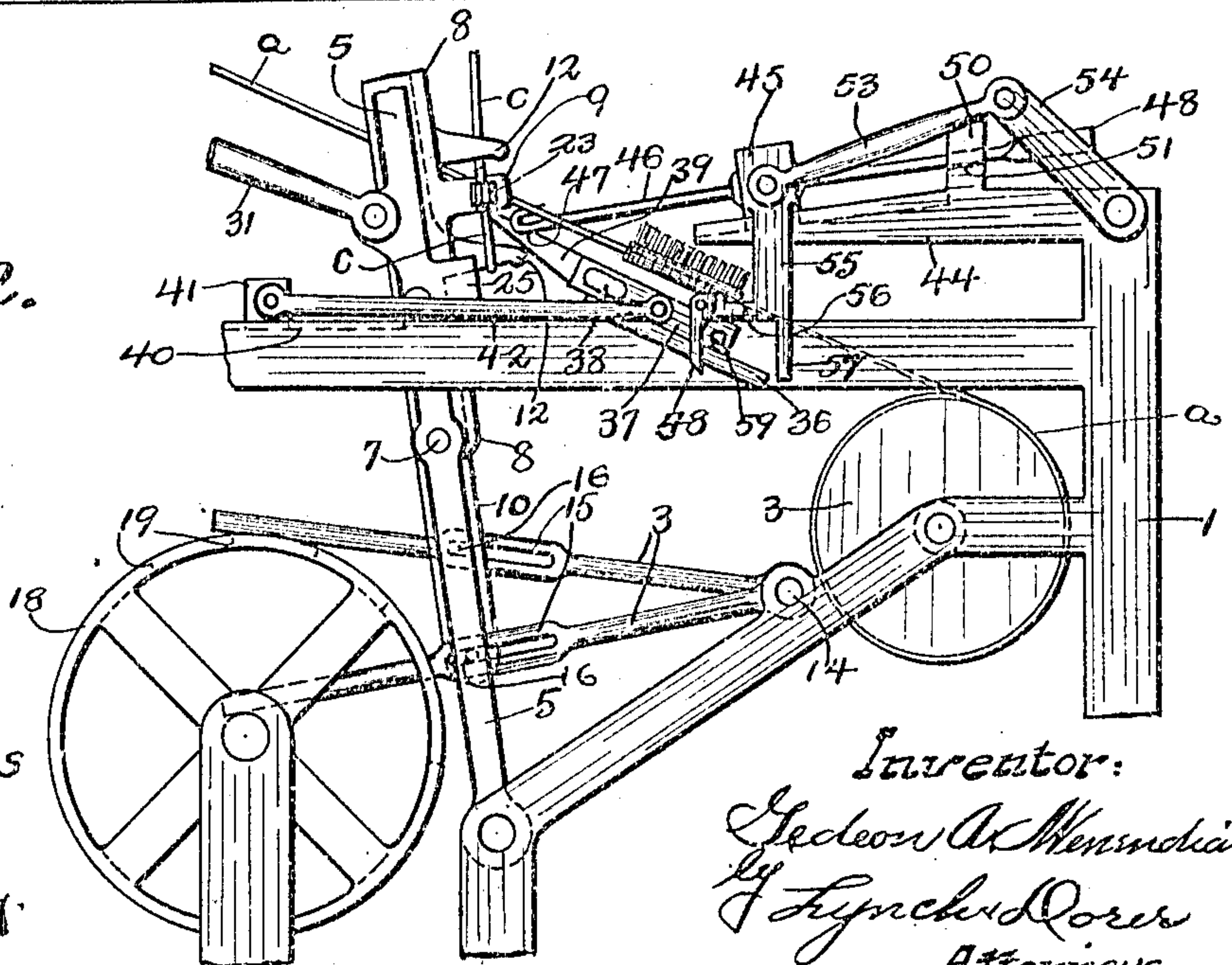


Fig. 2.



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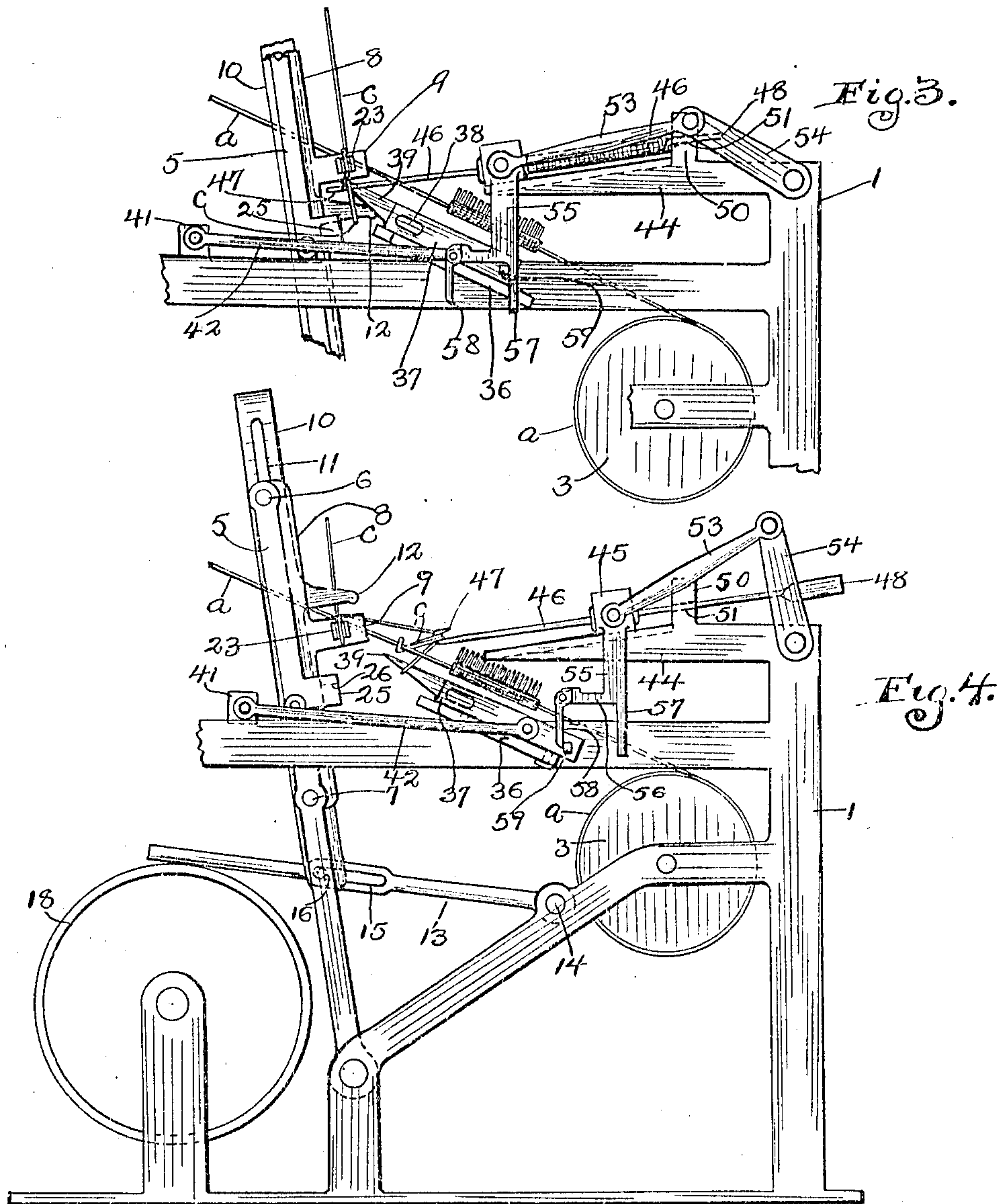
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4 SHEETS—SHEET 2.



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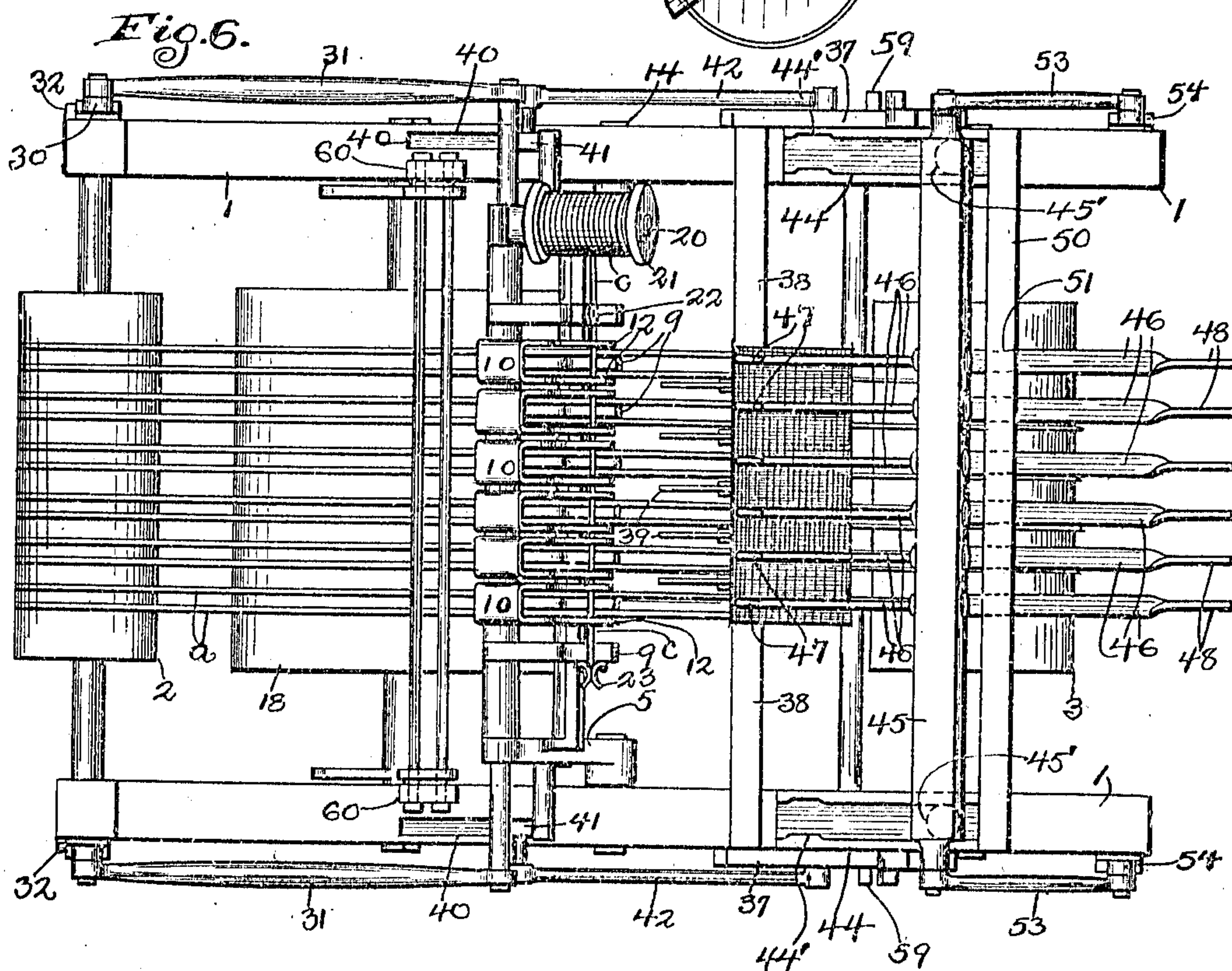
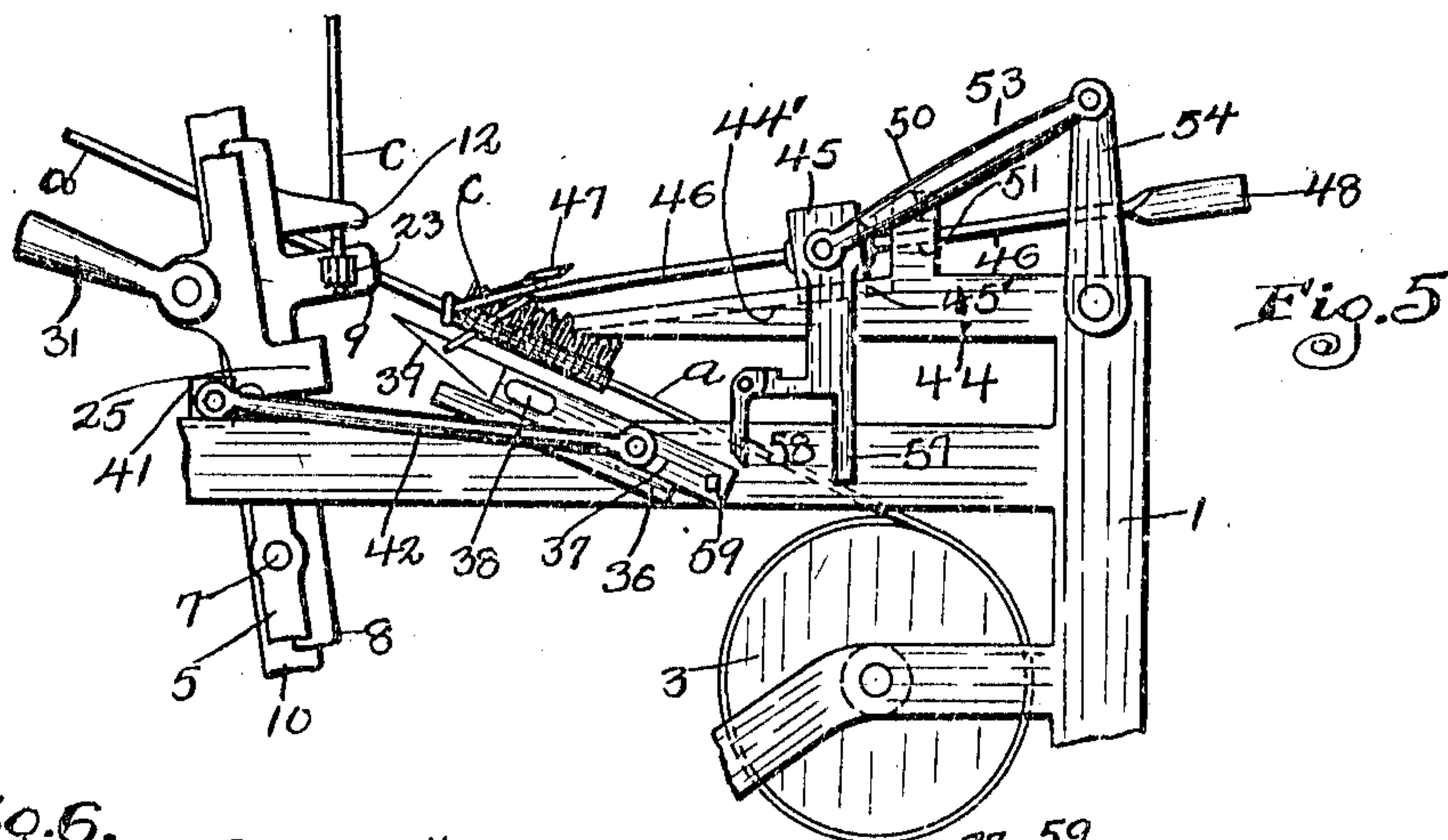
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4 SHEETS—SHEET 3.



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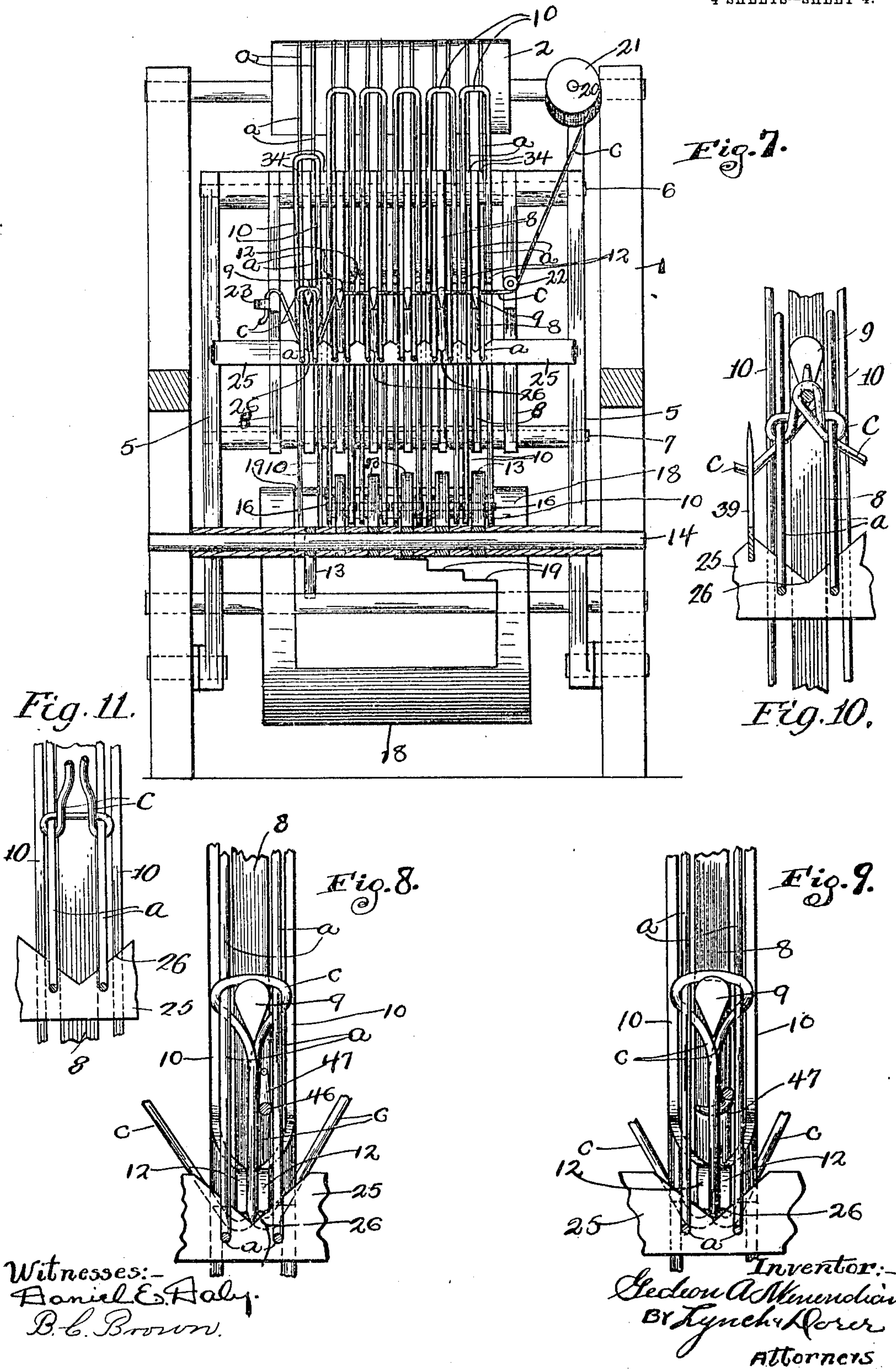
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4 SHEETS—SHEET 4.



UNITED STATES PATENT OFFICE.

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LOOM.

954,450.

Specification of Letters Patent.

Patented Apr. 12, 1910.

Application filed June 24, 1908. Serial No. 440,060.

To all whom it may concern:

Be it known that I, GEDEON ARISTOTLE MENENDIAN, a citizen of the United States of America, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Looms; and I hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use the same.

This invention relates to improvements in knot-tying mechanism for looms for making oriental rugs, carpets and the like.

The object of this invention is to provide a loom capable of producing a carpet or other fabric having a heavy tufted surface similar to that produced by oriental weavers.

With this object in view, my invention consists in providing in combination with a loom adapted to weave a suitable body fabric mechanism for knotting tufts of yarn into the said body fabric during the weaving process.

My invention also consists in the features of construction and combinations of parts as illustrated in the drawings and hereinafter described in the specification and pointed out in the claims.

By referring to the drawings, it will be seen that my improved loom comprises a main stationary frame on which are mounted the heddle frames which are arranged to operate in the usual manner. A vertically arranged frame is pivotally mounted at its lower end in the main frame so that it is free to rock therein. This frame extends from side to side of the main frame and carries a series of vertically arranged stationary spacing rods, each of which is provided with a small projection or bracket. The projections or brackets serve as supports for the yarn from which the knots or tufts are made as will be explained hereafter. At each side of each spacing rod is arranged a flat resilient strip or bar which is free to slide in said rocking frame so that each spacing rod lies between a pair of said bars, and the bars forming each pair of bars are preferably connected at their upper ends forming elongated inverted U-shaped members which of course are free to slide vertically in said rocking frame. A projection or jaw is arranged on each bar and extends forwardly therefrom and therefore each U-

shaped member carries a pair of said jaws and when the U-shaped members are in their upper or normal position in the rocking frame the jaws on each U-shaped member are above the bracket on the spacing rod within the U-shaped member. Means is provided for holding the bars in their upper position so that each pair of bars,—that is, each U-shaped member,—may be permitted to move down in the rocking frame as desired. As shown, this means comprises a series of levers which are fulcrumed at one end in the main stationary frame and to each of which one of the U-shaped members is operatively connected. The free ends of the levers rest on a drum, the surface of which is partially cut away forming a series of openings and the openings are so arranged that when the drum is rotated the support for each lever will be successively removed so that one lever will drop at a time, which permits the U-shaped members to move down in succession accordingly.

Mounted on and extending horizontally across the front of the rocking frame below the bracket on the spacing rod is a member or bar in the upper edge of which are formed a series of V-shaped notches each of which is designed to receive a pair of jaws on a U-shaped member and cause said jaws to converge and grip the knot or tuft forming yarn when the U-shaped member moves down as will be explained later. The reel that carries the warp threads is mounted on the rear end of the main frame and the threads are then carried downwardly through the heddle frame and through the rocking frame to a reel, at the front end of the main frame on which the woven fabric is wound. The warp threads are carried through the rocking frame in pairs, each pair passing through a U-shaped member, one thread passing at one side and the other thread passing at the other side of the spacing rod. The knot or tuft forming yarn is carried by a spool mounted near the top at one side of the rocking frame and the yarn is brought down around a small pulley and laid along the top of the brackets on the spacing rods and therefore under the jaws on the U-shaped members and the end of the yarn is secured in a clip on the side of the rocking frame opposite to the side on which the spool is mounted.

Mounted in the upper part of the frame near the front of the machine is a sliding

carriage which extends from side to side of the frame. This carriage is provided with a number of slender needle-like rods which correspond with the number of knots to be tied. These rods are revolubly mounted in the carriage and extend forwardly and rearwardly of the carriage and terminate in hooks at their rear ends. The opposite or forward ends of said rods are flattened and have a slight twist. These ends pass through openings in the stationary bar which extends across the front of the machine, and the openings are so arranged or shaped as to impart a quarter revolution to the rods or spindles when the carriage reaches its limit of travel rearwardly, that is toward the rocking frame so that the hook is turned from a vertical to a horizontal position. This carriage travels on an incline in the direction of the lower rear part of the machine, and the warp threads incline toward the lower front part of the machine and therefore the two approach each other and the inner or hook ends of the rods on the carriage pass downwardly and rearwardly through the warp threads when the carriage is advanced. A sliding carriage extends transversely of the frame and thereon is mounted a series of knife-blades which correspond in number to the number of U-shaped members. These knives are arranged to cut the yarn between the knots after the knots have been tied when the carriage is advanced by the means provided for that purpose which will be particularly described later.

In the accompanying drawings Figure 1 is a side elevation of the machine before being operated. Fig. 2 is a similar view with part broken away but showing one of the U-shaped members in its lowest position and with the hook bearing carriage and the knife bearing carriage partly advanced. Fig. 3 shows the parts in the same position as Fig. 2, except that the hook bearing carriage has been farther advanced so that the hooks thereon are in position to engage the tuft-forming yarn and the knives on the knife-bearing carriage are slightly inserted in the loops of the tuft-forming yarn. Fig. 4 is a similar view but showing the hook bearing carriage drawn back and the tuft-forming yarn engaged by the hook and also the knife-bearing carriage drawn back with the loop of the tuft-forming yarn on the blade. Fig. 5 is a similar view but showing the hook bearing carriage drawn back a little farther while the knife-bearing carriage has remained stationary which has caused the severing of the loop on the knife. Fig. 6 is a top plan of the machine. Fig. 7 is a section on line 7-7, Fig. 1. Fig. 8 is an enlarged front view of one of the U-shaped members with part broken away and the inclosed spacing bar together with two

warp threads and a portion of the tuft-forming yarn, also showing the end of one hook in a vertical position. Fig. 9 is in all respects similar to Fig. 8 but showing the hook in a horizontal position. Fig. 10 is similar to Fig. 9 showing the tufting-yarn withdrawn from the bracket by the hook. Fig. 11 is a similar view showing the yarn cut and the ends drawn up to form the tufts.

Again referring to the drawings 1 represents the stationary frame at the back of which is mounted a reel 2 from which the warp threads *a* are carried downwardly and across the frame to a reel 3 mounted at the front of the frame and on which the fabric is wound as woven. In the lower part of the frame near the center thereof is pivotally arranged a rocking frame comprising two vertically arranged side-pieces 5 which are joined together by cross rods 6 and 7 one at the top and the other half way down. On the cross pieces 6 and 7 are rigidly mounted spacing rods 8 each of which is provided with a forwardly extending projection or bracket 9. A series of U-shaped members 10 having slots 11 through which the cross pieces pass are mounted in the rocking frame so as to move freely up and down therein and the side pieces or bars of each U-shaped member inclose a spacing rod 8. On the side bars of each U-shaped member 10 is arranged a jaw 12 so that each U-shaped member carries a pair of such jaws, and when the U-shaped members 10 are in their upper position the jaws 12 are above the brackets 9, and when the U-shaped members 10 are in their lower position the jaws 12 are below the brackets 9. In the lower part of the frame below each U-shaped member is arranged a lever 13 one end of which is fulcrumed on a shaft 14. In each lever 13 is formed a slot 15 and a pin 16 is passed through the lower end of each U-shaped member and through the slot 15 in the lever 13 thereunder, so that each U-shaped member is operatively connected to a lever 13. A drum 18 is mounted below the free ends of the levers 13 so that the free ends of the levers may rest thereon, and a portion of the surface of the drum 18 is cut away, as at 19, making a sort of step-formation so that when the drum is turned by any suitable means, (not shown,) the support beneath the free ends of the levers 13 will be successively removed permitting the levers to drop down consecutively from left to right and the U-shaped members which are secured to said levers will move down in succession accordingly, and the extent of movement is such that the jaws 12 on the U-shaped members will move from their normal position above the brackets 9 on the spacing rods 8 to a position below the brackets 9. On the upper end of one of the sides 5 of the rocking frame is secured a spindle 20 on which is

mounted a spool 21 which carries the yarn *c* of which the knots or tufts are to be made. On the end spacing rod adjacent to that side of the frame on which the spool 21 is mounted is arranged a small pulley or guide sheave 22 and on the end spacing rod at the opposite side of the frame are mounted a pair of spring jaws 23; the pulley 22 and the jaws 23 being about in line with the brackets 9 on the spacing rods 8 and therefore below the jaws 12 on the U-shaped members 10. The yarn *c* from the spool 21 is carried beneath the pulley 22 and is laid along on top of the brackets 9 on the spacing rods 8 and the end of the yarn is secured between the jaws 23. A plate 25 is arranged across the rocking frame at a suitable distance below brackets 10 and in the upper edge thereof are formed a series of V-shaped notches 26, each of which is arranged to receive a pair of jaws 12 on a U-shaped member when they are in their lowered position and cause the jaws to close.

It will be readily understood that, as the drum 18 is turned permitting the levers 13 to move down, the U-shaped members nearest to the jaws 23 will move down first and the jaws 12 thereon will pass down on opposite sides of the bracket 9, on the spacing rod 8 inclosed by said U-shaped members, and said jaws will also pass on the outside of the pair of warp threads which pass through said U-shaped members and therefore the tuft-forming yarn is carried down around the bracket 9 and on the outside of the warp threads and when the jaws have passed below the warp threads they enter a V-shaped notch in the plate 25 and are caused to converge and grip the tuft-forming yarn as shown in Fig. 8. Crank arms 30 are mounted at each side of the frame below the reel 2 and links 31 are secured to these arms and to the rocking frame and when the rocking frame is in its backward or normal position the arms will abut against stops 32 which limit the backward movement of the frame and this arrangement serves to brace the rocking frame while permitting it to rock forward so as to pound the woven fabric after a row of knots has been tied or after a woof thread has been passed through the warp threads.

Before leaving the description of the rocking frame it may be mentioned that spacing rings 34 are arranged on the cross bars 6 and 7 between each U-shaped member and between the side bars of the U-shaped members and the spacing rods.

On the side bars of the frame 1 are arranged inclined strips 36 which form a slide-way for the knife carriage. This carriage comprises two side pieces 37 and a cross member 38 which extends across the top of the frame 1. The side pieces 37 are arranged on the outside of the side bars of the

frame 1 and rest on the strips 36 and are inclined to correspond to the inclination of said strips. On the cross member 38 are rigidly secured a series of knives 39 which are so located that the knives are in line with the spaces between the U-shaped members. In the top of each side bar of the frame 1 is formed a small groove or guideway 40 and in each guideway is arranged a sliding block 41. A link 42 extends from each block to the adjacent side of the knife carriage and this arrangement serves to hold the knife carriage on the strips 36 while permitting the carriage to slide freely on the said strips. At the front end of the frame 1 above the side bars thereof are arranged two brackets 44 which form the support and slideway for the hook carrying carriage 45 which consists of a bar extending from side to side of the frame 1 and provided with lugs 45' which extend down into guideways 44' formed in the bracket 44. The guideways 44' have a slight swerve or bend near their rear ends. In the carriage 45 are mounted a number of needle-like rods 46 which are arranged to turn freely in the carriage but are fixed against longitudinal movement in the carriage. On the rear ends of the rods 46 are formed hooks 47 and the front or outer ends of said rods are flattened and a quarter-twist is imparted to each, as at 48. On the brackets 44 is mounted a stationary cross bar 50 which is provided with a horizontal slot or opening 51 through which the rods 46 pass and when the carriage is advanced, by the means hereinafter described the twisted ends of the rods will be drawn through the opening in the bar 50 thereby producing a quarter turn of each rod, which changes the position of the hook thereon from vertical to horizontal. The rods are so mounted in the carriage that when the carriage is at the front of the frame the rods are in line with the tuft-forming yarn extending between the brackets 9 and the jaws 12, but when the carriage is advanced the turn in the guideways will shift the carriage transversely of the frame and the hooks will pass to one side of the yarn.

To each side of the carriage 45 is connected one end of a link 53 the other end of which is connected to a crank arm 54 journaled on the front end of the frame 1, and therefore by taking hold of the arms 54 the carriage can be moved back or forward as desired. A rigid arm 55 extends down at each side of the carriage 45 and has a horizontal extension 56 and a vertical extension 57. To the horizontal extension 56 is pivotally secured a depending pawl or dog 58 which can only swing toward the extension 57. On each side of the knife-carrying carriage is mounted a pin 59. Now as the hook carrying carriage is advanced the pawls 58

will pass over the pins 59 and there will be no movement of the knife-carrying carriage until the vertical extensions 57 come in contact with the pins 59 and then the hook-carrying carriage and the knife-carrying carriage will travel together the full rearward movement of both, that is until the points of the knife blades are inserted within the loops of the tuft-forming yarn. Then when the hook carrying carriage starts to move in the opposite direction it will travel a short distance, that is the distance between the vertical extensions 57 and the pawls 58 before the pawls 58 engage the pins on the knife carriage during which time there will be no movement of the knife carrying carriage and therefore the movement of the hook carrying carriage will pull the loops of the tuft-forming yarn farther up on the knife blades. When the pawls 58 come in contact with the pins 59 the knife carrying carriage will start to move with the hook carrying carriage and will continue to move with the hook carrying carriage until it has moved forward and down so that the pawls clear the pins on the knife carrying carriage when the knife carrying carriage will become stationary while the hook carrying carriage will continue to move pulling the loops of the tuft-forming yarn along the knives until they are severed.

At the rear of the rocking frame is arranged a casing 60 for the heddle frames which are mounted so as to slide vertically therein. The heddle frames may be shifted in the usual manner to separate the warp threads either by hand or in any preferred way but as the same does not form a part of this invention further description is not deemed necessary.

Before the machine starts to operate all the parts are as in Fig. 1 and the warp threads extend from the reel 2 downwardly across the frame to the reel 3. The warp threads passing through the rocking frame in pairs and each pair passing through a U-shaped member and one thread of each pair passing at each side of a spacing rod. The tuft-forming yarn *b* as before mentioned is brought down from the spool 21 and laid along on top of the brackets 9 on the spacing rods 8 and therefore extends along under the jaws 12 on the U-shaped members 10. The heddles are first operated to separate the warp threads and the woof thread is shot across by hand between the warp threads. The drum 18 is then rotated and the lever on the side of the frame opposite to the side on which the spool 21 is mounted will move down first, drawing down the U-shaped member connected thereto and of course the jaws on the U-shaped member will move down one passing at each side of the bracket 9 on the inclosed spacing rod 8 and therefore the tuft-forming yarn

will be folded down around the bracket 9 and around the pair of warp threads passing through said U-shaped members. As the U-shaped member moves down the jaws thereon enter one of the V-shaped notches 26 in the plate 25 which causes the jaws to come together and grip the tuft-forming yarn, as shown in Figs. 8 and 9. Of course as the jaw 12 moves pulling down the tuft-forming yarn the spool 21 rotates permitting the tuft-forming yarn to feed freely and when all the U-shaped members are in their lowest position the tuft-forming yarn will be so disposed that there will be an upper row of loops thereof which extend over the brackets 9 and around each pair of warp threads and a lower row of loops thereof which simply extend from one pair of jaws on a U-shaped member to the next pair of jaws on the adjacent U-shaped member. As the drum continues to rotate the other levers will move down in succession until all the U-shaped members are in their lowest position. The hook-carrying carriage is then advanced shoving ahead of it the knife-carrying carriage, in the manner before described, until the knife blades on the knife-carrying carriage extend between the U-shaped members and are therefore over the lower row of loops of the tuft-forming yarn, and as the hooks on the hook-carrying carriage continue to move the hooks will pass behind the portions of the tuft-forming yarn which extend down from the brackets 9 to the jaws 12 and the hooks will be turned from their vertical position to their horizontal position, as before described, and when the hook-carrying carriage starts in the opposite direction that is toward the front of the machine the hooks will catch hold of the yarn and draw it out between the warp threads of each pair of warp threads. As the hook-carrying carriage continues to move toward the front of the frame the tuft-forming yarn will be pulled from the brackets 9 and the lower loops will be pulled up on the knives. The drum 18 is again turned so that all the levers are raised simultaneously thereby lifting the U-shaped members and freeing the yarn from between the jaws thereof and as the hook-carrying carriage continues to move back after the knife-carrying carriage has ceased to move, as before described, the lower loops of the tuft-forming yarn will be drawn along the edges of the knives thereby severing the loops and the free ends thereof will be pulled up by the hooks and will form the tufts. The heddles are again operated and another woof thread is passed across after which the rocking frame is moved forward to beat-up the woven material in the customary manner.

What I claim is,—

1. In a loom, the combination with means for weaving the body of the fabric, of means

for supporting a thread of tuft-forming yarn transversely of the warp-threads, means for folding portions of said thread of tuft-forming yarn down between the warp-threads at predetermined points and thereby forming loops of the tuft-forming thread between predetermined groups of the warp-threads, means for cutting said loops at their ends and thereby severing the thread of tuft-forming yarn into sections, each of which surrounds a group of warp threads and means for engaging each section of tuft-forming thread at its ends and drawing said ends up between the threads of the group of warp-threads surrounded thereby.

2. In a loom, the combination with means for weaving the body of the fabric, of means for supporting a thread of tuft-forming yarn transversely of the warp-threads, means for separating the warp-threads into groups, each group containing a plurality of threads, means for folding portions of said thread and tuft-forming yarn down between the groups of warp-threads and thereby forming loops of the tuft-forming thread between said groups of the warp-threads, means for cutting said loops at their ends and thereby severing the thread of tuft-forming yarn into sections, each of which surrounds a group of warp-threads and means for engaging each section of tuft-forming thread at its ends and drawing said ends up between the threads of the group of warp-threads surrounded thereby.

3. In a loom, the combination with means for weaving the body of the fabric, of means for supporting a thread of tuft-forming yarn transversely of the warp-threads, means for separating the warp-threads into pairs, means for folding portions of said thread of tuft-forming yarn down between the pairs of warp-threads and thereby forming loops of the tuft-forming thread between the pairs of warp-threads, means for cutting said loops at their ends and thereby severing the thread of tuft-forming yarn into sections, each of which surrounds a pair of warp-threads and means for engaging each section of the tuft-forming thread at its ends and drawing said ends up between the threads of the pair of warp-threads surrounded thereby.

4. In a loom, the combination with means for weaving the body of the fabric, of means for supporting a thread of tuft-forming yarn transversely of the warp-threads, means for separating the warp-threads into pairs, means for folding portion of said thread of tuft-forming yarn down between the pairs of warp threads and thereby forming loops of the tuft-forming thread between the pairs of warp-threads, means for cutting said loops at their ends and thereby severing the thread of tuft-forming yarn into sections, each of which surrounds a

pair of warp-threads and means arranged to pass down between the threads of each pair of warp-threads and engage and draw the ends of said sections of tuft-forming yarn up between the threads of each pair of warp-threads.

5. In a loom, the combination with means for weaving the body of the fabric, of means for supporting a thread of tuft-forming yarn transversely of the warp-threads, means for consecutively folding down portions of said thread of tuft-forming yarn between the warp-threads at predetermined points and thereby forming loops of the tuft-forming thread between predetermined groups of the warp-threads, means for cutting said loops at their ends and thereby severing the thread of tuft-forming yarn into sections, each of which surrounds a group of warp-threads and means for engaging each section of tuft-forming thread at its ends and drawing said ends up between the threads of the group of warp-threads surrounded thereby.

6. In a loom, the combination with means for weaving the body of the fabric, of means for supporting a thread of tuft-forming yarn transversely of the warp-threads, means for folding portions of said thread of tuft-forming yarn down between the warp-threads at predetermined points and thereby forming loops of the tuft-forming thread between predetermined groups of the warp-threads, a carriage arranged transversely of the frame of the machine and adapted to move back and forth thereon, a plurality of hooks mounted on said carriage and arranged to pass between the warp-threads when said carriage is actuated toward said warp-threads, means for rotating said hooks so as to cause them to engage with the tuft-forming yarn and knives arranged to sever the tuft-forming yarn on the backward movement of said carriage.

7. In a loom, the combination with mechanism for weaving the body of the fabric, of means for supporting the tuft-forming yarn transversely of the warp threads, means for depressing said yarn on each side of each pair of warp threads, means for gripping the loops thus formed below the warp threads, means for cutting the loops at each side of where they are gripped and means passing down between the warp threads and adapted to engage and pull the severed ends of said loops up between the threads of each pair of warp threads.

8. In a loom, the combination with mechanism for weaving the body of the fabric, of means for supporting the tuft-forming yarn, means for depressing the tuft-forming yarn on each side of each pair of warp threads consecutively from one side to the other, means for gripping the loops thus formed, means for simultaneously severing the ends

of the said loops and means for simultaneously grasping the severed ends and pulling said ends up between the threads of the respective pairs of warp threads.

5 9. In a loom, the combination with mechanism for weaving the body of the fabric of means for dividing the warp thread into groups, means for supporting the tuft-forming yarn, means for depressing said tuft-
10 forming yarn on each side of each group of said warp threads consecutively from side to side of the machine thus forming loops of tuft-forming yarn between each group of warp threads, means for gripping the loops
15 of tuft-forming yarn below the warp threads, means for simultaneously severing the ends of said loops and means for simultaneously grasping the ends of said loops and drawing them up between the threads of each group
20 of warp threads.

10. In a loom, the combination with mechanism for weaving the body of the fabric of means for supporting the tuft-forming yarn, means for carrying said yarn around each
25 side of a group of warp threads and gripping said yarn below said warp threads, hooks arranged to pass down between the threads of each group of warp threads and engage the tuft forming yarn between the
30 warp threads and the point at which said tuft-forming yarn is gripped and means for severing the ends of said yarn below the point where it is gripped.

11. In a loom, the combination with mechanism for weaving the body of the fabric of means for supporting the tuft-forming yarn, means for depressing said yarn so as to form a series of loops over the supporting means
35 and around the warp threads, means for gripping said yarn after it is depressed so as to form a series of loops below the warp threads, a series of knives and means for bringing the lower loops in contact with said
40 knives so as to sever said yarn.

45 12. In a loom, the combination with a frame and mechanism mounted therein for weaving the body of the fabric of brackets for supporting the tuft-forming yarn, vertically movable jaw-carrying bars arranged
50 at each side of each bracket and adapted to move down and carry the tuft-forming yarn around a group of warp threads, means for causing the jaws on said bars to engage the tuft-forming yarn below the warp thread
55 and means for engaging the tuft-forming yarn and drawing it up between the threads of the group of warp threads.

13. In a loom, the combination of a frame and mechanism mounted therein for weaving the body of the fabric, a bracket for supporting the tuft-forming yarn, vertically movable jaw-carrying bars arranged
60 at each side of each bracket and adapted to move down and carry the tuft-forming yarn around a group of warp threads, means for

causing the jaws on said bars to engage the tuft-forming yarn below the warp threads and hooks arranged to pass between the threads of each group of warp threads and engage the tuft-forming yarn and draw it
70 up between the threads.

14. In a loom, the combination with a frame and mechanism mounted therein for weaving the body of the fabric of brackets for supporting the tuft-forming yarn, vertically movable jaw-carrying bars arranged
75 in pairs, one bar at each side of each bracket and adapted to move down and carry the tuft-forming yarn around the bracket and a group of warp threads, means for causing
80 the jaws on each pair of bars to engage the tuft-forming yarn below the warp threads, means for severing the yarn at each side of said jaws and means for engaging the severed ends and drawing them between the
85 threads of groups of warp threads.

15. In a loom, the combination with a frame and mechanism mounted therein for weaving the body of the fabric of brackets for supporting the tuft-forming yarn, vertically movable jaw-carrying bars arranged
90 in pairs, one bar at each side of each bracket and each pair adapted to move down and carry the tuft-forming yarn around the bracket and a group of warp threads, means
95 for causing the jaws on each pair of bars to engage the tuft-forming yarn below the warp threads, means for severing the yarn at each side of said jaws, a carriage mounted on said frame, hooks mounted on said carriage
100 and adapted to pass between the warp threads when the carriage is advanced and means for rotating said hooks after they have passed behind the tuft-forming yarn.

16. In a loom, the combination with a frame and mechanism mounted therein for weaving the body of the fabric, of brackets for supporting the tuft-forming yarn, vertically movable jaw-carrying bars arranged
105 in pairs, one bar at each side of each bracket and each pair adapted to move down and carry the tuft-forming yarn around the bracket and a group of warp threads, means for causing the jaws on each pair of bars to engage the tuft-forming yarn below the
110 warp threads, means for severing the yarn at each side of said jaws, a carriage mounted on said frame, hooks mounted on said carriage and adapted to pass between the warp threads when the carriage is advanced,
115 means for shifting the carriage transversely of the frame as it approaches the end of its travel, and means for rotating said hooks after they have passed behind said tuft-forming yarn.
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125

17. In a loom, the combination with a frame and mechanism mounted therein for weaving the body of the fabric, of brackets for supporting the tuft-forming yarn, vertically movable jaw-carrying bars arranged
130

in pairs, one bar at each side of each bracket, and each pair of bars adapted to move down and carry the tuft-forming yarn around the bracket and a group of warp threads, means
 5 for causing the jaws on each pair of bars to engage the tuft-forming yarn below the warp-threads, a hook-carrying carriage mounted on said frame, hooks mounted on said carriage and adapted to pass between
 10 the warp threads when the carriage is advanced and engage the tuft-forming yarn when the carriage is drawn back, a knife-carrying carriage and knives mounted on said carriage and arranged to extend over
 15 the portions of tuft-forming yarn extending between said pairs of jaws when the said knife-carrying carriage is advanced.

18. In a loom, the combination with a frame and mechanism mounted therein for
 20 weaving the body of the fabric, of brackets for supporting the tuft-forming yarn, vertically movable jaw-carrying bars arranged in pairs and each pair adapted to move down and carry the tuft-forming yarn around the
 25 bracket and a group of warp threads, means for causing the jaws on each pair of bars to engage the tuft-forming yarn below the warp threads, a carriage mounted on said frame, hooks mounted on said carriage and
 30 adapted to pass between the warp threads when the carriage is advanced and engage the tuft-forming yarn when the carriage is drawn back, a knife-carrying carriage, knives mounted on said carriage and ar-
 35 ranged to extend over the portions of tuft-forming yarn extending between said pairs of jaws when the said knife-carrying carriage is advanced and an operative connection between said hook-carrying carriage
 40 and said knife-carrying carriage.

19. In a loom, the combination with a frame and mechanism mounted therein for
 weaving the body of the fabric, of brackets for supporting the tuft-forming yarn, verti-
 45 cally movable jaw-carrying bars arranged in pairs, one bar at each side of each bracket, and each pair of bars adapted to move down and carry the tuft-forming yarn around the bracket and a group of warp threads, means
 50 for causing the jaws on each pair of bars to engage the tuft-forming yarn below the warp-threads, a hook-carrying carriage mounted on said frame, a knife-carrying carriage mounted on said frame, a rigid arm
 55 secured to the hook-carrying carriage and arranged to engage the knife-carrying carriage when the hook-carrying carriage is advanced, and a swinging arm arranged on said hook-carrying carriage and arranged to
 60 engage said knife-carrying carriage when the hook-carrying carriage is drawn back.

20. In a loom, the combination with a frame and mechanism mounted therein for
 weaving the body of the fabric, of a verti-
 65 cally arranged frame extending transversely

of said first-mentioned frame, rigid spacing bars arranged vertically in said last-men-
 tioned frame and provided with brackets for supporting the tuft-forming yarn, jaw-car-
 70 rying bars arranged in pairs, one bar at each side of said spacing bars, and each pair of jaw-carrying bars adapted to move down and carry the tuft-forming yarn around the bracket on the spacing bar and a group of
 75 warp threads, means for causing the jaws on each pair of bars to engage the tuft-forming yarn below the warp-threads, a hook-carrying carriage, hooks mounted on said carriage and adapted to pass between the warp threads when the carriage is ad-
 80 vanced and engage the tuft-forming yarn when the carriage is drawn back, a knife-carrying carriage and knives mounted on said carriage and arranged to extend over the portions of tuft-forming yarn extend-
 85 ing between said pairs of jaws when the said knife-carrying carriage is advanced.

21. In a loom, the combination with a frame and mechanism mounted therein for
 weaving the body of the fabric, of a rock-
 90 ing frame mounted in said first-mentioned frame, spacing bars mounted in said rock-
 ing frame and provided with brackets for supporting the tuft-forming yarn, vertically
 95 movable jaw-carrying bars arranged in pairs, one bar at each side of each bracket, and each pair of bars adapted to move down and carry the tuft-forming yarn around the bracket on the spacing bar and a group of
 100 warp threads, means for causing the jaws on each pair of bars to engage the tuft-forming yarn below the warp-threads, a hook-carrying carriage, hooks mounted on said carriage and adapted to pass between the warp threads when the carriage is advanced
 105 and engage the tuft-forming yarn when the carriage is drawn back, a knife-carrying carriage and knives mounted on said carriage and arranged to extend over the portions of the tuft-forming yarn extending
 110 between said pairs of jaws when the said knife-carrying carriage is advanced.

22. In a loom, the combination with a frame and mechanism mounted therein for
 weaving the body of the fabric, of a rock-
 115 ing frame mounted in said first-mentioned frame, spacing bars mounted in said rock-
 ing frame and provided with brackets for supporting the tuft-forming yarn, vertically
 120 movable jaw-carrying bars arranged in pairs, one bar at each side of each spacing bar, and each pair of jaw-carrying bars adapted to move down and carry the tuft-forming yarn around the bracket on the spacing bar, levers mounted in the main
 125 frame and operatively connected with the jaw-carrying bars, means for raising and lowering said levers so as to shift said jaw-carrying bars up and down, means for caus-
 130 ing the jaws on each pair of bars to engage

the tuft-forming yarn when in their lowest position, a hook-carrying carriage, hooks mounted on said carriage and adapted to pass between the warp threads when the carriage is advanced and engage the tuft-forming yarn when the carriage is drawn back, a knife-carrying carriage and knives mounted on said carriage and arranged to extend over the portions of tuft-forming yarn extending between said pair of jaws when said knife-carrying carriage is advanced.

23. In a loom, the combination with a frame and mechanism mounted therein for weaving the body of the fabric, of a rocking frame mounted in said first-mentioned frame, spacing bars mounted in said rocking frame and provided with brackets for supporting the tuft-forming yarn, vertically movable jaw-carrying bars arranged in pairs, one bar at each side of each spacing bar, and each pair of jaw-carrying bars adapted to move down and carry the tuft-forming yarn around the bracket on the spacing bar, levers mounted in the main frame and operatively connected with the jaw-carrying bars, means for raising and lowering said levers so as to shift said jaw-carrying bars up and down, means for causing the jaws on each pair of bars to engage the tuft-forming yarn when in their lowest position, a hook-carrying carriage, hooks mounted on said carriage and adapted to pass between the warp threads when the carriage is advanced and engage the tuft-forming yarn when the carriage is drawn back, means for shifting said hook-carrying carriage transversely of the frame, a knife-carrying carriage, knives mounted on said carriage and arranged to extend over the portions of the tuft-forming yarn extending between said pairs of jaws when said

knife-carrying carriage is advanced and an operative connection between said knife-carrying carriage and said hook-carrying carriage.

24. In a loom, the combination with a frame and mechanism mounted therein for weaving the body of the fabric, of a rocking frame mounted in said first-mentioned frame, spacing bars mounted in said rocking frame and provided with brackets for supporting the tuft-forming yarn, a vertically movable U-shaped member arranged to inclose each spacing bar and provided with a pair of jaws, levers fulcrumed in said frame and operatively connected to said U-shaped members, means for raising and lowering said levers, a plate provided with V-shaped notches arranged to cross the rocking frame and adapted to receive the jaws on said U-shaped members, a hook-carrying carriage, hooks mounted on said carriage and adapted to pass between the warp threads when the carriage is advanced and engage the tuft-forming yarn when the carriage is drawn back, means for shifting said hook-carrying carriage transversely of the frame, a knife-carrying carriage, knives mounted on said carriage and arranged to extend over the portion of the tuft-forming yarn extending between said pairs of jaws when said knife carrying carriage is advanced and an operative connection between said knife-carrying carriage and said hook-carrying carriage.

In testimony whereof, I sign the foregoing specification, in the presence of two witnesses.

GEDEON ARISTOTLE MENENDIAN.

Witnesses:

DANIEL E. DALY,
VICTOR C. LYNCH.