

W. F. ASTLEY.
LOOM.

APPLICATION FILED JULY 5, 1916.

Patented Nov. 19, 1918.
6 SHEETS—SHEET 1.

1,284,973.

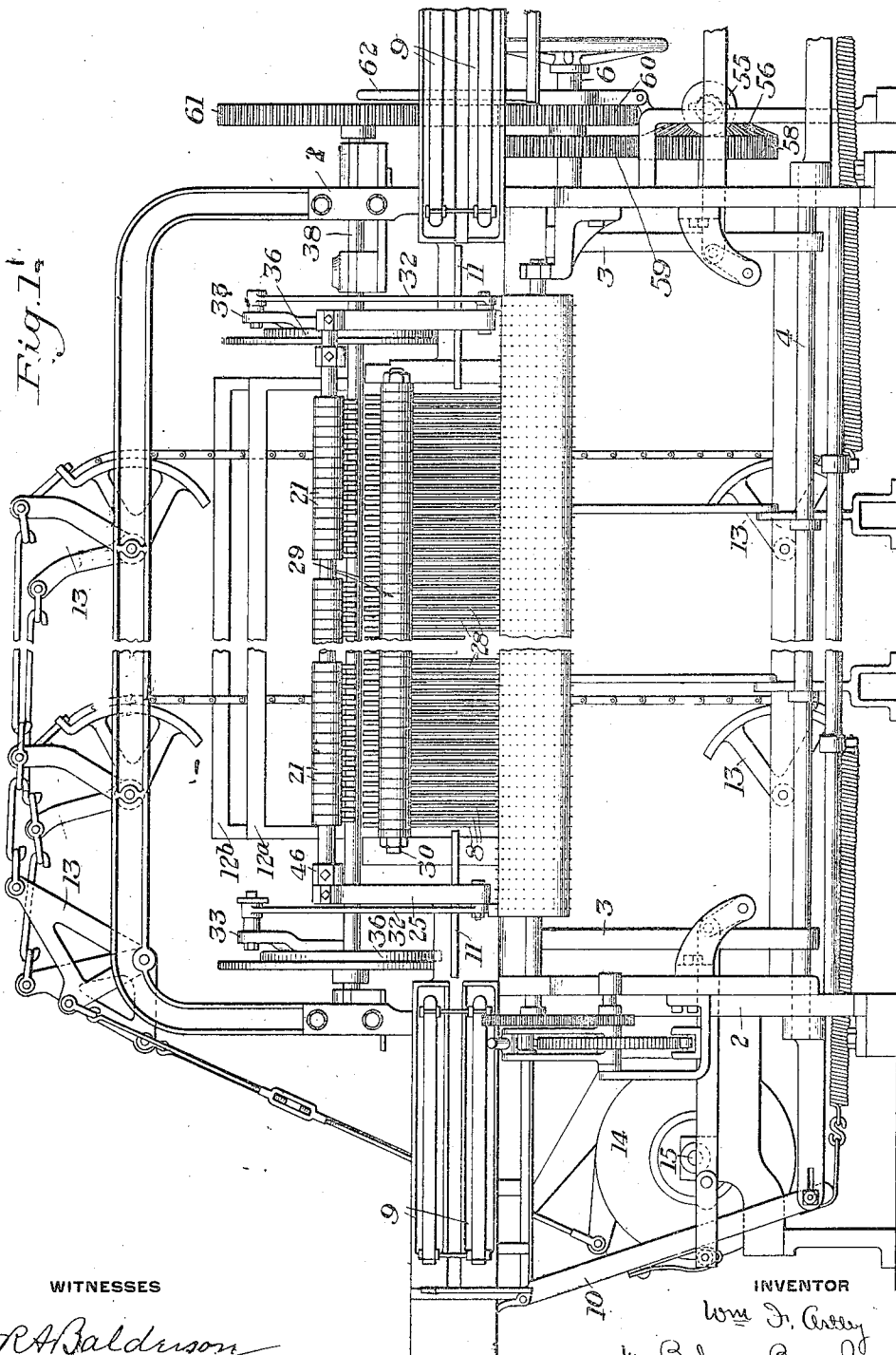


Fig. 1.

WITNESSES

R. A. Balderson
S. B. Blumling

INVENTOR

Wm. F. Astley
by F. B. Burrell, R. J. Burrell, R. J. Burrell
Attys.

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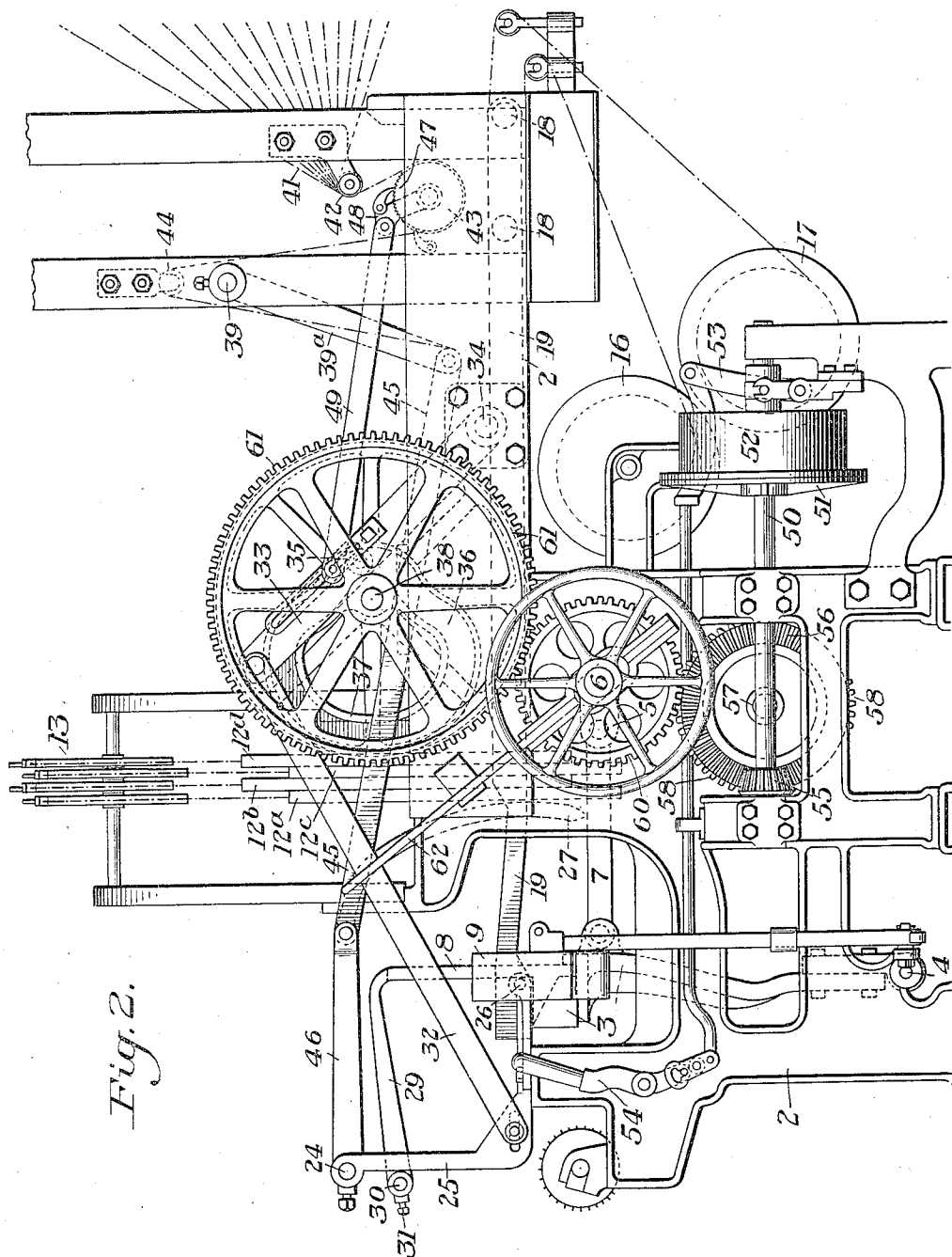


Fig. 2.

WITNESSES

R. A. Balderson
G. B. Blumling

INVENTOR

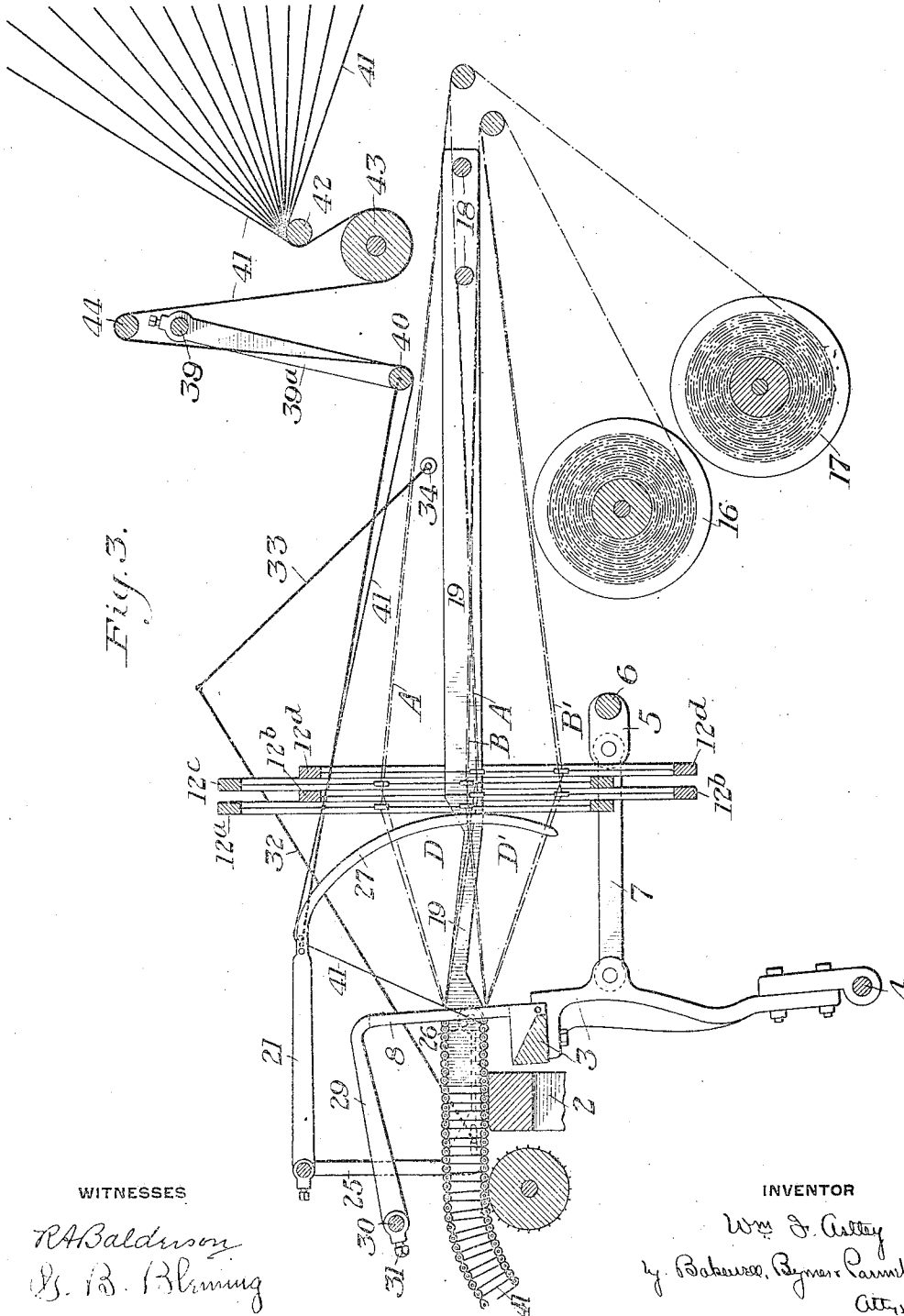
Wm. J. Ashley
by Baker, Byrnes & Carmichael
Attys.

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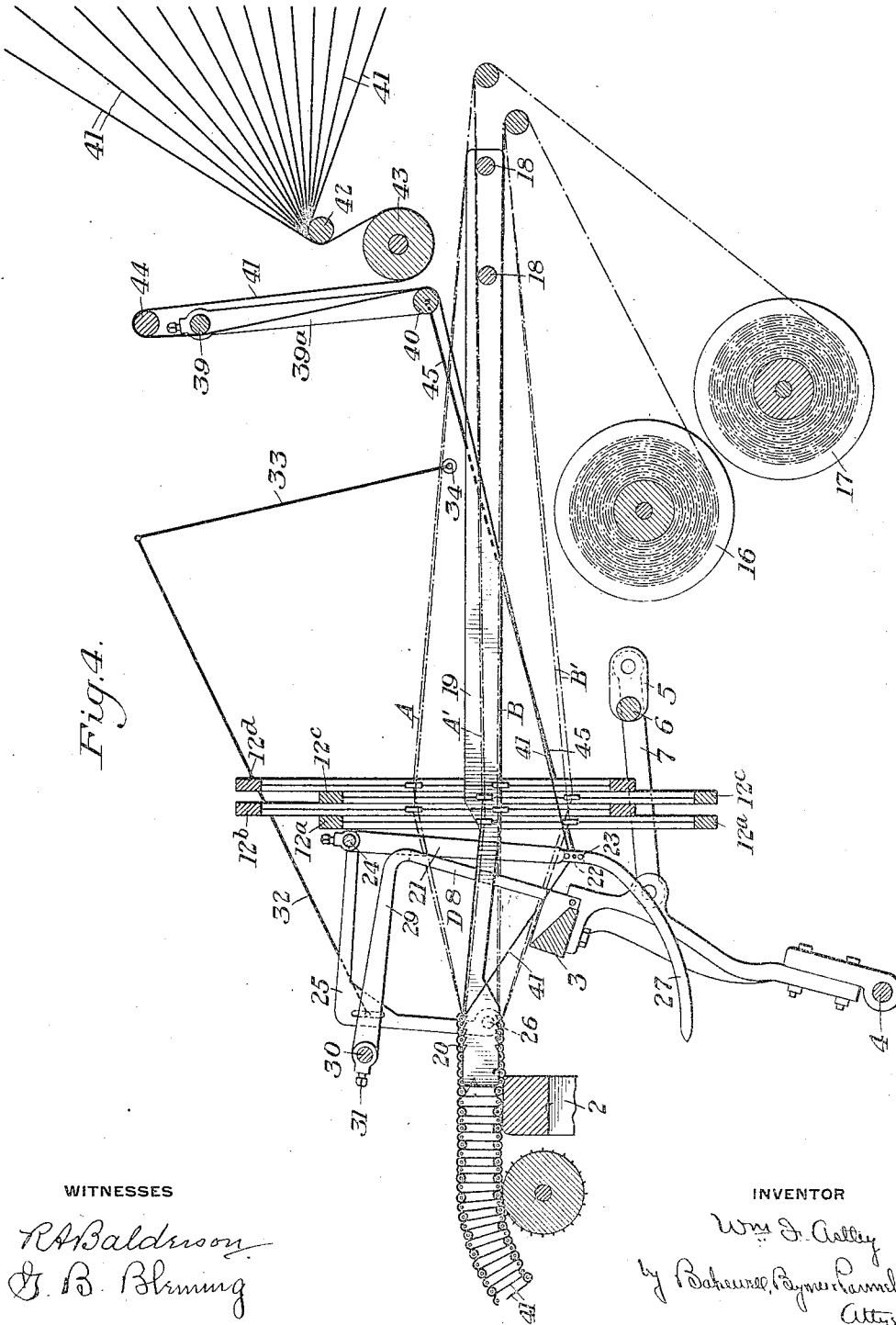
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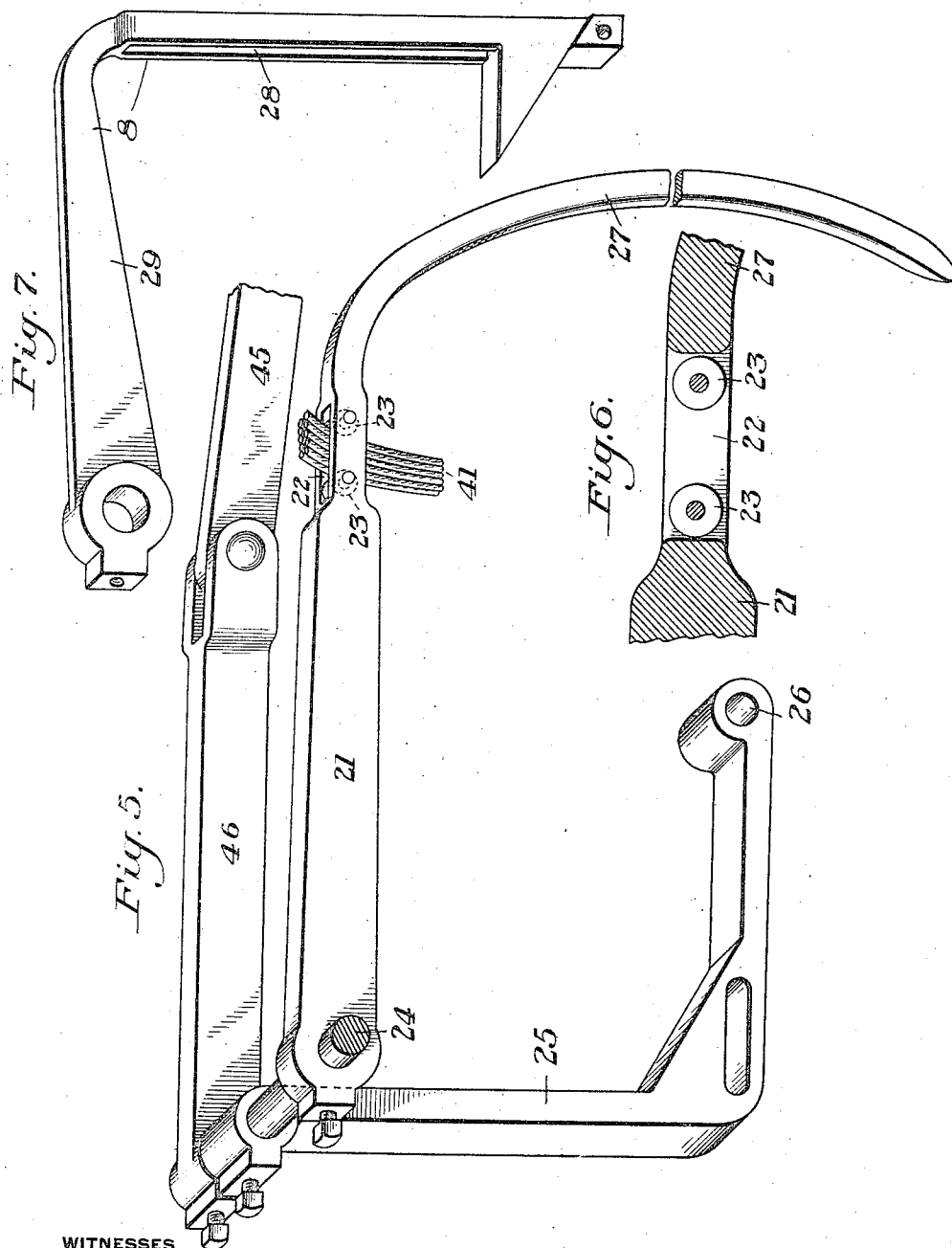
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WITNESSES
R. A. Balderson
G. B. Blumling

INVENTOR
Wm. F. Astley
by Baker, Dyer & Co.
Attorneys

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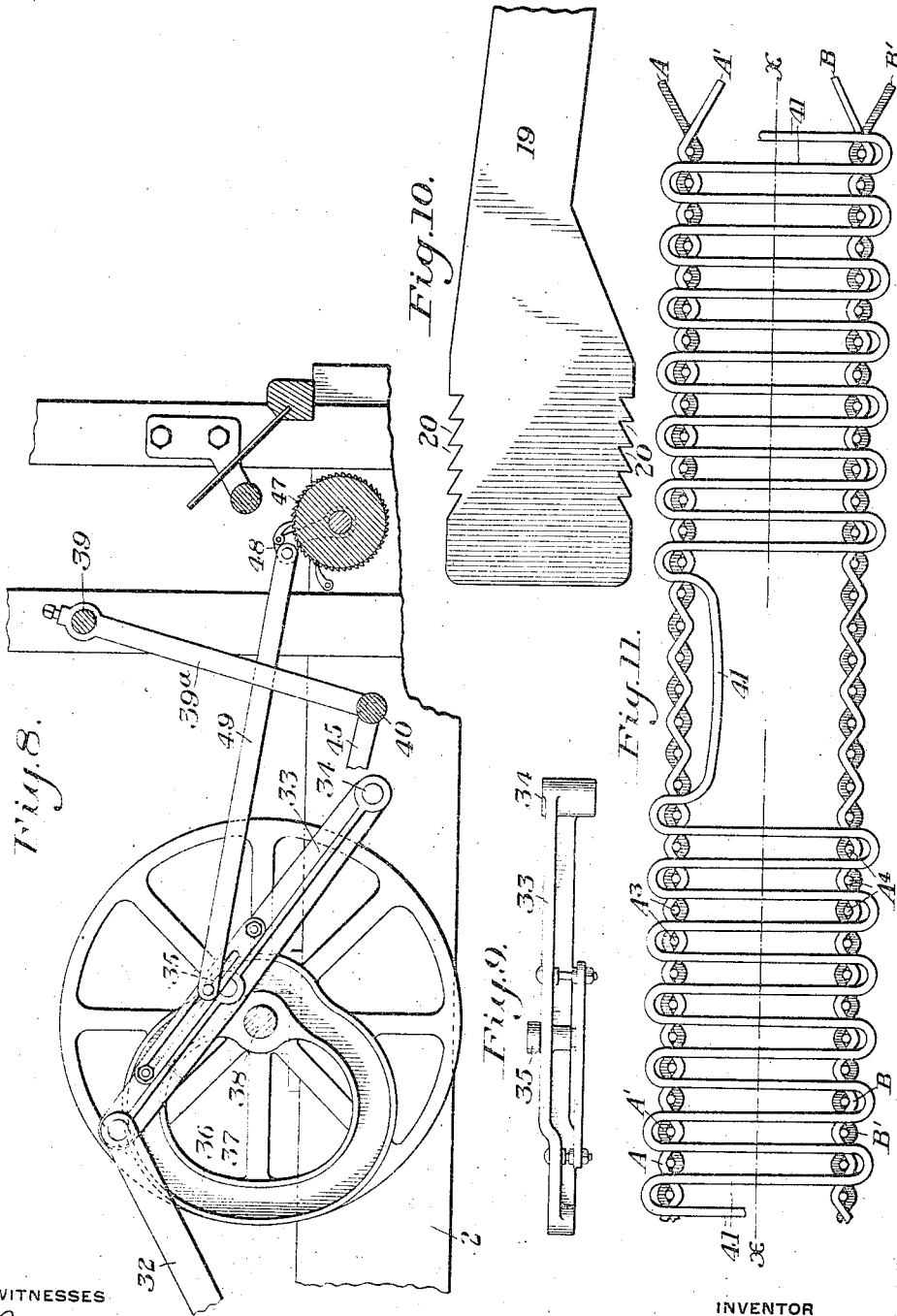
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6 SHEETS—SHEET 6.



WITNESSES

R. A. Balderson
G. P. Hanning

INVENTOR

Wm. F. Astley
by Ralston, Rymer, Carmichael
Attorneys

UNITED STATES PATENT OFFICE.

WILLIAM F. ASTLEY, OF PITTSBURGH, PENNSYLVANIA, ASSIGNOR TO DUQUESNE RUG COMPANY, OF PITTSBURGH, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

LOOM.

1,284,973.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, WILLIAM F. ASTLEY, a citizen of the United States, residing at Pittsburgh, Allegheny county, State of Pennsylvania, have invented a new and useful improvement in Looms, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a front elevation of one form of loom built in accordance with my invention.

Fig. 2 is an end view thereof.

Figs. 3 and 4 are diagrams illustrating the warp controlling mechanism in different positions.

Fig. 5 is a detail perspective view of one of the tuft warp guide bars and a portion of its operating mechanism.

Fig. 6 is a detailed sectional view through one of the tuft warp guide bars.

Fig. 7 is a detail perspective view of one of the reeds.

Fig. 8 is a detailed sectional view illustrating the warp feeding roll operating mechanism and a portion of the tuft warp guide bar operating mechanism.

Fig. 9 is a detail plan view of one of the levers for actuating the warp guides.

Fig. 10 is a side elevation of a portion of one of the fabric gage bars, and

Fig. 11 is a longitudinal sectional view through a portion of the finished fabric.

This invention relates to an improvement in looms for weaving door mats from coconut fiber, and is designed to provide a cheap and efficient device of this character for weaving a double pile fabric having a plurality of tufting warp threads woven into both of said fabrics, and which are severed to form two pieces of fabric having cut tuft threads projecting upwardly from one face thereof.

Various attempts have heretofore been made to weave mats of this character by machine, but as far as I am aware no one had been able to successfully weave mats of a good grade on an automatic loom, in view of the fact that the threads from which the mats are made have been so cumbersome that no one has heretofore designed mechanism to

properly handle the threads to form a closely woven mat, and for this reason all high grade mats have heretofore been made by hand.

The precise nature of my invention will be best understood by reference to the accompanying drawings, which will now be described, it being premised, however, that various changes may be made in the details of construction of the apparatus without departing from the spirit and scope of my invention as defined in the appended claims.

Referring to the accompanying drawings, the reference character 2 designates the frame of a well known type of loom having the usual lay 3 pivotally mounted on a shaft 4 mounted in the frame 2. This lay is operated in the usual manner by means of cranks 5 connected to a shaft 6 which is journaled in the frame of the machine, and which cranks are connected to the lay by means of connecting rods 7, to oscillate the lay in the usual manner. This lay is provided with a plurality of improved reeds 8, more specifically referred to hereinafter, and which are arranged to guide both sets of binder warp threads, and also to form separators between the binder warp threads and the tufting warp threads. Mounted on each end of the lay are two shuttle boxes 9 for the shuttles for the weft threads for the double fabric, and which shuttles are thrown by the usual levers 10. 11 are guides on the lay between the shuttle boxes and are arranged to guide the upper shuttle to a point adjacent to the upper set of warp threads, the lower shuttle being guided in the usual manner on the top of the beam of the lay. 12^a, 12^b, 12^c and 12^d are heddle frames having double eyed heddles for guiding the binder warp threads for the double fabric, and which heddle frames are reciprocated in the usual manner by the mechanism 13 which is actuated by the usual cams 14, on the shaft 15. 16 and 17 are warp beams for the binder warp threads of the double fabric, the threads from the upper beam 16 are arranged to form the lower ply of the fabric, while the warp threads on the beam 17 form the upper ply of the fabric.

In the drawings I have shown four heddle frames, each of which is provided with

double eyed heddles, the heddles in the frames 12^a and 12^c carry one-half of the binder warp threads for the upper and lower plies of the fabric, while the heddles in the frames 12^b and 12^d carry the other half of the binder warp threads for both plies of the fabric; the arrangement being such that alternate sets of threads are guided by the heddles in the frames 12^a, 12^b, and 12^c and 12^d, respectively. I do this in order to relieve the strain on the heddle frames, so that each frame controls one-fourth of all of the binder warp threads. It will be readily understood by those familiar with the art that, if desired, the binder warp threads for the two plies of the fabric might be guided by means of double eyed heddles in two heddle frames, or single eyed heddles in four heddle frames, but I prefer to use four heddle frames with double eyed heddles in order to relieve the strain.

Connected to the frame of the machine by means of rods 18 are gage bars 19 having teeth 20. These gage bars extend in a longitudinal direction between some of the binder warp threads and extend to a point beyond the lay and form gage bars for spacing the upper ply of fabric from the lower ply of fabric, and determining the length of the tuft threads between the two plies of the fabric.

In order to lay the tufting warp threads about the weft in the upper and lower plies of the fabric, I provide a plurality of tufting warp guide bars 21, each having an eye 22 through which the threads pass, and mounted within these eyes are rollers 23 to overcome friction of the tufting warp threads passing through the eyes. These tufting warp guide bars are connected at one end to a rod 24 which is connected at its ends to angle levers 25 which are pivoted at 26 to the frame of the machine, and are arranged to pass the tufting warp threads below both plies of the fabric after one throw of the shuttles, and then place them above both plies of the fabric after the next throw of the shuttles.

The tufting warp thread guide bars are preferably provided with downwardly extending arms 27, the lower ends of which are always below the warp threads of the lower ply of the fabric, and are arranged to form guides to retain the various threads in their longitudinal positions. The reeds 8 are provided with slots 28 through which the binder warp threads of both plies of the fabric are arranged to pass, while the tufting warp threads are guided between the reeds by their guide bars. These reeds are provided with laterally extending arms 29 which are connected to a rod 30 by set screws 31 to form a rigid structure. Connected to the angle levers 25 at each side of the machine are links 32 which are in turn con-

nected to links 33 which are pivotally connected to the frame of the machine at 34. The links 33 are each provided with a roller 35 which engages cam slots 36 on cams 37, which are connected to the shaft 38 journaled in the frame of the machine.

In order to feed and maintain the tufting warp threads under tension, I provide the following mechanism: Journaled in the frame of the machine is a shaft 39, which is provided with levers 39^a, connected to each other at their lower ends by means of a rod 40. The tufting warp threads 41 are led from the usual rack around a guide bar 42, thence around a feed roll 43, which is operated as hereinafter described, and from the feed roll these warp threads pass around a second guide rod 44 slightly above the shaft 39. These tufting warp threads then pass downwardly around the rod 40, and from therethrough the eyes 22 in the guide bars 21. To oscillate the rod 40 in order to maintain the tufting warp threads under tension when the guide bars 21 are in both positions, I provide a connection such as the links 45 at each side of the machine which are connected to the ends of the levers 39^a and to levers 46 connected to the supporting rod 24 for the tufting warp guide bars, so that the rod 40 will be oscillated in timed relation with the tufting warp guide bars to maintain the same under tension. Connected to the shaft of the feed roller 43 is a ratchet wheel 47, and 48 is a pawl arm which is arranged to oscillate on the shaft of the feed roll 43. Connected to the arm 48 is a link 49, which is adjustably connected to one of the links 33, the arrangement being such that the feed roll is moved a predetermined distance for each throw of the tufting warp guide bars.

Journaled in the frame of the machine is a main driving shaft 50 having a clutch member 51 mounted thereon, which is arranged to be moved into clutching engagement with the main driving pulley 52 by means of clutching mechanism 53, which is arranged to be actuated by a hand lever 54 at the front of the loom. Connected to the shaft 50 is a bevel gear wheel 55 which meshes with a bevel gear wheel 56 on the stub shaft 57. Connected to this shaft 57 is a spur gear 58 which meshes with a spur gear 59 on the shaft 6, and which shaft is connected by suitable gearing to the shaft 15, so that the lay shuttle throwing levers and heddle frames will be actuated in timed relation to each other. Connected to the shaft 6 by means of a spline so as to be rotated thereby but permit it to move longitudinally thereon is a gear wheel 60, which meshes with a gear wheel 61 on the shaft 38 for rotating the cams to actuate the tufting warp guide bars. The ratio of the gears 60 and 61 is two to one, so that the tufting

warp guides will be moved downwardly after one throw of the shuttles and then be moved upwardly after the next throw of the shuttles, to place the tufting warp threads about the weft threads.

Connected to the frame of the machine is a lever 62 having an eye in which the hub of the gear wheel 60 is rotatably mounted and which is arranged to shift the gear 60 in a longitudinal direction along the shaft 6 to disconnect it from the gear wheel 61, in order to throw the tufting warp thread controlling mechanism out of action, as hereinafter described.

In Fig. 11 I have shown a longitudinal section through a portion of the fabric made on this loom, and in which A and A' designate the binder warp threads of the upper ply of the fabric, while the characters B and B' designate the binder warp threads of the lower fabric. 41 designates the tufting warp threads, and A³ and A⁴ designate the weft threads of the upper and lower plies of the fabric respectively.

The operation of the device is follows:

Assuming that the loom has been threaded and a portion of the fabric formed with the parts in the position shown in Fig. 4, the shuttles will be thrown between the upper and lower sets of binder warp threads along the points designated D and D'. The upper weft thread A³ will lie below the warp threads A and above the warp threads A', while the lower weft threads A⁴ will lie below warp threads B, and above the warp threads B' and the tufting warp threads 41. The lay is then moved forward to beat up the fabric, and during the movement of the lay the tufting warp guide bars will be moved to the position shown in Fig. 3 by means of operating mechanism to pull the tufting warp threads about the weft threads A⁴ and to place the tufting warp threads above all of the binder warp threads, and at the same time the heddle frames will be shifted to reverse the positions of the binder warp threads of both sets. The shuttle is then thrown and the lay is again moved forward to beat up the fabric, and during the next movement the positions of the tuft warp threads will be shifted to that shown in Fig. 4. After a predetermined length of fabric has been made to form a mat or a series of mats on the loom, the gear wheel 60 is shifted laterally to throw the tufting warp thread controlling mechanism out of action, and a portion of plain fabric is woven as indicated in the central portion of Fig. 11, the tufting warp threads merely lying between the plies of fabric. After a predetermined amount of plain fabric has been woven the tufting warp thread mechanism is again thrown into action and the operation is repeated. The fabric is then cut along the dotted line X-X shown in Fig. 11 to separate the two

fabrics and to form two sets of mats, the edges of each are then finished in any desired manner.

The advantages of my invention result from the provision of a loom having means for weaving a double ply fabric, together with means for guiding and placing tufting warp threads about the weft thread in one ply of the fabric after one throw of the shuttles, and then placing the tufting warp threads about the weft thread of the other ply after the next throw of the shuttles; furthermore, from the provision of means for gaging the distance between the two fabrics, together with take-up mechanism for maintaining the tufting warp threads under tension in the extreme positions of the tufting warp guide bars; also from the provision of means for feeding and guiding the tufting warp threads between the sets of binder warp threads.

I claim:

1. A loom for weaving double fabric, comprising a set of warp thread guides for each set of fabric, means for actuating said guides, a weft shuttle for each ply, means for throwing said shuttles to lay the weft thread between the warp threads of each ply in each pick, a plurality of tufting warp thread guides arranged to lay the tufting warp around alternate weft threads of both plies, the axes of said guides being in front of the warp thread guides, so as to pull the tufting warp threads toward the woven fabric when elevating or lowering the tufting warp thread guides beyond the center of the fabric, substantially as described.

2. A loom for weaving a double ply fabric, comprising means for feeding a plurality of sets of binder warp threads for each ply, weft thread shuttle actuating mechanism for each ply of fabric, a plurality of oscillating tufting warp thread guides for feeding tufting warp threads between the sets of binder warp threads of the two fabrics, means to maintain the tufting warp threads under tension connected to and operated with the means to lay the tufting warp threads, and means for oscillating said tuft thread guides to place the warp threads around alternate weft threads in the two plies of fabric; substantially as described.

3. A loom for weaving a double ply fabric, comprising a lay, reeds on said lay, means for oscillating said lay, means for feeding a plurality of sets of binder warp through said reeds, means for reversing the positions of the binder warps for forming each fabric, means for throwing weft controlling shuttles between the warps for each fabric after each reversal, a plurality of oscillating tuft warp thread guides located between the different series of warps for each fabric, said warp thread guides being pivoted to oscillate about an axis located in

front of the rearward position of the lay, and means for oscillating said warp guides to place the tuft warp threads around alternate weft threads in each fabric; substantially as described.

4. A loom for weaving a double ply fabric, comprising a lay, reeds on said lay, means for oscillating said lay, means for feeding a plurality of sets of binder warp through said reeds, means for reversing the positions of the binder warps for forming each fabric, means for throwing weft controlling shuttles between the warps for each fabric after each reversal, a plurality of oscillating tuft warp thread guides located between the different series of warps for each fabric, a fulcrum for said tufting warp thread guides in front of the reeds, means for oscillating said warp guides to place the tuft warp threads around alternate weft threads in each fabric, and a take-up device for maintaining the tuft warp threads under tension; substantially as described.

5. A loom for weaving a double ply fabric, comprising a lay, reeds on said lay, means for oscillating said lay, means for feeding a plurality of sets of binder warp through said reeds, means for reversing the positions of the binder warps for forming each fabric, means for throwing weft controlling shuttles between the warps for each fabric after each reversal, a plurality of oscillating tuft warp thread guides located between the different series of warps for each fabric, a fulcrum for said tufting warp thread guides in front of the rearward position of the reeds, means for oscillating said warp guides to place the tuft warp threads around alternate weft threads in each fabric, a tension device for maintaining the tuft warp threads under tension connected to and arranged to be actuated with the tufting warp thread guides, means to actuate said tufting warp thread guides, and means for feeding tuft warp threads; substantially as described.

6. A loom for weaving double ply fabric, each ply comprising a plurality of sets of binder warp threads and a plurality of weft threads, tufting warp thread guide bars for laying the tufting warps around some of the weft threads of each ply, said guide bars having eyes therethrough between the ends thereof for the tufting warp threads, and an arm extending beyond the eye at an angle to the main portions of the bars, said arms being of sufficient length to form guides for the various sets of binder warp threads of the two plies, an oscillating device for said tufting warp guide bars, and means for connecting said tufting warp guide bars to the oscillating device; substantially as described.

7. A rigid tufting warp thread guide bar for looms, having an eye for the thread be-

tween its ends, means for connecting one end of said bar to an actuating member, an arm on the other end thereof extending at an angle to the other portion of the bar, said arm extending a sufficient distance beyond the eye to form a separator for the warp threads when the guide bar is in its raised or lowered position; substantially as described.

8. A loom for weaving double fabric, comprising a set of warp thread guides for each ply of said fabric, means for actuating said guides, a weft shuttle for each ply, means for throwing said shuttles to lay the weft thread between the warp threads of each ply, a lay having reeds for beating up the weft threads, a plurality of oscillating tufting warp thread guides arranged to lay the tufting warp around the weft threads of both plies, the axis of said guides lying within the plane of the fabric and approximately in line with the fronts of the reeds when the lay is in its forward position, and means to oscillate said tuft warp thread guides, substantially as described.

9. A loom for weaving double fabric, comprising a set of warp thread guides for each ply of said fabric, means for actuating said guides, a weft shuttle for each ply, means for throwing said shuttles to lay the weft thread between the warp threads of each ply, a lay having reeds for beating up the weft threads, a plurality of oscillating tufting warp thread guides arranged to lay the tufting warp around the weft threads of both plies, the axis of said guides lying within the plane of the fabric and approximately in line with the fronts of the reeds when the lay is in its forward position, said tufting warp thread guides each having a projecting member beyond the guide which extends beyond the warp threads of both plies when the guides are in their elevated positions, substantially as described.

10. A loom for weaving double fabric, comprising a set of warp thread guides for each ply of said fabric, means for actuating said guides, a weft shuttle for each ply, means for throwing said shuttles to lay the weft threads between their respective warp threads, a lay for beating up the weft threads, a plurality of oscillating tufting warp thread guides arranged to lay the tufting warp threads around the weft threads of both plies, a fixed guide for the tufting warp threads, an oscillating rod between the oscillating guides and the fixed guide about which the tufting warp threads are arranged to pass, actuating levers for the oscillating rod, actuating links connected to said levers, and levers connected to the oscillating tufting warp thread guides, said levers being connected to said links at points approximately in line with the eyes of the oscillating tufted warp thread guides, the arrange-

ment being such that the tufting warp threads in their passage from the fixed guide over the oscillating bar and the oscillating guides are constantly maintained under tension, substantially as described.

11. A loom for weaving double fabric, comprising a set of warp thread guides for each ply of said fabric, means for actuating said guides, a weft shuttle for each ply, means for throwing said shuttles to lay the weft threads between their respective warp threads, a lay for beating up the weft threads, a plurality of oscillating tufting warp thread guides arranged to lay the tufting warp threads around the weft threads of both plies, a fixed guide for tufting warp threads, an oscillating rod between the oscillating guides and the fixed guide about which the tufting warp threads are arranged to pass, actuating levers for the oscillating

rod, actuating links connected to said levers, and levers connected to the oscillating tufting warp thread guides, said levers being connected to said links at points approximately in line with the eyes of the oscillating tufted warp thread guides, the arrangement being such that the tufting warp threads in their passage from the fixed guide over the oscillating bar and the oscillating guides are constantly maintained under tension, and positively actuated means for feeding the tufting warp threads; substantially as described.

In testimony whereof, I have hereunto set my hand.

WILLIAM F. ASTLEY.

Witnesses:

JESSE B. HELLER,
H. M. CORWIN.