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J. W. JENKINS

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HAND-OPERATED LOOM

Filed April 12, 1947

3 Sheets-Sheet 1

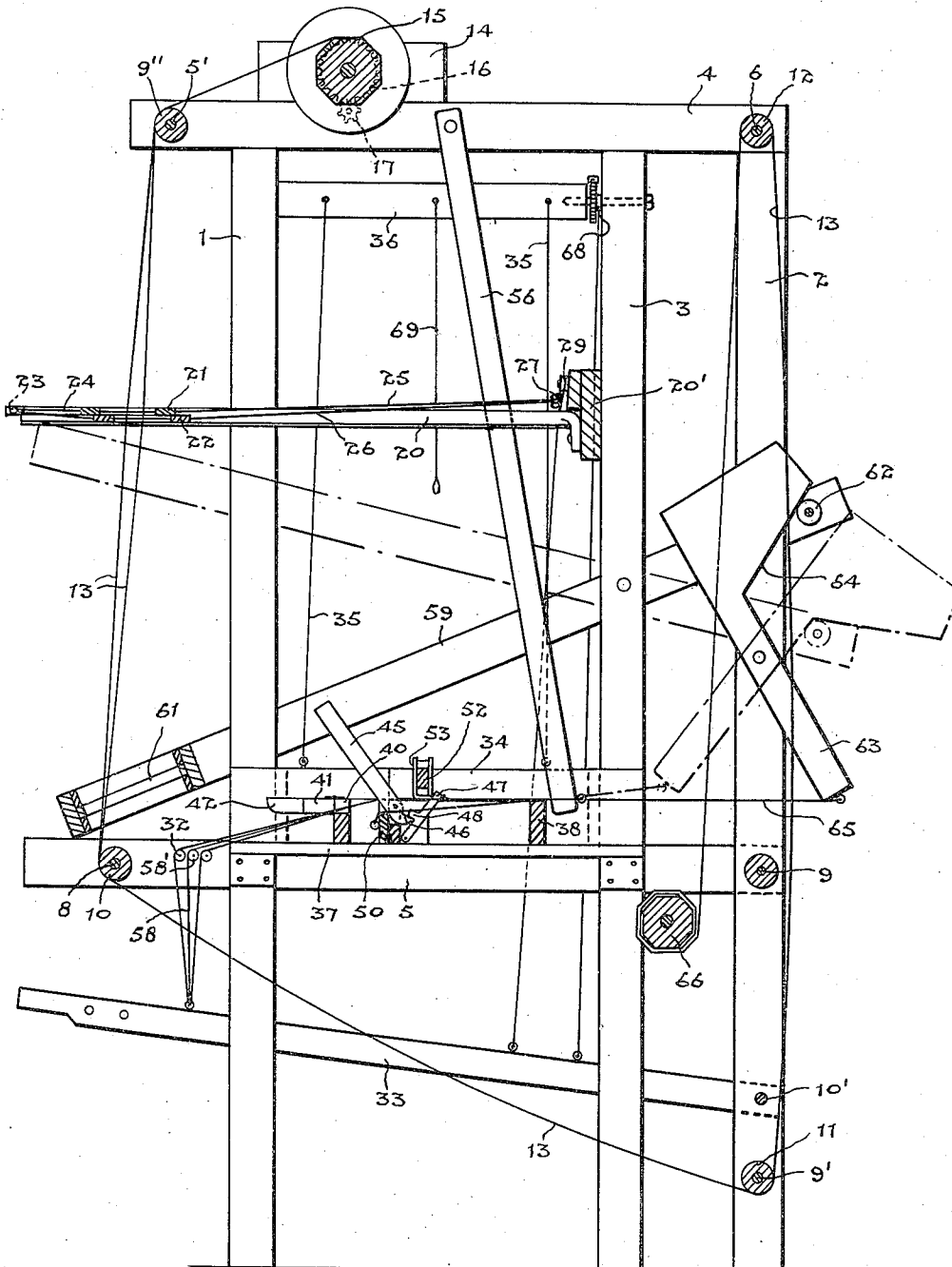


Fig. 1.

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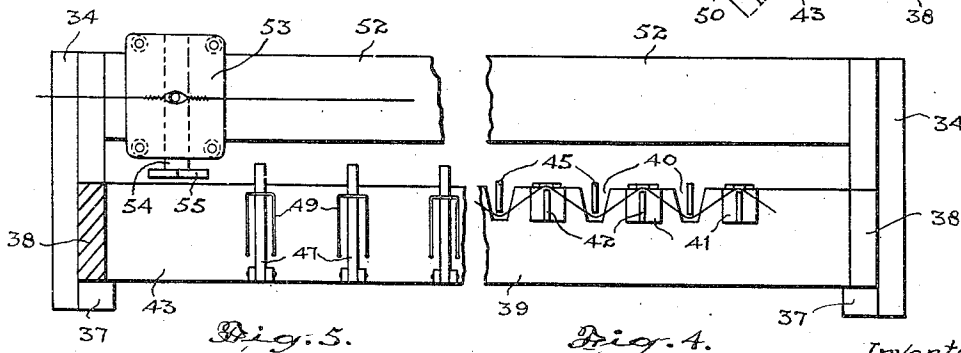
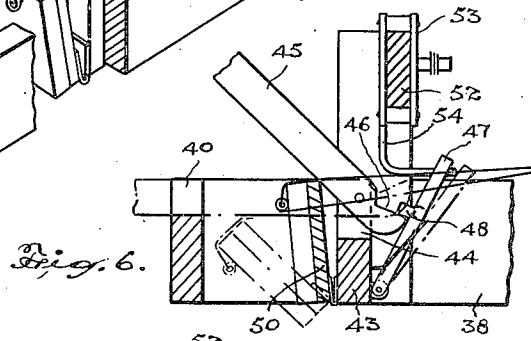
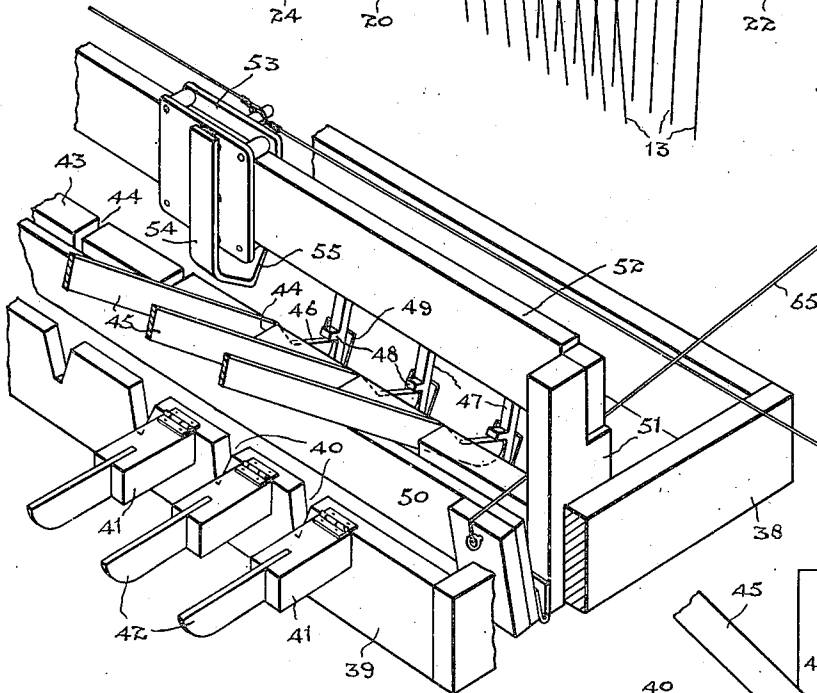
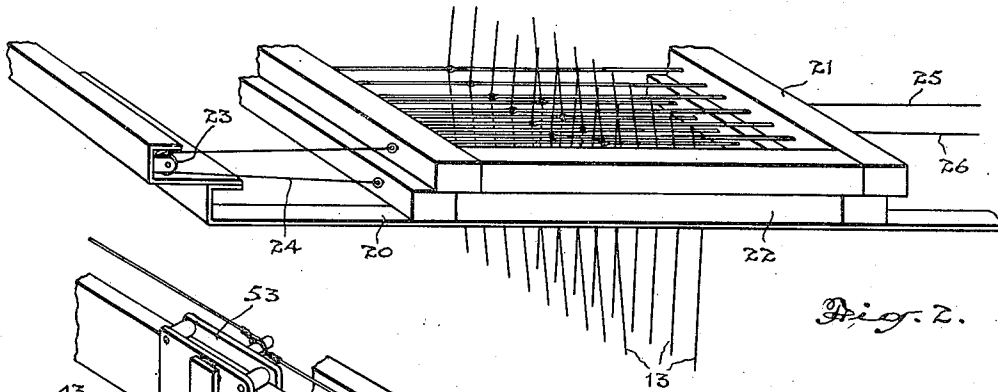
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3 Sheets-Sheet 2



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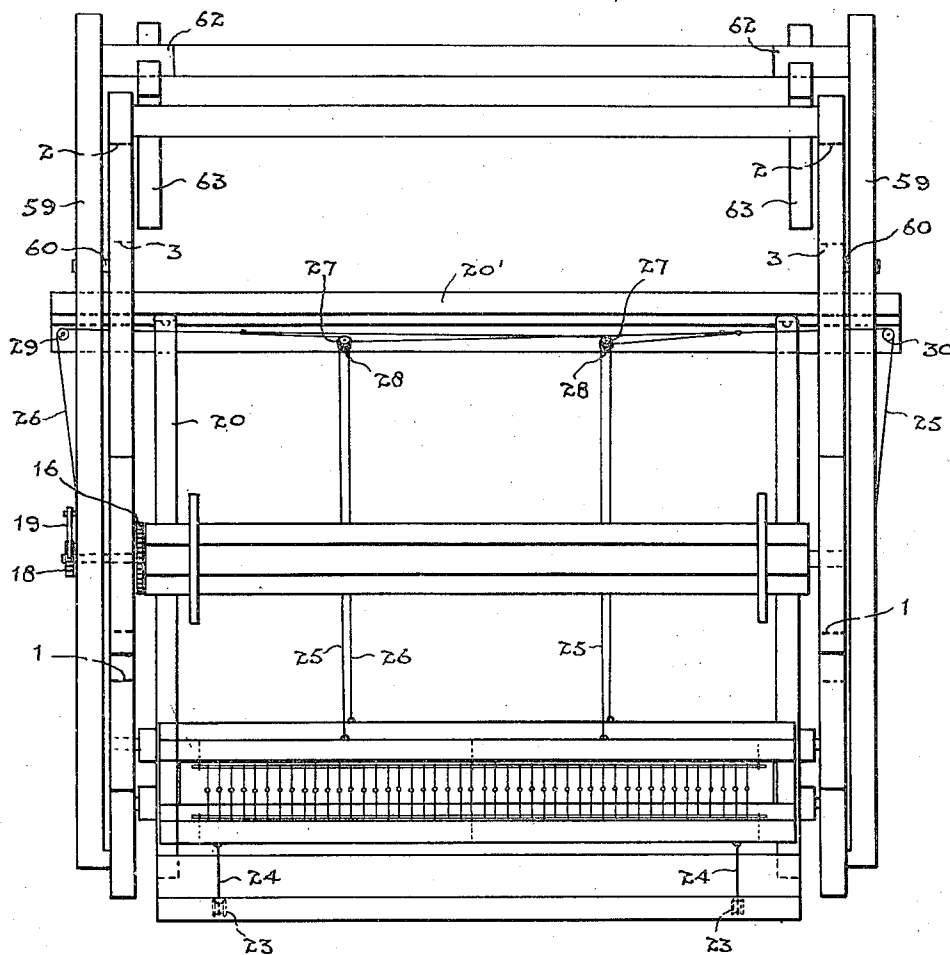
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HAND-OPERATED LOOM

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3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

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HAND-OPERATED LOOM

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6 Claims. (Cl. 139—29)

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This invention relates to improvements in looms of a type particularly adapted to the manufacture of rugs which may be operated by individuals without the use of power machinery and which will enable persons who are more or less unskilled to produce excellent results, and the principal object of the invention is to provide a loom with means which will overcome the difficulty of weaving a rug and gradually diminishing its width during the weaving operation with a consequent tightening or constriction of the yarn or shot material.

A further object of the invention is to provide a structure in which the amount of effort required in manipulating the reed will be reduced to a minimum, thus relieving the stress on the operator.

A still further object is to provide in a loom means which will keep the warps true and will enable an increase in the speed of production while producing a better and more uniform fabric.

The principal feature of the invention consists in the provision of a novel warp spacing means and providing means associated with such spacing means for unifying the length of the weft following each traverse of the shuttle across the sheds of the warps, such means comprising spacing fingers adapted to be projected between the warps prior to the passing of the shuttle and fingers interposed between the spacing fingers adapted to be swung downwardly following the passing of the shuttle to engage the weft or shot to depress same uniformly between the spacing fingers prior to the reverse movement of the heddles.

In the accompanying drawings Figure 1 is an elevational part-sectional view of a loom constructed in accordance with this invention.

Figure 2 is a detail perspective view of a portion of the warp-manipulating heddles.

Figure 3 is a part-broken part-section perspective detail of one end of the filling setter frame and spacing fingers.

Figure 4 is a front elevational detail of one end of the filling setter frame and spacing and weft-engaging fingers.

Figure 5 is an elevational view of a portion of the filling setter frame showing the latches for holding the weft depressing fingers raised.

Figure 6 is a vertical sectional detail of a portion of the filling setter frame and latch releasing member.

Figure 7 is a plan view of the machine.

The loom herein shown and described is pref-

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erably a wooden structure and consists primarily of a rectangular upright frame having parallel front posts 1, rear posts 2 and intermediate posts 3 spaced a short distance forward from the rear posts. These posts are rigidly connected by top bars 4 and horizontal bars 5 spaced about one-third of the height of the floor.

The rods 5' and 6 connect the front and rear ends of the top bars 4 and similar tie rods 8 and 9 connect the front and rear ends of the intermediate bars 5. The tie rod 9' connects the lower ends of the rear posts 2.

Upon each of the tie rods between the two side frame members are arranged spacer pipes 9'', 10, 11 and 12 which form guides over which the warps 13 extend.

Mounted upon suitable journal blocks 14 on the top bars of the frame is a roller 15 upon which the warps are wound. This roller may be held against rotation by any suitable form of braking means. A spur gear 16 is here shown attached to one end of the warp roller and this is engaged by a pinion 17, the spindle of which is journaled in the frame and has mounted on the other end a ratchet wheel 18 which may be provided with a suitable spring pawl 19 to retard movement of the warp roller.

A horizontal heddle frame 20 is mounted on and extends forwardly between the side frame members, being supported at its rear end on a cross bar 20' rigidly connected to the intermediate upright posts 3, and slidably mounted on this frame are a pair of heddles 21 and 22.

Pulleys 23 are arranged at the outer end of the heddle frame, and cords 24 having one end connected to each of the heddle frames extend around said pulleys.

Cords 25 and 26 are connected respectively to the upper heddle 21 and lower heddle 22 adjacent to the ends of their inner sides. These cords extend back and around pulleys 27 and 28 mounted on the cross bar 20', and said cords extend outwardly and are carried downwardly over pulleys 29 and 30 at the outer ends of the cross bar.

A pair of spaced heddle levers 33 (only one of which is shown) are pivotally mounted on the ends of the rear tie rod 10' and the heddle cords extending over the pulleys 29 and 30 are connected to these levers.

Elevator members 34 are arranged one on each side of the main frame to slide vertically on the inward side of the uprights 1 and 3. These may or may not be connected transversely across the frame but lifting cords 35 are con-

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nected adjacent to the front and rearward ends and extend upwardly and around rollers 36 rotatably mounted between the front and intermediate posts 1 and 3, so that upon the turning of said rollers and the winding up of the cords the elevators will be moved upwardly in the upright frame.

Extending along the inward bottom edges of the elevator members 34 are guide strips 37 and resting upon these guide strips and extending across the frame is an open rectangular frame 38 which I term the filling setter frame.

The front bar 39 of the frame 38 is formed with a plurality of equally spaced U-shaped grooves or notches 40, and arranged at either side of these notches extending throughout the length of the said cross bar are blocks 41 which are mounted on hinges and normally rest in a horizontal position extending from the forward side of the bar.

In each of the said blocks there is secured a narrow blade 42, preferably of thin metal. The outward ends of these are curved upwardly.

Extending lengthwise of the frame 38, about mid-way between the front and back bar thereof, is a rigid bar 43 which is formed with a plurality of vertical slots 44 arranged transversely thereon, and these slots are aligned centrally with the V-notches 40 in the front bar.

Pivotally mounted in each of the slots 44 is a thin metal bar 45. These bars form fingers which extend outwardly beyond the front bar and parallel with the blades 42. Each of the bars 45 extend rearwardly of the supporting middle bar of the frame and each is formed with a bevelled top surface 46.

Pivotally mounted on the back of the bar 43 and in alignment with the slots 44 are latch members 47 which are provided with forwardly extending lugs 48 adapted to engage the bevel top surfaces 46 of the bars 45. These latches are spring-held by loop springs 49, with the lugs 43 engaging and holding the bars 45 in an angularly elevated position clear of the notches 40 in the bar 39. Hinged to the lower side of the bar 43 is a board 50 which, when swung to a substantially vertical position as shown in Figures 3 and 6, will engage and lift the blades from a horizontal position to the raised position, and as the board 50 is thus manipulated the individual latch members 47 slip over the rounded under corners of the blades 45 and ultimately engage the top bevelled edges to hold them in the elevated position.

Mounted on blocks 51 at each end of the frame 38 is a horizontal bar 52 and on this bar is mounted a trolley 53 which is capable of moving longitudinally thereon. Secured to and extending downwardly from the trolley is an arm 54 provided with a horizontal and bevelled extension 55 which is adapted, on being moved longitudinally, to engage the latch members 47 to effect the withdrawal of the lugs 48 of said latches from engagement with the bevel top of the blades 42.

Levers 56 are pivotally mounted to the top bars of the frame of the loom midway between the front and intermediate posts 1 and 3. These extend downwardly and the lower ends are adapted to engage the back bar of the filling setter frame 38.

A cord 58 is attached to each of the heddle levers 33 and extend over pulleys 58' and are connected to the levers 56 so that upon the depression of the heddle lever at its forward end will cause the swinging of the lever 56 to engage the frame 38 and slide it forward in the elevators

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34. This movement carries the frame forwardly so that the hinged blades 42 are extended through the warps passing downwardly through the heddles, thereby holding the warps from lateral distortion and also presenting a positive guiding surface for the shuttles which are passed back and forth between the warps.

A pair of bars 59 are pivotally mounted intermediate of their length on pivots 60 arranged intermediate of the height of the intermediate horizontal bars 5. The forward ends of the bars 59 extend beyond the front post 1 beneath the heddle frame and between these arms is secured the comb 61, through the cross bars of which the warps are threaded. This comb or reed frame is adapted to be swung downwardly following the passing of a shuttle to press the weft shots tightly into the warps against the previous shots passed in the construction of the carpet or other piece of goods that is being woven.

The rear ends of the bars 59 extend back of the rear posts 2 and a cross bar connecting same has a roller 62 mounted thereon weighted to counterbalance the bar 59.

Pivotally mounted on the inner side of each of the rear posts 3 are the cam arms 63 which are pivoted intermediate of their length and their upper ends have the rearwardly extending underside bevelled faces 64 which engage the rollers 62.

The forward and downwardly extending ends of the cam arms 63 are connected by means of cords 65 to the filling setter frame 38, such cords extending over the top of the hinged board 50, so that when the cam arms are swung on their pivots so that their bottom ends move rearwardly the said cords first swing the board 50 upwardly to engage and lift the blades 45 to swing them to their latched position, and then the cords pulling upon the frame move the frame backwardly so that it slides upon the guides of the elevators 34 and withdraws the hinged bars mounted on the front bar 39 of the filling setter frame out from between the warps.

This action is caused by the downward swinging of the reed frame and the bars of the filling setter frame are withdrawn from the warps before the reed or comb moves far enough down to engage the weft shots to pack them securely.

In operating this machine the weaver first winds his warps on the roller 15 and these are carried downwardly over the spacer tubes 9" and 10, then beneath the frame around the rear spacer tubes 11 and up the back of the frame and over the top spacer tubes 12 from whence they are carried downwardly to the roller 66 mounted in suitable bearing blocks below the horizontal bars 5 and between the intermediate and rear posts.

In placing the warps they are threaded through the heddles and the reed in the usual approved manner.

The operator of the loom by pressing downwardly on one or other of the heddle levers pulls downwardly on the cords connected with the heddles, thus spreading the warps apart, the upper heddle being moved in one direction while the lower heddle is moved in the opposite direction.

With the same movement of the heddle levers the filling setter frame levers are swung forwardly and these levers engaging the filling setter frame slide it forward until the guide blades extending forwardly therefrom pass between the warps.

Simultaneously with the forward movement of the said filling setter frame the cam arms, which

are connected thereto by the cords 65 swing on their pivots and the under bevelled surfaces engaging the rollers 62 swing the reed frame comprising the bars 59 upwardly to a position closely adjacent the underside of the heddle frame where it is retained by the counterbalance 62. With the reed frame counterbalanced it will be understood that with the reed frame in its upward position the cord 65 connecting its actuating cams 63 with the setter frame will be sufficiently slack to permit the board 50 to swing down under its own weight clear of the bars 45. The weaver then passes the shuttle through the shed of the warps and the weft shot lies loosely between said warps over the blades 42.

The weaver then manipulates the trolley 53 riding on the horizontal bar 52 carried on the filling setter frame, and the bevelled extension of the cam arm 54 travelling across the loom engages the latches 47, pushing them back to clear the pivotal bars mounted in the rigid middle bar 43, and these bars swinging downwardly enter the notches 49 in the front bar and in their downward passage engage the piece of shot material which has been passed across through the warps and presses it downwardly stretching over the blades extending between the warps from the front bar of the frame. This imparts to each shot of fabric a zig-zag shape, as illustrated particularly in Figure 4, and draws out an equal amount of shot material, placing it uniformly over the previous shots and with an equal amount of tension.

This provision is a critical part of the present invention as it places the material of the weft shots uniformly in position without drawing tightly in at the ends so that when the reed frame is depressed by the voluntary operation of the weaver the zig-zag contour of the shots permits it to pack down uniformly without drawing the end loops inwardly to constrict and pull the warps out of their vertical position.

The weaver then manipulates the reed frame downwardly and the downward swinging of the reed frame causes the roller 62 to swing the cam arms upwardly with their bottom ends swinging rearwardly, thereby pulling on the cords to swing the hinged board upwardly as described and raise the shot depression bars or fingers until they are latched in their raised positions, and the continuing movement draws the filling setter frame backwardly to again clear the warps and permit the repetition of the operations as described.

It will be understood that as successive weft shots are placed between the warps the fabric will grow, consequently it is necessary that the filling setter frame be raised to take care of this growth of the fabric upwardly. This raising is accomplished by providing suitable cords or chains connected to the heddle levers to pull downwardly upon and operate ratchet members 68 which rotate the rollers 36, and as such rollers rotate they wind up the cords 35 and raise the elevators 34.

A suitable return operating cord 69 is secured to the elevator rollers so that when the elevators have been raised a sufficient distance the carpet or other fabric woven may be wound upon the carpet roller 66, after which the rollers 36 may be reversed by pulling on these return cords to lower the elevators to the desired position.

It will be understood that a loom such as described may be made at extremely low cost. It may be operated quite successfully by persons who may be partially handicapped by physical disability; it requires no power to operate and

it produces a woven article of a uniform width throughout its length.

What I claim as my invention is:

1. In a hand operated loom, the combination with the warps, heddles for manipulating said warps, and heddle levers for operating said heddles, of a frame mounted to move toward and from said warps, spacer bars mounted on said frame and intermittently spaced thereacross adapted to extend between said warps upon movement of said frame towards said warps, bars mounted on said frame spaced between the aforesaid bars and adapted to be raised above the horizontal plane of said spacer bar assembly, means for moving said raised bars downwardly in succession to press the weft material downwardly in a zig-zag pattern between the spaced spacer bars extended between the warps, and weft beating means for withdrawing said weft-engaging bars clear of the webs and for thereafter effecting the movement of said frame to withdraw said spacer bars from between said warps.

2. A hand operated loom as claimed in claim 1 in which the spacer bars extending forwardly from the movable frame are hinged thereto and the bars adapted to be moved between said hinged spacer bars are pivotally mounted to swing upwardly, means being provided to hold said pivotally mounted bars in the raised position, and means for releasing said holding means.

3. In a hand operated loom the combination with the warps, heddles for manipulating said warps and heddle levers for operating said heddles, of a frame movable toward and from the warps, spacer bars hinged to said frame to extend horizontally forward therefrom to project between said warps, bars pivotally mounted on said frame back of the hinged forwardly extending bars and adapted to swing downwardly between the aforesaid bars to engage and press the weft material downwardly between the hinged bars in a zig-zag pattern, latches mounted in said frame adapted to engage and hold said pivotally mounted bars in a raised position, a member movable transversely of said frame and adapted to engage said latches to allow said pivotal members to drop, and means for moving said frame away from the warps.

4. A hand operated loom comprising a rigid upright frame, means for supporting the warps vertically in said frame, a frame mounted in the aforesaid frame and adapted to be moved horizontally toward said warps, spacer bars extending from the forward edge of said horizontal movable frame adapted to extend between said warps, bars mounted on said horizontally movable frame adapted to swing downwardly between the aforesaid bars to depress weft shots between the spacer bars extending between the warps, heddles for manipulating the warps, heddle levers mounted on the main frame and connected with said heddles, means connecting said heddle levers to the frame carrying the spacer bars to move said spacer bar frame toward the warps, comb-supporting members pivotally mounted on the main frame, cam members pivotally mounted on the main frame and engaging said comb-supporting members to raise the comb coincident with the forward movement of the frame carrying the spacer bars, and to move said frame carrying said spacer bars away from the warps coincident with its downward movement to beat the weft downwardly.

5. A hand operated loom comprising a frame

having vertical front and back posts, elevator members slidably mounted between each pair of front and back posts, a frame supported between said elevators to slide horizontally and having separator bars extending therefrom to extend between the warps arranged vertically at the front of the frame, heddles for manipulating said warps, heddle levers connected with said heddles, cords connecting said heddle levers with said horizontal slidable frame to move same forwardly, means carried on said frame for alternately depressing the weft shots placed between the warps over the separator bars extending from said horizontal frame, means for moving said frame to withdraw weft-engaging members from the warps, and means for moving said elevators vertically in the main frame.

6. A hand operated loom, comprising a plurality of vertical posts forming two sides of a frame, spacer members extending horizontally between said frame, tie rods extending through said spacer members, a warp-supporting roll journaled at the top of said frame, warps extending from said roll vertically downward over a pair of spacer members and back around other of said spacer members, a wind-up roll extending between said uprights, a heddle support rigidly mounted in said main frame between the side uprights, heddles mounted in said heddle frame, heddle levers pivotally mounted at either side of said frame and operatively connected with said heddles to move said heddles alternately in opposite directions, a beater comb having side arms pivotally mounted in the frame below said heddle frame, rollers mounted at the rear end of said

beater frame arms, cam members pivotally mounted on either side of the frame uprights and operatively engaging rollers on said beater comb arms, a frame extending transversely of the main frame formed by said uprights, cords operatively connecting said cams with said transverse frame to effect the rearward movement of said transverse frame upon the downward movement of the comb, spacer bars extending forwardly from said transverse frame adapted to extend between the warps upon the forward movement of said transverse frame, arms pivotally mounted on the inward side of the uprights adapted to engage and move said transverse frame forwardly toward the warps, cords connected with the heddle levers connected with the latter arms to pull same forwardly coincident with the movement of the heddles, and means mounted in said transverse frame extending forwardly between the spacer members and adapted to engage and depress the weft material passed between the warps between said spacer members.

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