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2,714,397

DEVICE FOR SHIFTING PILE WARP CROSSINGS TOWARD FELL

Filed June 28, 1954

3 Sheets-Sheet 1

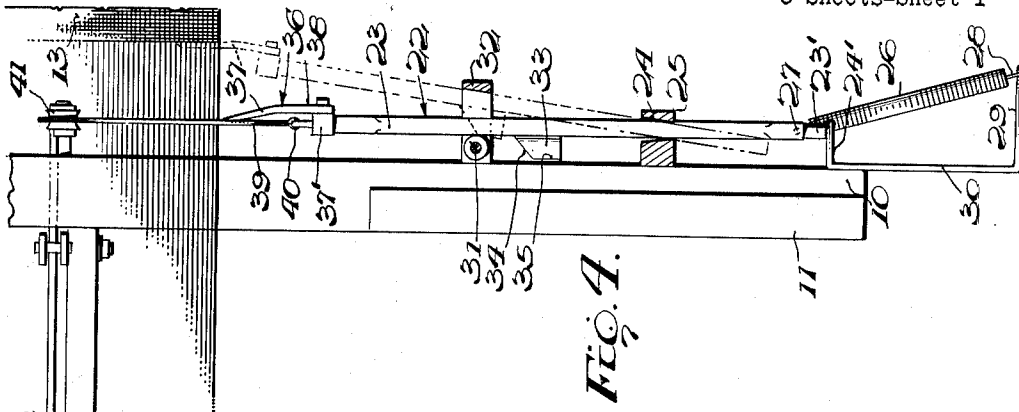


FIG. 1.

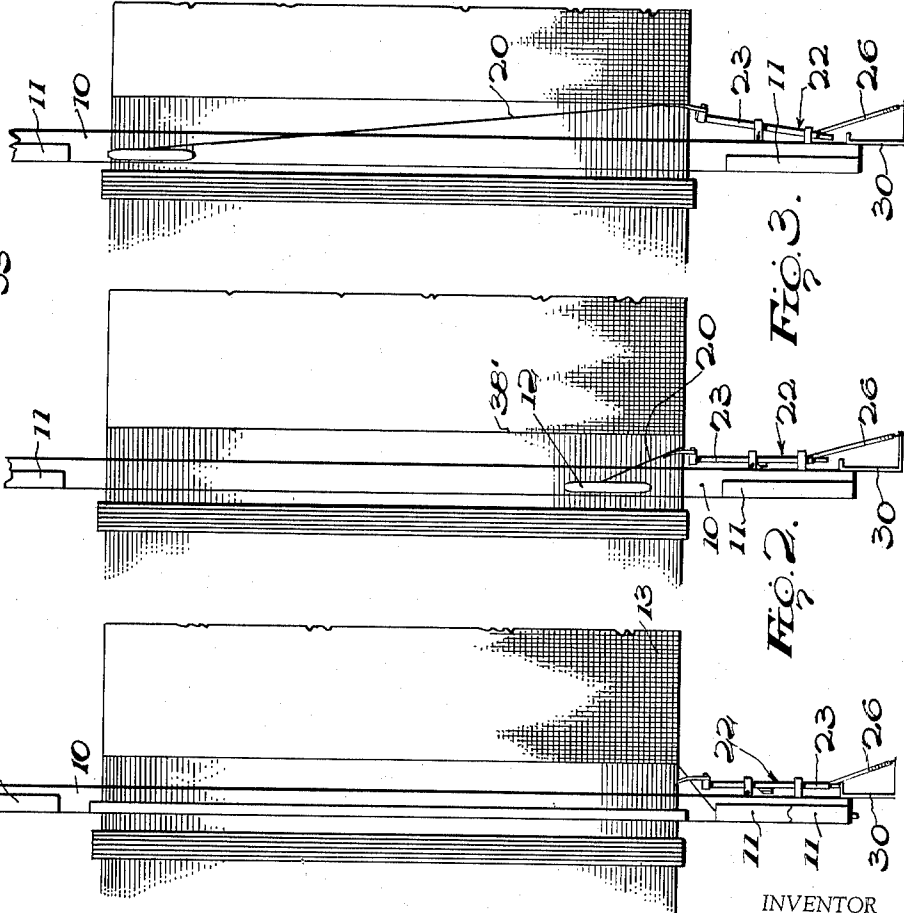


FIG. 2.

FIG. 3.

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FIG. 5.

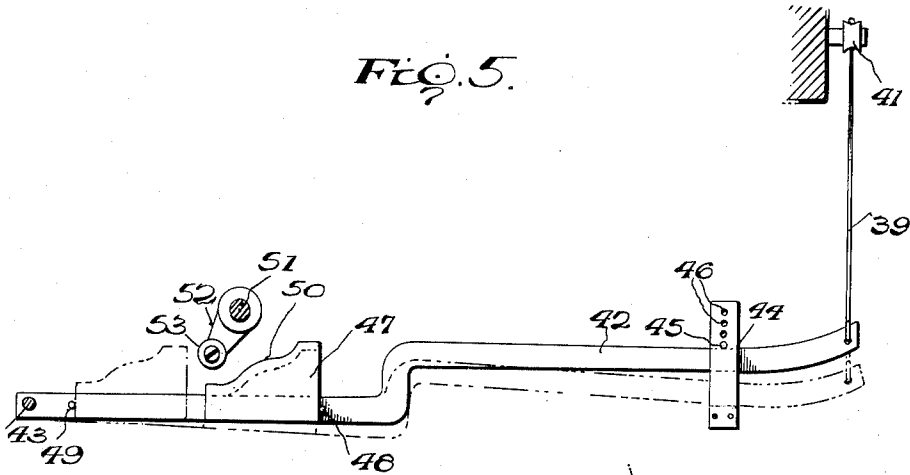


FIG. 6a

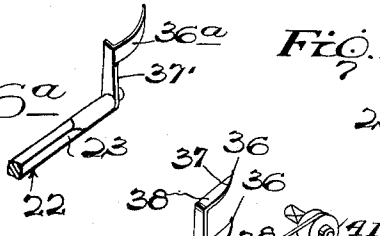


FIG. 6.

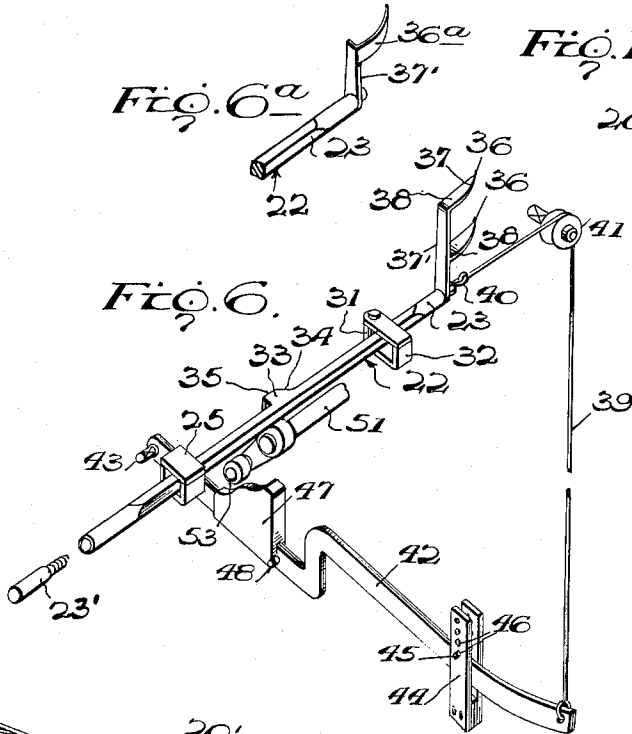


FIG. 10

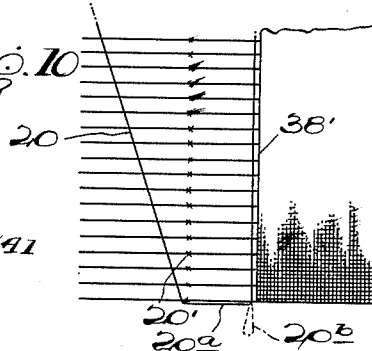


FIG. 11.

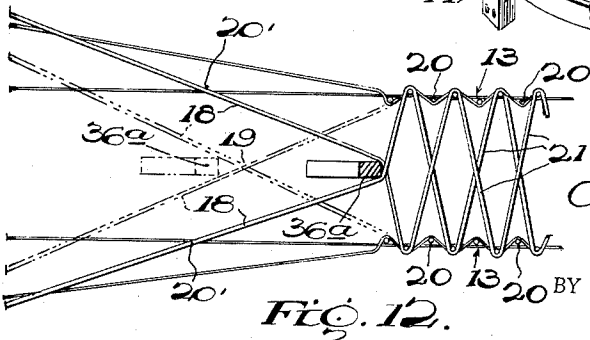
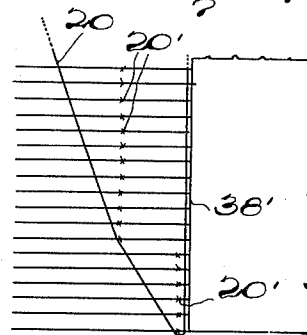


FIG. 12.

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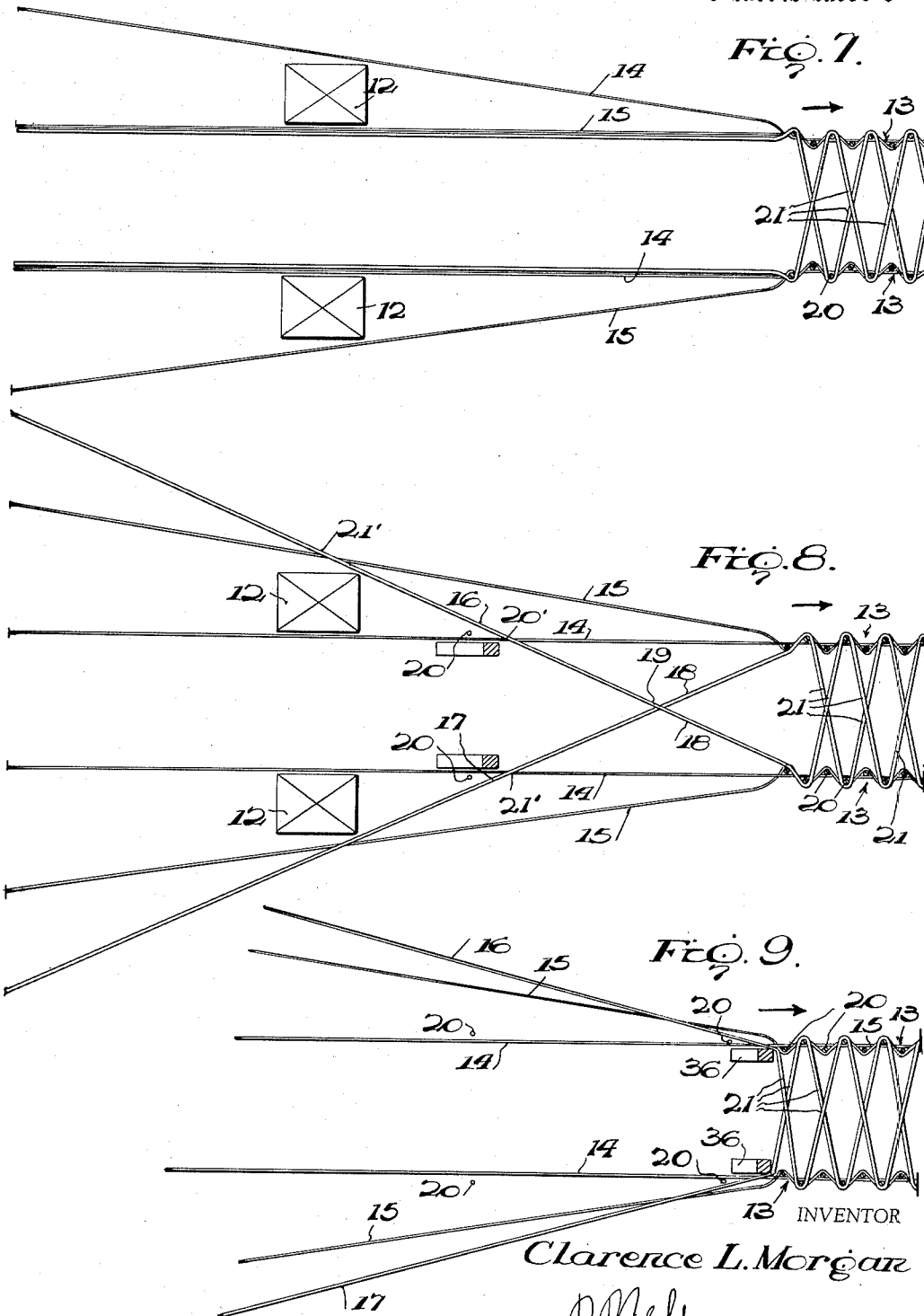
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2,714,397

DEVICE FOR SHIFTING PILE WARP CROSSINGS TOWARD FELL

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Application June 28, 1954, Serial No. 439,535

8 Claims. (Cl. 139—21)

My invention relates to looms, and has particular reference to an attachment to be mounted upon the lay, for shifting the pile warp crossings which are adjacent to the selvage, close to the fell.

In the manufacture of woven pile rugs, it is old to weave two rugs at the same time, and the pile of the two rugs is originally integral, and is severed as the weaving of the rugs progresses. In the weaving of the two rugs, the rugs are ordinarily arranged in superposed relation and there are two sets of ground warps for each rug and two sets of pile warps which are common to the two rugs. The ground warps of each rug are manipulated by the heddles, in timed order with respect to the weft of each rug, so that the ground is woven in the conventional manner. The two sets of pile warps are manipulated to form pile warp crossings, and the pile warps are woven into the grounds, and the pile warps form an original pile which is integral and connects the two rugs. As the two rugs being woven are advanced, the integral pile is brought into contact with severing means and the pile warp crossings are severed forming two separate pile rugs. In the weaving of two rugs at the same time, with the pile warp crossings connecting the grounds of the two rugs, two shuttle boxes are arranged at the opposite ends of the lay in superposed relation and two shuttles are picked simultaneously, to form the weft for each rug. This procedure is conventional in the art, and is illustrated broadly by Patent Numbers 294,968; 1,524,398; 1,676,931; 1,757,555; 2,152,592 and 2,391,835.

As is well known in the art, difficulty is experienced in the weaving of two pile rugs simultaneously, with slack at the selvage of each rug. This slack occurs at the selvage when the weft is beaten up by the reed and this slack is caused by the fact that the pile warp crossings hold the weft spaced from the fell, adjacent to the selvage. This spacing may occur at one or both of the selvages.

In accordance with my invention, I mount a device upon the lay of the loom, which device travels with the lay toward and from the fell. This device includes means which is moved a short distance into the shed of the pile warps, and forces the pile warp crossings closer, or in close relation, to the fell. This brings the end of the weft at the adjacent selvage closer to the fell, and upon the next pick, the tension upon the weft from the traveling shuttle, will draw the weft close to the ground warps and adjacent to the fell, at the selvage, thereby eliminating undue slack in the weft at the selvage, when the weft is packed up by the reed. It is highly desirable to dispense with looseness in the weft at the selvage, as excessive looseness may result in the cut pile being displaced and thereby producing a ragged appearance, or even being pulled out of the ground.

In the accompanying drawings forming a part of this application and in which like numerals are employed to designate like parts throughout same,

Figure 1 is a plan view of the lay and associated elements of a loom, showing the lay starting on its rearward

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movement from the fell and the warp pile crossings shifting device in the retracted or outer position,

Figure 2 is a similar view, showing the lay moved rearwardly from the fell for about two-thirds of its movement and the pile warp crossings shifting device moved into the pile warp shed, and the shifting device not as yet moved close to the fell,

Figure 3 is a similar view showing the lay approaching the end of its stroke from the fell and the pile warp crossings shifting device moved close to the fell to bring the crossings close to such fell,

Figure 4 is a plan view, somewhat enlarged with respect to Figures 1 to 3 inclusive, of the pile warp crossings shifting device and associated elements, parts broken away and parts omitted,

Figure 5 is a side elevation of the operating lever which shifts the pile warp crossings shifting device,

Figure 6 is a perspective view of the pile warp crossings shifting device and operating lever and the connecting means between the same,

Figure 6a is a fragmentary view of an alternative form of pile warp crossing shifting device,

Figure 7 is a diagrammatic view of the sheds of the ground warps and the pile warps, viewed from the good selvage edges of the rugs,

Figure 8 is a similar view, viewed from the bad selvage edges of the rugs, with the crossings shifting device moved into the shed of the pile warps, but in the rear position,

Figure 9 is a similar view showing the shifting device moved forwardly close to the fell,

Figure 10 is a plan view, partly diagrammatic, illustrating the formation of the long loops in the weft at the bad selvage edge, in accordance with the old practice,

Figure 11 is a similar view showing the elimination of the long loop in the weft at the bad selvage edge, by the use of the present invention,

Figure 12 is a diagrammatic view of the sheds of the ground warps and pile warps, viewed from the bad selvage edges of the rugs, and showing the crossings of the pile warps moved closer to the fells of the rugs.

In the drawings, where for the purpose of illustration is shown a preferred embodiment of my invention, the numeral 10 designates a lay, equipped at each of its opposite ends with two shuttle boxes 11 arranged in spaced superposed relation. There is an upper shuttle for use with the upper pair of shuttle boxes and a lower shuttle for use with the lower pair of shuttle boxes and the shuttles are indicated at 12. The conventional means is employed to move the lay, and conventional picker sticks and operating means for the picker sticks are employed, to pick the shuttles, as indicated in said patents.

The numeral 13 designates upper and lower rugs being woven, and which are being fed to the right, during the weaving operation, Figures 7 to 9. In Figures 7 to 9 inclusive, the numerals 14 and 15 designate the ground warps of the upper and lower rugs and 16 and 17 designate the pile warps forming crossings 18, which cross each other at 19, and cross the ground warps at 20' and 21'. The wefts are designated by the numeral 20, in the woven rugs, and 21 designates the integral pile, connecting the woven rugs before the integral pile is severed to form two complete rugs.

I provide a pile warp crossings shifting device 22, which is mounted upon the lay 10, for movement therewith. This crossings shifting device comprises a bar 23, which is square in cross section, and extends longitudinally of the lay 10 and is mounted upon the forward side of the lay. The bar 23 is slidably mounted within a tapered opening 24 formed in a bracket 25, rigidly mounted upon the lay 10. This bracket guides the bar 23 and pivots the bar to the lay so that it may swing

horizontally. The bar 23 is moved longitudinally in an outward direction from the selvage edges of the rugs by a retractile coil spring 26, attached to the outer end of the bar 23, as shown at 27, and having its outer end attached at 28 to the laterally extending arm 29 of a bracket 30, which is rigidly secured to the lay 10. The spring 26 is disposed at an inclined angle with respect to the bar 23 and not only moves the bar 23 longitudinally outwardly, but swings the bar horizontally in the bracket 25, so that this bar may engage a roller 31, mounted in a loop-bracket 32, which is rigidly secured to the lay 10. When the bar 23 engages the roller 31, the bar is parallel with the lay. The bar 23 carries a shock absorbing element 23', at its outer end, to engage a stop 24', secured to the bracket 30. The bracket 25 and loop-bracket 32 hold the bar 23 against vertical swinging movement, but permits the bar to swing horizontally, and also hold the bar against turning upon its longitudinal axis. This bar has rigidly secured thereto upon its side next to the lay, a cam 33, having an inclined face 34 of a sharp angle, and a dwell face 35 parallel with the bar 23. When the bar 23 is moved inwardly with respect to the rugs, the inclined face 34 of the cam shifts the bar 23 laterally from the lay so that the inner end of the bar is nearer or close to the fell, and the bar remains in this shifted position while the dwell face 35 contacts with the roller 31.

Rigidly secured to the inner end of the bar 23 is a vertical arm 37', having shifting elements or fingers 36, rigidly secured thereto. Each element or finger has an angularly arranged portion 37 and a portion 38, which is parallel with the fell 38'. These shifting fingers 36 are adapted to be moved inwardly of the shed of the pile warps and into engagement with the crossings 18, adjacent to the crossing points 20', Figure 8.

Means are provided to move the bar 23 toward the sheds or rugs, comprising a flexible element or cable 39, Figures 4, 5 and 6, which is attached to the bar 23 at 40. This cable is passed over a grooved pulley 41, rotatably mounted upon the lay, and the pulley then extends downwardly and is connected with the forward end of a vertically swinging lever 42, extending at right angles to the lay 10, and pivoted to swing vertically upon a fixed pivot 43. This lever 42 operates within a stationary vertical guide 44, which will limit the downward movement of the lever and its upward movement is limited by a stop pin 45, inserted within selected vertically spaced openings 46. A cam block 47 is slidably mounted upon the rear end of the lever 42, and this cam block when moved forwardly upon the lever will engage a stop pin 48, and its rearward movement is limited by a stop pin 49, Figure 5. The cam block has an inclined cam face 50.

The numeral 51 designates a pick shaft, extending longitudinally of the lay as is customary, and this pick shaft carries a crank 52 provided with a roller 53. The shaft 51 and crank 52 are rotating counter-clockwise, Figures 4 and 5. When the roller 53 is moved over the cam face 50, the lever 42 is swung downwardly, and the cable 39 pulls the bar 23 inwardly toward the rugs. When the pick shaft 51 is rotated in an opposite direction, such as clockwise in Figure 5, the roller 53 will contact with the high end of the cam block 47, and shift the cam block toward the pivot 43, until the roller clears the cam block, and the lever 42 will not then be swung downwardly upon its pivot. The crossings shifting device will therefore not be operated when the loom is running backward, in repairing warps, or for other reasons.

The operation of the loom is as follows:

Viewed from the bad selvage edges of the rugs, which is the bottom of Figures 1 to 4 inclusive, and also shown in Figure 8, the heddles have shifted the ground warps 14 and 15 so that they make the next cross, and the heddles have shifted the pile warps 16 and 17 so that

they make the next cross with each other and also cross the warps 14 and 15, Figure 8. Figure 8 shows the relative positions of the ground warps and the pile warps, and their sheds, at the time that the shuttles 12 enter the sheds, at the bad selvage edges. With the warps arranged as shown in Figure 8, the lay is moving rearwardly from the fell, and when the lay moves rearwardly for about two-thirds of its travel, the pick of the shuttles occurs. This places the wefts 20 near the crossing points 20' and 21' at the bad selvage edges and spaced a considerable distance from the fell. If this is not corrected, improper slack will occur at the selvage edge. This arrangement, see more particularly Figure 10, produces a weft portion 20a, and when the reed beats up the weft, it will produce a loop 20b, extending outwardly beyond the selvage edge, and it is this loop which provides the improper slack. The roller 53 is timed in operation with respect to the picker sticks, and this roller engages the cam block 47 and forces the cam block downwardly, and this cam block swings the lever 42 downwardly, and the lever 42 pulls the cable 39, which shifts the bar 23 forwardly toward the sheds. The vertical arm 37' moves the fingers 36 inwardly of the shed of the pile warps, and the fingers 36 engage the pile warps 16 and 17, adjacent to the points of crossing 20', and inwardly of the ground warps 14 and 15. When the bar is thus shifted longitudinally to the projected position, the cam 33 engages the roller 31, and the bar 23 is rapidly swung laterally toward the fell, Figures 3 and 4. The bar 23 is swung toward the fell while the lay 10 is traveling from the fell, but the forward movement of the bar toward the fell is much faster than the rearward movement of the lay from the fell, and hence the fingers 36 will move close to the fell, and shift the crossings 18 to upstanding positions and close to the fell. When the bar 23 is traveling laterally toward the fell, the fingers 36 engage behind the pile warp crossings 18, adjacent to the points of crossing 20', and when these fingers move close to the fell, the crossings are shifted to generally vertical positions, close to the fell. The weft from the shuttle is designated at 20, Figures 3, 9 and 11, and in each rug this weft will be arranged behind the pile warps 16 and 17, close to the fell. It is thus seen that the weft portions 20a are eliminated and the wefts adjacent to the bad selvage edges are close to the fell and will remain in this position, Figure 11, and hence no improper slack will be made when the reed beats up the wefts. The parts are so timed in operation that the bar 23 is moved inwardly into the shed and then shifted forwardly close to the fell, before and about the time that the shuttle has traveled two-thirds of its distance from the bad selvage edge, Figure 3. The shuttle is therefore still placing the weft under tension, and this will draw the weft close to the ground warps at the selvage, and since the distance between the points of crossing of the pile warps with the ground warps, from the fell, is close or materially decreased, undue slack at the selvage edge is eliminated, as stated. The bar 23 and fingers 36 may remain in the projected or forward position until the lay has reached its rearmost position from the fell, and when the lay moves forwardly from the rearmost position for about one-third of its stroke, the roller 53 will disengage the cam block, and the spring 26 will rapidly return the bar 23 to the outer or retracted position. The fingers 36 are moved out of the shed and out of the path of travel of the reed, before the reed nears the fell, and the reed cannot contact with the fingers. The fingers 36 are spaced slightly from the warps when the bar 23 is in the retracted position.

The shuttles 12 having been thrown from the bad selvage edges to the good selvage edges, the shuttles are in the shuttle boxes at the good selvage edges, and when in such shuttle boxes, the heddles are operated to cross the ground warps 14 and 15, Figure 7, and the heddles have started to cross the pile warps 16 and 17, but there

is a dwell in the crossing of the pile warps and the pile warps are held substantially parallel, Figure 7, and when the shuttles are again picked, these shuttles travel from the good selvage edges to the bad selvage edges. Since the warps 16 and 17 are not now crossing, they do not hold the weft spaced from the fell, and hence the weft will be close to the fell when the shuttle is picked and when the reed beats up the weft, and undue slack at the good selvage edge will not occur. After the shuttle reaches the shuttle boxes at the bad selvage edges, the completion of the crossing of the pile warps 16 and 17 is made, and the ground warps are again crossed, Figures 8 and 9. It is thus seen that the ground warps are crossed for each pick, while the pile warps are crossed for each alternate pick. Upon the next pick, the shuttles again move from the bad selvage edges to the good selvage edges, and the crossings 18 are again shifted close to the fell, and the operation is completed, and the complete cycles of operation continued.

I also contemplate using one crossing shifting finger 36a, instead of two, which single finger is rigidly mounted upon the vertical arm 37'. This is shown in Figure 6a. The finger 36a will engage the crossings 18 adjacent to their point of crossing and will shift the crossings to the position shown in Figure 12. This will reduce the distance between the points 20' and the fell to about one-half, and materially reduce the slack at the selvage edges. However, the single finger cannot shift the crossing as close to the fell as the two fingers.

It is to be understood that the forms of my invention herewith shown and described are to be taken as preferred examples of the same and that various changes in the shape, size and arrangement of parts may be resorted to, without departing from the spirit of my invention or the scope of the subjoined claims.

Having thus described my invention, I claim:

1. An attachment for a loom including a lay and which is adapted to weave two pile fabrics connected by pile warp crossings which are to be severed, said attachment including a device to be mounted upon the lay and movable into and out of the shed of the pile warps, said device including means to engage the crossings of the pile warps and shift said crossings toward the fell.

2. An attachment for a loom including a lay and which is adapted to weave two pile fabrics connected by pile warp crossings which are to be severed, said attachment including a device, means to mount the device upon the lay, means to shift the device into and out of the shed of the pile warps, said device including means to engage the crossings of the pile warps and shift said crossings toward the fell.

3. An attachment for a loom including a lay and which is adapted to weave two pile fabrics connected by pile warp crossings which are to be severed, said attachment including a device to engage the crossings of the pile warps, means to mount the device upon the lay, means to move the device longitudinally of the lay for shifting the device into and out of the shed of the pile warps, and means to shift the device transversely of the lay so that the device moves the crossings toward the fell.

4. An attachment for a loom including a lay and which is adapted to weave two pile fabrics connected by pile warp crossings which are to be severed, said attachment

including a device to engage the crossings of the pile warps and shift said crossings toward the fell, means to mount the device upon the lay so that the device may move longitudinally of the lay and be swung transversely of the lay, means to move the device longitudinally, and means to swing the device laterally when moved longitudinally.

5. An attachment for a loom including a lay and which is adapted to weave two pile fabrics connected by pile warp crossings which are to be severed, said attachment including a bar, means to mount the bar upon the lay so that the bar may move longitudinally of the lay and be swung transversely of the lay, means connected with the bar to shift the pile warp crossings toward the fell, a cam connected with the bar, an element mounted upon the lay and arranged in the path of travel of the cam, and means to move the bar longitudinally in opposite directions.

6. An attachment for a loom including a lay and which is adapted to weave two pile fabrics connected by pile warp crossings which are to be severed, a bar, means to mount the bar upon the lay so that the bar may move longitudinally of the lay and be swung transversely of the lay, means carried by the bar to engage with the pile warp crossings to shift them toward the fell, means connected with the bar to move the bar longitudinally toward the pile warps, a cam mounted upon the bar, an element mounted upon the lay and arranged in the path of travel of the cam, said cam and element serving to swing the bar with relation to the lay and toward the fell, and a spring connected with the bar to return the same to its starting position.

7. An attachment for a loom including a lay and which is adapted to weave two pile fabrics connected by pile warp crossings which are to be severed, a bar, means to mount the bar upon the lay for movement therewith and so that the bar may move longitudinally of the lay and be swung transversely of the lay, means carried by the bar to engage with the pile warp crossings to shift them toward the fell, means connected with the bar to move the bar longitudinally toward the pile warps, a cam mounted upon the bar, an element mounted upon the lay and arranged in the path of travel of the cam, said cam and element serving to swing the bar with relation to the lay and toward the fell, and a spring connected with the lay and arranged at an inclined angle with respect to the bar and connected with the bar and serving to return the bar to the starting position when released, said spring also serving to swing the bar laterally toward the lay when the cam disengages said element.

8. The combination with a loom including means to weave two pile fabrics and pile warp crossings which are to be severed, said loom including a lay, of a device mounted upon the lay and movable into and out of the shed of the pile warps, said device including means to engage the crossings of the pile warps and shift said crossings toward the fell, and means to move said device into and out of the shed.

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