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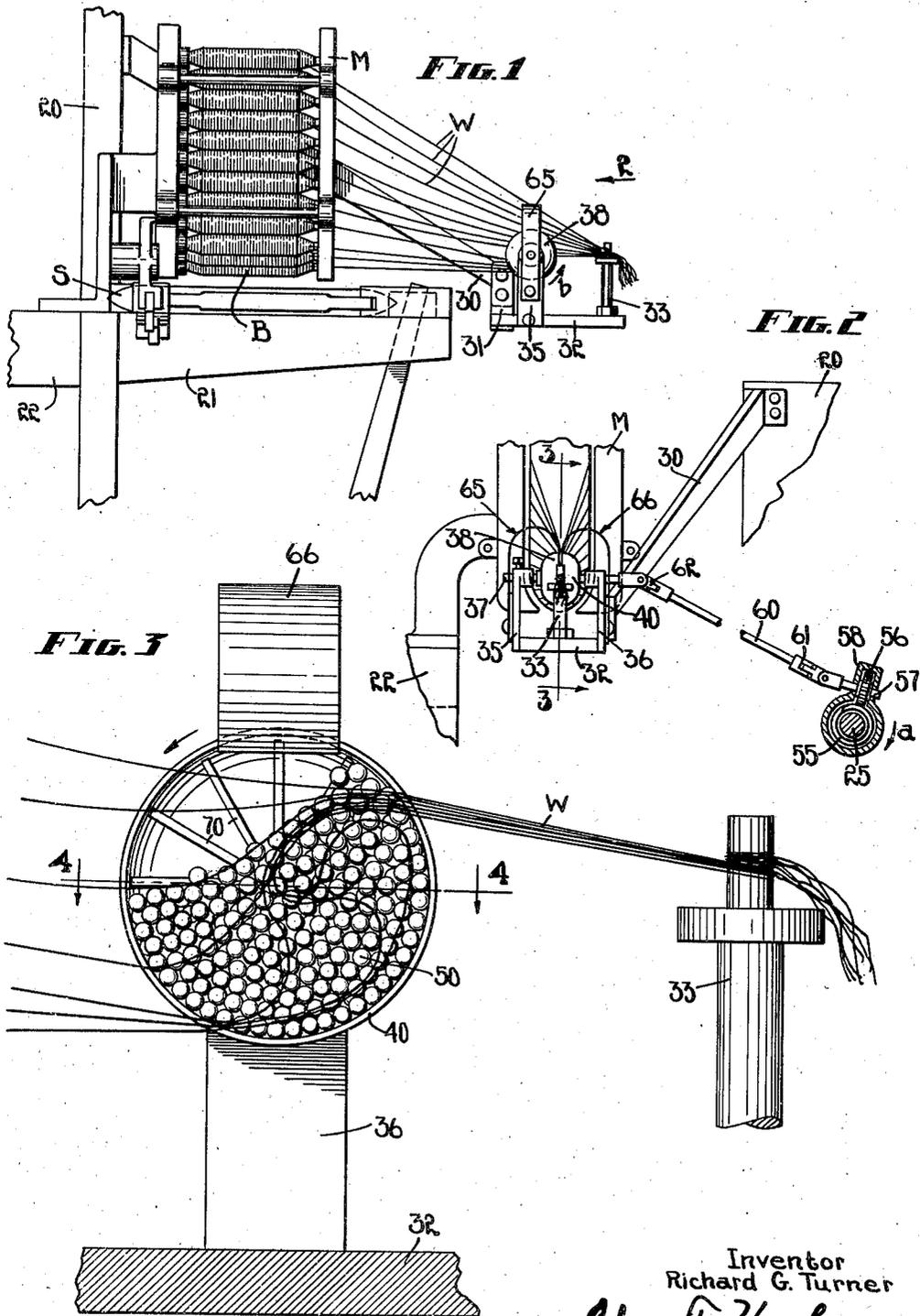
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THREAD HOLDER FOR WEFT REPLENISHING LOOMS

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2 Sheets-Sheet 1



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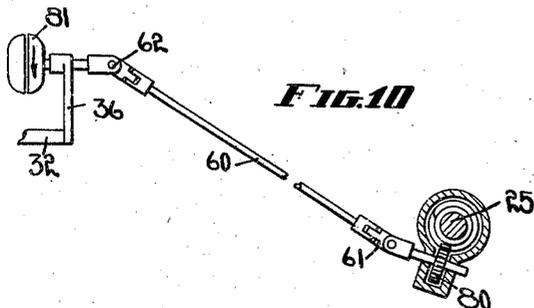
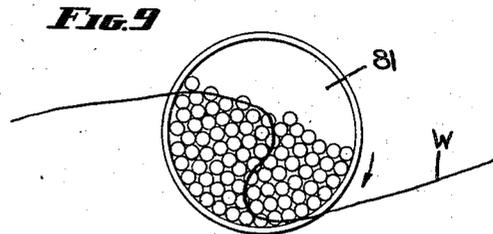
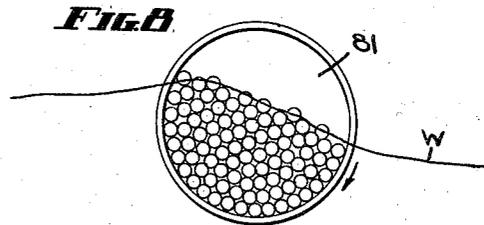
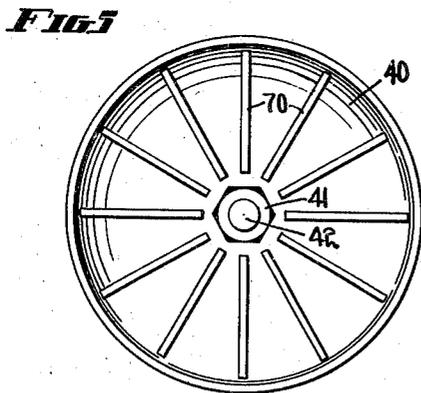
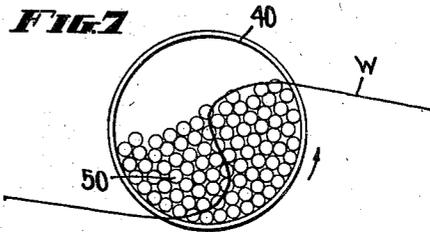
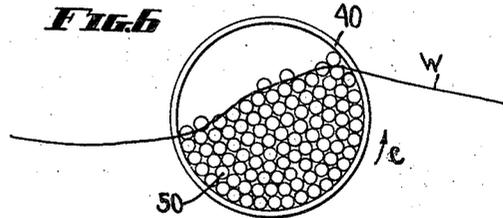
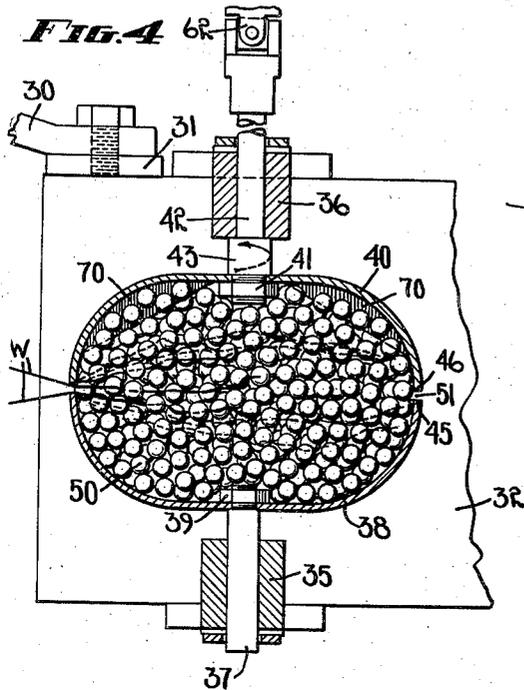
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# UNITED STATES PATENT OFFICE

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## THREAD HOLDER FOR WEFT REPLENISHING LOOMS

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15 Claims. (Cl. 139—247)

This invention relates to improvements in thread holders for weft replenishing looms and it is the general object of the invention to provide a thread holder capable of taking up the slack of weft ends and maintaining them taut.

In weft replenishing looms it is customary to store a number of reserve bobbins from each of which extends a weft end. The ends are held to some part of the loom so that the shuttle may be threaded during the pick following transfer. In the multi-color type of loom the reserve bobbins are held in a plurality of vertical stacks and feed downwardly by gravity toward transfer position. At each transfer the group of reserve bobbins from which the transfer is made falls and slackening of the weft end results. Unless the ends are held taut they will fall into the path of the lay and be broken, rendering threading of the shuttle impossible. It is an important object of my present invention to take up the slack by means of a thread holder including in its construction a large number of separate elements between which the threads can extend, said threads being held by frictional contact with the elements.

It is a further object of my present invention to provide means for turning the container for the elements so that the latter shift their relative positions and in doing so entangle the weft ends and move the latter in such a way as to keep them taut.

It is a more particular object of my present invention to provide a holder for a group of shot or the like, the holder being formed with a thread receiving slot which is narrower than the diameter of the shot. I make provision for turning the shot holder in a direction to cause a tumbling or pouring action of the shot, the turning being set forth hereinafter as continuing constantly throughout loom operation, although I do not wish to be limited to this mode of operating the holder. During the tumbling of the shot they are caused to fall repeatedly and in doing so bury parts of the weft ends under the shot, movement of a part of a group of shot away from the magazine serving to drag the weft ends by friction in a direction to tighten them. When taut the threads can slip relatively to the shot to avoid breakage.

Although the thread receiving slot of the holder is comparatively narrow, yet the threads located within the holder spread out due to the fact that the shot tumble in directions having a horizontal component and in doing so entrap the threads and move them toward the sides of

the holder and away from the plane of the slot. Because of this action the capacity of the holder is enlarged, and the threads are prevented from matting together.

Many thread holders as heretofore constructed have been so made as to render difficult or inconvenient the clearing of cut weft ends. In order to facilitate removal of the weft ends it is another object of my invention to provide a thread holder having a thread slot extending there-across so that a thread can pass from the top down through the holder and pass out the bottom of the slot to free itself from the shot or the like located in the shot holder. I have found that a holder made as set forth hereinafter has a tendency to clear itself of threads which have free ends, the turning or pouring of the shot facilitating the downward passage of such threads so that they ultimately reach the lower end of the slot.

While I have found that my thread holder works to best advantage when the shot are poured in a direction toward the magazine, yet beneficial results can be had by pouring the shot away from the magazine and I have set forth hereinafter forms of the invention which show the shot being poured in both directions.

With these and other objects in view which will appear as the description proceeds, my invention resides in the combination and arrangement of parts hereinafter described and set forth.

In the accompanying drawings, wherein a convenient embodiment of my invention is set forth,

Fig. 1 is a front elevation of one end of a weft replenishing loom having the preferred form of my improved thread holder applied thereto,

Fig. 2 is an end view of the structure shown in Fig. 1 taken in the direction of arrow 2,

Fig. 3 is an enlarged vertical section on line 3—3 of Fig. 2,

Fig. 4 is a horizontal section on line 4—4 of Fig. 3,

Fig. 5 is an inside view of the driven bell shown in Fig. 4,

Figs. 6 and 7 are diagrammatic views showing the relation of the thread and shot in the preferred form of the invention,

Figs. 8 and 9 are viewed similar to Figs. 6 and 7 but showing the mass of shot being rotated in the opposite direction in a modification of the invention, and

Fig. 10 is a view similar to a portion of Fig. 2 showing means for driving the bells so that the shot turn in a direction opposite to that in which they turn in the preferred form.

Referring particularly to Figs. 1 and 2, I have shown a loom frame 20 and a lay 21 carrying shuttle S to be replenished by the reserve bobbin B in the magazine M supported by the breast beam

22. The magazine may be of the usual type and a plurality of weft ends W extend outwardly from the tip ends of the bobbins toward the right, as viewed in Fig. 1. During operation of the loom the bobbins will descend toward transfer position and the weft ends will become slack as they more nearly approach a horizontal line. This slackness is likely to interfere with proper threading of the shuttle after transfer, particularly if the threads are slack enough to be broken by the lay as the latter swings back and forth. The matter thus far described is of common construction to be found in the commercial type of multi-color weft replenishing loom which operates with a top shaft 25 turning in the direction of a, Fig. 2.

20 In carrying my present invention into effect I secure a support arm 30 to the loom frame 20 and extend the same outwardly to have attached thereto the upright 31 of a plate or support base 32. The latter has at its right extremity as shown in Fig. 1 a thread post 33 the upper end of which is arranged to have the weft ends W tied to or wrapped therearound.

The plate 32 has front and back bearing standards 35 and 36, respectively, which are spaced and have mounted thereon bells or containers for a plurality of shot. I set forth hereinafter the different ways of utilizing this shot to take up the slack in the weft ends W.

In the preferred form shown in Figs. 1 to 3 and 6 and 7 the front upright bearing 35 has secured therein a stud 37 to the rear end of which is secured a hollow bell 38 of the general form suggested in Figs. 2 and 3. The stud 37 passes into the front bell and is held in place by a nut 39.

40 The rear bell 40 is similar to the front bell and is secured by a nut 41 to a stub shaft 42 passing through the rear bearing 36. A shoulder 43 spaces the rear bell from the rear bearing, while a set screw 44 in the front bearing spaces the front bell from the rear one to define a thread slot 51 adjustable as to width. By the proportion of the parts already described the opposing rims 45 and 46 of the front and back bells 38 and 40, respectively, are held so that the width of slot 51 is less than the diameter of the shot 50, a considerable number of which is located within the two bells.

As shown in Fig. 2 the top shaft 25 of the loom carries a worm 55 meshing with a worm gear 56 rotatable with a short shaft 57 journaled in a housing 58 supported by the shaft. A forwardly extending rod 60 has a rear universal joint connection 61 with the shaft 57 and a forward universal joint connection 62 with the stub shaft 42. During loom operation the turning of the top shaft 25 causes a relatively slow turning of the worm gear 56 and in turn rotates the rear bell 40 in a direction so that the top of said bell moves toward the magazine, or in the direction of arrow b, Fig. 1.

65 The rotating bell 40 is provided with a series of vanes 70 which may be radial and preferably are spaced an appreciable distance from the slot 51 so that the shot which these vanes lift on one side of the axis of the container will be free to fall to the other side of the axis to establish holding relation with the weft ends. The front holder 38 is preferably not provided with the webs or vanes 70 and therefore offers no interference to the motion of the shot located within the front bell 38. The 75 lower vanes move certain of the shot positively in

a direction away from the magazine and the other shot are moved similarly by frictional contact with the shot moved by the vanes and also by frictional contact with the interior of the bell 40.

The use and operation of the preferred form of my invention will be understood from Figs. 3, 4, 6 and 7. When new bobbins are placed in the magazine their weft ends W will be passed down through the thread slot 51 and will either fall on shot within the container or actually be sunk into the shot by manipulation of the thread by the weaver. As the loom runs the bell 40 will turn in the direction of arrow c, Fig. 6, the shot at the right moving upwardly and being poured to the left, or toward the magazine. As the shot fall they cover the slack weft ends located within the holder and by their weight prevent escape of the threads. The beginning of such an operation is shown in Fig. 6, but as a thread is caught by the shot and the latter continues to move the thread will assume the position shown in Fig. 7, the lower part of the mass of shot moving from the left to the right in a direction away from the magazine and frictionally holding the thread to maintain the same taut. When the threads are tight they have a sliding or slipping relation with respect to the shot as the latter move, thereby avoiding breakage.

In order that entry of the threads into the slot 51 may be facilitated I provide a pair of guides 65 and 66 which may be mounted on front and back bearings 35 and 36, respectively, and have downwardly and approaching surfaces leading to the slot 51. These surfaces, as suggested in Fig. 2, serve to direct the threads from the reserve bobbins into the thread slot.

Fig. 3 illustrates some of the positions which may be taken by the threads after the shot has been poured on them several times. It is the weight and motion of the shot in contact with the threads moving away from the magazine or to the right as viewed in Fig. 3, which by frictional contact with the threads tends to hold the latter taut.

As the shot fall they tend to deflect the threads toward the supports 35 and 36 and away from the thread slot, as suggested in dotted lines in Fig. 4. This spreading of the threads increases the capacity of the thread holder and also prevents the formation of bundles or knots of threads which would interfere with the clearing of the holder of reserve weft ends after transfer. It will be apparent from the lower part of Fig. 3 that should one of the weft ends entering the lower part of the slot 51 be cut subsequent to a transfer of the corresponding bobbin, it would be free to fall and experience shows that in time this end will fall through the lower part of the slot 51. By this action the thread holder automatically clears itself of threads which are no longer held at their magazine end. If desired, the weaver may pull the cut ends down through the bottom of slot 51, the shot moving laterally to permit passage of the threads.

In the modification of the invention provision is made for turning the mass of shot in a direction so that they pour away from the magazine, this action being suggested in Figs. 8 and 9. I find under certain conditions that the shot moving as set forth in this modification operate quite satisfactorily to take up slack of the thread, since the mass of shot at the left of the holder as viewed in Fig. 9, when moving toward the right will drag the weft ends W sufficiently to hold them taut. The drive for the shot holder in

the modification may be substantially the same as that illustrated in Fig. 2 except the worm gear 80 is on the under side of the shaft 25 and thereby effects a reversal of the direction of rotation of the bell 81.

In each form of the invention provision is made for pouring a mass of shot or similar small individual and separately movable elements on to the slack weft ends for the purpose of embedding the ends in a mass of shot, after which motion of the shot is relied upon to tighten the weft ends and keep them above the path of the lay. While I have shown means for rotating but one of the two bells, an arrangement which has proved satisfactory in actual practice even without the vanes 70, yet I do not wish to be limited to this particular kind of drive.

From the foregoing it will be seen that I have provided means for introducing weft ends from a reserve supply of weft into a mass of shot or the like which by its rotation establishes frictional holding contact with the threads. The threads are held by the weight of the shot when the loom is at rest, and when the loom is operating the mass of shot acts by its motion to take up any slack which may occur either from improper unwinding of the thread from the reserve bobbins or by the descent of the latter incident to transfer. It will further be seen that although a considerable mass of matter is interposed between the top and bottom parts of the thread slot 51, yet this mass is made up of a large number of small individually moving parts through which the weft ends may pass to clear the container and prevent undue accumulation of threads. It will also be seen by reference to Fig. 4 that the thread ends are spread out by the action of the shot so that the latter are enabled to have a larger area of contact with the threads than would be the case if the weft ends were confined to the plane of the slot 51. It will further be understood that the mass of shot can be turned in either direction and that the vanes 70 assist in lifting the shot and moving them around the axis of the container. I have found in actual practice that the rotation of a single bell which is internally smooth will suffice to pour the shot from one side to the other of the axis established by the stud 37 and shaft 42, but I prefer to use the vanes. Figs. 2 and 10 also suggest continuous driving relation between the loom and the shot container, but I do not wish necessarily to be limited to such a drive.

Having thus described my invention it will be seen that changes and modifications may be made therein by those skilled in the art without departing from the spirit and scope of the invention and I do not wish to be limited to the details herein disclosed, but what I claim is:

1. In a weft replenishing loom, an actuator moving during loom operation, a magazine to hold reserve bobbins from which extend weft threads, means to hold the ends of the threads, a group of shot, and means moved by the actuator to cause the shot to fall on and hold the weft threads.

2. In a thread holder for the weft threads of reserve bobbins, means to hold the ends of the threads, a shot holder, and a group of shot in the holder and in contact with each other and through which the weft threads extend in frictional contact with the shot, the weft threads being capable of being drawn through the group for the purpose of tightening said threads and the shot holding the weft threads.

3. In a thread holder for the weft threads of reserve bobbins, means to hold the ends of the threads, a shot holder, and a group of separate individual elements in the holder and in contact with each other and the weft threads which pass through the group, the elements above the weft threads holding the latter on the elements below the weft threads, the elements having friction contact with the weft threads to permit the latter to be drawn through the group to tighten said weft threads and thereafter holding said weft threads.

4. In a thread holder for the weft threads of reserve bobbins, means to hold the ends of the threads, a group of separate individually movable elements in frictional contact with the weft threads which extend through the group, and means to move the elements in a direction to draw the weft threads away from the reserve bobbins.

5. In a weft replenishing loom, a magazine to hold reserve bobbins from which extend weft threads, means to hold the ends of the threads, a group of shot through which the weft threads extend to have frictional contact therewith, and means to move the shot along a path having a component away from the magazine.

6. In a weft replenishing loom, a magazine to hold reserve bobbins from which extend weft threads, means to hold the ends of the threads, a group of shot through which the weft threads extend, and means to cause the shot to move while in contact with the weft threads along a path part of which leads away from the magazine and toward the first means to take up slack in the weft threads.

7. In a weft replenishing loom, a magazine to hold reserve bobbins from which extend weft threads, means to hold the ends of the threads, a group of shot, a housing for the shot into which the weft threads extend, said housing located between the magazine and said means, and means to move the housing to cause the shot to fall on the weft threads and move along a path leading away from the magazine to hold the weft threads taut.

8. In a weft replenishing loom, a magazine to hold reserve bobbins from which extend weft threads, a hollow housing into which the weft threads extend, a plurality of individually movable elements in said housing and supported thereby, and means to move the housing in a direction to cause the elements to fall on the weft threads and move along a path in a direction to draw the weft threads away from the magazine.

9. In a thread holder for reserve bobbins from which extend weft threads, a group of separate individual elements movable relatively to each other and into which the weft threads pass, a support for said elements, and means to move the support in a direction to cause the elements to fall toward the reserve bobbins and on the weft threads.

10. In a thread holder for reserve bobbins from which extend weft threads, a group of shot through which the weft threads extend, and means to pour the shot in a direction toward the reserve bobbins and down on the weft threads.

11. In a thread holder for reserve bobbins from which extend weft threads, a group of separate individual elements movable relatively to each other, and means to cause movement of said elements in a direction away from the reserve bobbins and down on the weft threads.

12. In a thread holder for reserve bobbins from which extend weft threads, a group of shot be-

tween the reserve bobbins and said means and through which the weft threads extend, a rotatable support for the shot, and means to turn the support in a direction to cause the shot to fall on the weft threads and in a direction away from the reserve bobbins.

13. In a thread holder for the weft threads of reserve bobbins, a hollow holder with a vertical slot passing downwardly therethrough, a group of separate individual elements in the holder and among which pass the weft threads extending through the slot, and means to move the holder in a direction to move the elements in a direction away from the reserve bobbins to draw the weft threads taut, said weft threads being capable of passing down through the group of elements and out of the bottom of the slot to clear the holder.

14. In a thread holder for the weft threads of reserve bobbins, a hollow holder between said means and the reserve bobbins and having a vertical slot passing downwardly therethrough, a group of separate individual elements in the holder and among which pass the weft threads

extending through the slot, and means to move the holder in a direction to move the elements in a direction away from the reserve bobbins to draw the weft threads taut, said weft threads being capable of passing down through the group of elements and out of the bottom of the slot to clear the holder.

15. In a thread holder for the weft threads of reserve bobbins, a hollow holder with a vertical slot passing downwardly therethrough, a group of separate individual elements in the holder and among which pass the weft threads extending through the slot, and means to move the holder in a direction to move the elements in a direction away from the reserve bobbins to draw the weft threads taut, said weft threads being capable of passing down through the group of elements and out of the bobbin of the slot to clear the holder, certain of the vanes moving in a direction away from the reserve bobbins to move the shot positively in a direction to tighten the weft threads.

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