

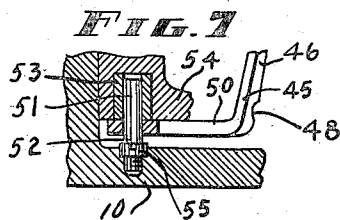
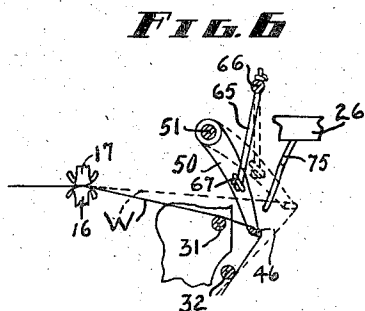
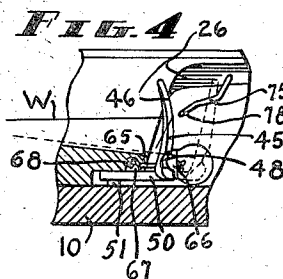
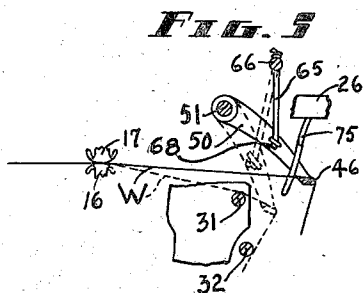
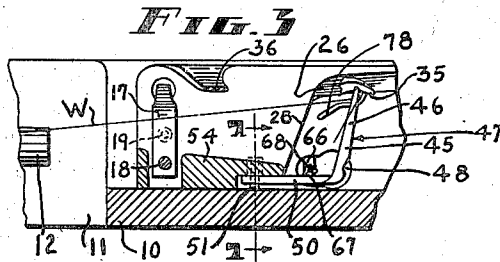
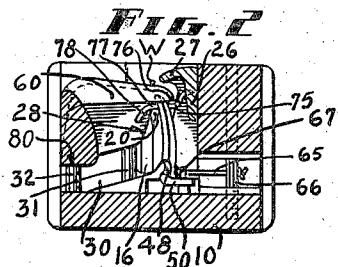
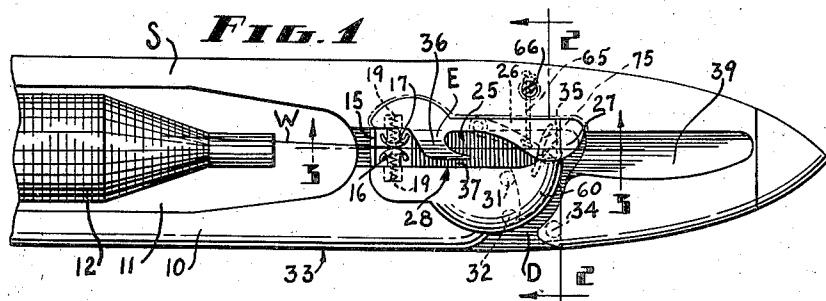
June 24, 1941.

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2,247,286

SHUTTLE TENSION

Filed March 25, 1940



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2,247,286

SHUTTLE TENSION

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Application March 25, 1940, Serial No. 325,794

7 Claims. (Cl. 139—215)

This invention relates to loom shuttles and it is the general object of the invention to provide means in the shuttle for maintaining uniform tension in the weft.

In the usual fly shuttle loom the weft continues to be drawn off during movement of the shuttle into the receiving shuttle box, and if there is any rebound of the shuttle the weft slackens and a loose pick is formed in the cloth. It is an important object of my present invention to form a shuttle eye with a part movable to take up any slack which may result from shuttle rebound.

When pull back tensions are used in automatic looms provision must be made for automatic threading of the shuttle and it is a further object of my present invention to provide a shuttle so formed as to direct the thread of a freshly transferred bobbin into tensioning relationship with the previously mentioned movable part. Other features of my invention relate to an improved pivotal mounting for the movable part of the shuttle eye, to the means for attaching an elastic element to the movable part, and to the formation of the movable part in such a way as to preserve proper positioning of the thread with respect to the movable part.

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 drawing, wherein a convenient embodiment of my invention is set forth,

Fig. 1 is a plan view of one end of the shuttle having my invention applied thereto,

Fig. 2 is a vertical section on line 2—2 of Fig. 1 with the tensioning member in relaxed position such as might exist immediately after a transferring operation, on a slightly enlarged scale,

Fig. 3 is a fragmentary vertical section on line 3—3 of Fig. 1, also on a slightly enlarged scale,

Fig. 4 is a view similar to a part of Fig. 3 but with the tension element moved to weft tensioning position,

Figs. 5 and 6 are diagrammatic plan views showing the relation between the thread and the tensioning element with respect to other parts of the shuttle, and

Fig. 7 is an enlarged vertical section on line 7—7 of Fig. 3, showing the pivotal mounting for the tension member.

Referring to the drawing, the shuttle S has a body 10 provided with a weft compartment 11 in which is located the bobbin or weft carrier 12. The weft W wound on the bobbin leads to the

right as viewed in Fig. 1 toward the shuttle eye designated generally at E. The eye may be formed in part of a block of cast metal as is usual and has a thread receiving throat 15 in which are mounted two friction pads 16 and 17 mounted respectively in front of and behind the weft thread W. These pads may be mounted on wire 18 as shown in Fig. 3 and are urged toward each other in a horizontal direction by light compression springs 19, indicated in Fig. 1, and the upper parts of the pads are beveled so as to form a downwardly converging notch 20 to receive the thread.

The shuttle eye has a longitudinal vertical thread slot 25 defined in part by a rear wall 26 from which projects forwardly an overhanging guard 27. The front part of the slot 25 is defined by a downwardly and forwardly inclined wall 28, and the outer or right end of slot 25 as viewed in Fig. 1 communicates with a downwardly and forwardly inclined slot 30, see Fig. 2. Wear pins 31 and 32 extend vertically along the inner wall of slot 30 and guide the thread on its way out of the shuttle. A third guide pin 34 is also provided as shown in Fig. 1 and is spaced from pin 32 to form with the latter a thread delivery eye D.

Projecting rearwardly from the wall 26 is a thread hook 35 which extends under the overhanging guard 27 and is spaced below the latter sufficiently to permit the thread to pass under the guard 27 and over the hook 35. A hook 36 projecting forwardly from the rear wall of the shuttle eye may be provided and lies above the normal position occupied by the thread during weaving but defines with the front wall 28 a narrow passage 37 through which the weft can pass in its threading operation.

The matter thus far described of itself forms no part of my present invention except as pointed out hereinafter and may be of the usual construction. During a transferring operation a replenishing mechanism of the loom not shown will insert a fresh bobbin downwardly into the weft compartment 11 and a weft thread will extend to the right over the shuttle eye. The shuttle body is formed with a groove 38 beyond the shuttle eye and on the first pick after transfer the thread will move downwardly into the slot 25 in front of hook 36 and behind hook 35 and will also pass downwardly between the pads 16 and 17 to some such position as indicated in Fig. 3. This partial threading of the shuttle eye on the first pick after transfer is due to the fact that the axis of the bobbin in the shuttle lies

below the guard 27 and the hooks 25 and 36, and also between the upper beveled ends of the tension pads.

In carrying my present invention into effect I add to the well-known features already described a tension member 45 having an upwardly extending arm 46 with a surface 47 which is inclined downwardly and toward the center of the shuttle as shown more particularly in Fig. 3. This surface is for engagement with the weft and lies in front of the rearmost part of hook 35. As the thread moves downwardly into the slot 25 and over the rear part of hook 35 it will therefore move to a position behind arm 46. A notch 48 in the bottom of arm 46 helps to hold the weft in proper position after the shuttle eye has been threaded.

The tension member 45 may be provided with a horizontal arm 50 to the inner end of which is secured a vertical journal pin 51 preferably extending slightly below the bottom of the arm 50 as at 52. The pin 51 is held rigidly to the arm 50 in any approved manner and extends upwardly into a bushing 53 driven into the bottom 54 of the shuttle eye block. The pin 51 fits the bushing 53 closely but is free to turn in it.

The bushing and pin are above the arm 50 and in order to hold the tension member 45 in proper vertical position I insert a small wear block 55 into the bottom wooden part of the shuttle directly under and positioned for engagement with the lower part 52 of the pin 51. This block or plate 55 is hardened and may take the form of a screw as shown in Fig. 7. The head of the screw is flat and smooth and offers negligible frictional resistance to turning of the tension member 45. The block or screw 55 also determines the vertical position of the tension member and holds the upper end thereof above a downwardly extending guide apron 60 which extends forwardly from the hook 35 to prevent the thread from moving upwardly over the top of the vertical arm 46.

In order that the tension member may be held normally and yieldingly in rearward position, I provide an elastic in the form of a rubber band designated at 65 and pass the same through a vertical screw 66 which can be turned to adjust the tension of the elastic. As shown more particularly in Fig. 2, I extend an eye 67 upwardly from the arm 50 to receive the forward end of the elastic which has a knot 68 held against the front of the eye. The reason for providing the eye 67 is to keep the elastic above the floor of the slot cut into the shuttle for the reception of the block eye. By this construction the lower surface of the arm 50 may be placed close to the bottom of the block receiving slot without weakening either the shuttle or the block.

In order to prevent unthreading of the eye there is provided a guard wire 75 which as shown in Fig. 2 is secured to the rear wall 26 of the shuttle block E and extends generally in a forward direction across the slot 25. While I do not wish to be limited to the particular shape of this wire as shown in the drawing, it can conveniently extend downwardly as at 76, then horizontally forwardly as at 77 and terminate in a downwardly and forwardly extending free end 78. The wire lies close to the arm 46 between the latter and the inclined wall 28 and at a level between the top and bottom of the wall 28.

In operation, the elastic 65 will hold the top of the tension member 45 rearwardly against the hook 35 and thus hold said arm 46 yieldingly in front of the rearmost part of hook 35. The wire

75 projects to a position in front of arm 46 when the latter is in the normal position shown in Fig. 1. On the first pick of the shuttle subsequent to a transfer it will move to the left as viewed in Fig. 1 and the weft W as already described will move into slot 25 along a path which can be understood from Figs. 1 and 2. The thread moves down to a position under hooks 35 and 36 and behind the arm 46 and also above the wire 75. During this first flight of the shuttle the weft will move down to a position between the pads 16 and 17. On the return pick the thread will be moved to the left part of the diagonal slot 39 against guide post 32 and the pull on the thread due to its attachment at the left selvage of the fabric will swing the tension member from the full line to the dotted line position in Fig. 5 against the resistance of elastic 65. When the arm 46 is in its foremost position it is in front of the free forward end 78 of wire 75, and the inclined wall 28 and surface 47 of arm 46 acts to move the taut thread down to the notch 70.

When the shuttle reaches the end of its travel the arm 46 will be in the full line position shown in Fig. 6. If the shuttle rebounds, or if a slight excess of weft has been unwound from the bobbin, the elastic will move the tension member from the full line to the dotted line positions in Fig. 6. From an inspection of the last named figure it will be seen that the dotted line path traversed by the weft is longer than that shown in full lines. It is for this reason that swinging of the upright tension arm 45 rearwardly takes up slack which may result from rebounding of the shuttle. Because of the inclination of the edge 47 the thread will tend normally to remain in the lower part of the eye, a position in which it is also kept by the roof 30 formed on the front part of the block and overhanging the slot 39. Should the thread by some circumstance reach the upper part of the arm 46 the guard apron will hold it in a low enough position to prevent it from moving over the top of arm 46.

From the foregoing it will be seen that I have provided a simple form of pull back tension for a shuttle eye including a pivoted member normally located in front of the thread slot 25 and movable forwardly in response to weft tension incident to weaving and movable rearwardly by the elastic 65 to take up slack in the weft. It will be seen that the upper end of the wire 46 extends above the guide apron 60 to prevent unthreading of the eye and it will further be seen that the hook 35 requires the thread to traverse a path which will place it behind the arm 46 during the initial stages of shuttle threading. So long as arm 46 is held forwardly there will be sufficient tension in the weft to hold it against the arm, but as the latter moves to its rearmost position the thread will be prevented from unthreading by reason of the wire 75 which extends across the slot 25 above the thread. In this connection it will be noted in Figs. 5 and 6 for instance that when the arm 46 is in its foremost position it is in front of the free end of the wire 75, thereby permitting the thread to move down toward the notch 70. It will further be seen that the elastic is attached to the upper part of the arm 50 so that it does not project downwardly toward the part of the shuttle under the shuttle eye, thereby making unnecessary clearances which might otherwise weaken the shuttle. It will also be seen that the bearing set forth in Fig. 7 is sufficiently long to require the top of arm 46 to remain at substantially the same level throughout

the flight of the shuttle. This bearing is so formed as to permit the tension arm to swing freely but without objectionable looseness. If it is desired to remove the tension member the block is loosened and raised, whereupon the tension member falls from its bearing and can be readily removed. It will also be seen from Fig. 2 that the apron 50 extends from a position in front of arm 45 to a position behind it to prevent the thread from passing upwardly over the top of the free end of arm 46.

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 loom shuttle having a wound mass of weft, a shuttle eye block having a vertical longitudinal slot through which the weft passes, a lever having an upright weft engaging arm disposed in front of the slot, the block having a relatively long vertical bore in the lower part thereof, a vertical journal secured to the lever and projecting upwardly into the bore to provide a pivot for the lever, an elastic to move the lever rearwardly and to yield when the tension of the weft thread moves the lever forwardly, and a bearing plate mounted in the shuttle under the shuttle eye block and against which the lever is held by gravity and on which the lever turns.

2. In a loom shuttle having a mass of weft, a shuttle eye block held in the shuttle and having a vertical longitudinal thread slot through which the weft extends, a lever having an upright weft engaging tension arm in front of the slot and around which the weft passes, a vertical journal extending upwardly from the lever, a bushing held in the lower part of the shuttle eye block above the lever and into which the journal extends, elastic means to move the lever around the journal as a pivot and move the arm rearwardly, tension in the weft moving the tension arm forwardly, and a bearing plate mounted in the shuttle under the journal and on which the lever rests by gravity and on which the lever turns.

3. In a loom shuttle having a wound mass of weft, a shuttle eye block having a longitudinal vertical thread slot through which the weft passes, a lever having an upright arm located in front of the slot and around which the weft is led during weaving operations, a journal secured to the lever and extending upwardly therefrom, a bushing mounted in the lower part of the shuttle eye block over the lever and having a vertical bore to receive the journal of the lever, elastic means which cooperate with the weft to move the lever about the axis of the bore as a pivot, the journal being extended below the lever, and a supporting bearing plate mounted in the shuttle under the bushing and on which that part of the journal extending below the lever turns and rests by gravity.

4. In a loom shuttle having a wound mass of weft, a shuttle eye block having a vertical longitudinal thread slot through which the weft passes, a tension lever located in the lower part of the shuttle below said vertical slot, an upright tension arm on the lever for engagement with the weft and movable forwardly by the weft when the latter is under tension, an elastic having the rear end thereof fixed with respect to the shuttle, and an eye projecting upwardly

from the lever, the eye being connected to the forward end of the elastic and the latter and eye being located above the lever, said elastic acting to move the tension arm and lever rearwardly.

5. In a loom shuttle having a mass of wound weft, a shuttle eye block carried by the shuttle and having a longitudinal vertical thread slot into which the weft descends and through which the weft passes, a vertically extending tension arm located in front of the slot in position to be engaged by the weft and moved forwardly by the weft when the latter is under tension, elastic means to move the tension arm rearwardly, means carried by the block defining a depending apron extending downwardly below the top of the tension arm to prevent the thread from moving over the top of said arm, a guard wire secured to the shuttle block and projecting forwardly across said vertical slot below the top of the latter and at a level between the top and bottom of said tension arm and terminating in a free end in front of the position of the thread as determined by the tension arm when the latter is in rearmost position, said guard wire having the free end projecting downwardly, and means in engaging position with respect to the weft when the latter is placed under tension tending to move the weft downwardly, said tension arm moving forwardly due to tension in the weft to position the weft in front of the free end of said guard wire, whereupon the weft thread moves to a position below said guard wire and is held in said position so long as the weft is under tension, the elastic means moving the tension arm rearwardly when tension in the weft is slackened and the weft being held in a position below the guard wire and behind the tension arm.

6. In a loom shuttle having a wound mass of weft, a shuttle eye block having a vertical thread slot into which the weft descends and through which the weft passes, a lever pivoted to the block behind and under the thread slot, an upright weft tension arm on the lever, a stop to limit rearward motion of the lever, an elastic connected to the lever to hold the same yieldingly in rearward position against the stop and the latter holding the arm in front of the vertical slot when said arm is rearmost, a guard wire secured to the block and projecting forwardly across the thread slot at a level between the top and bottom of the tension arm, the weft extending from the slot around said arm and forwardly and tension of the weft moving said arm forwardly from said stop against the action of said elastic to a front position, the guard wire terminating in a free end between the front and back positions of the weft as determined by said tension arm, and means acting on the thread when the latter is under tension to move the thread toward the bottom of said arm and to a position under the guard wire when the arm is in front position due to tension of the weft, slackness of the weft being accompanied by rearward motion of the tension arm to move the thread to a position under and behind the said free end of the guard.

7. In a loom shuttle having a wound mass of weft, a shuttle eye block having a vertical thread slot extending longitudinally of the shuttle, a lever pivoted to the lower part of the block and extending forwardly across the bottom of the thread slot, an upright thread tension arm on the lever located in front of the thread slot and having a free upper end, means to direct a thread

when drawn taut and forwardly downwardly and against the arm to cause forward swinging of the lever, and a depending apron on the upper part of the shuttle eye block hanging downwardly to a position below said free upper end of the tension arm and extending from a position in

front of to a position behind the upright thread tension arm to prevent the thread from passing over the top of said tension arm, the thread being held above the lever and below the apron.

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