Nov. 4, 1952 N. E. KLEIN 2,616,456

SHUTTLE EYE

Filed Dec. 1, 1949 2 SHEETS—SHEET 1

Fig. 1.

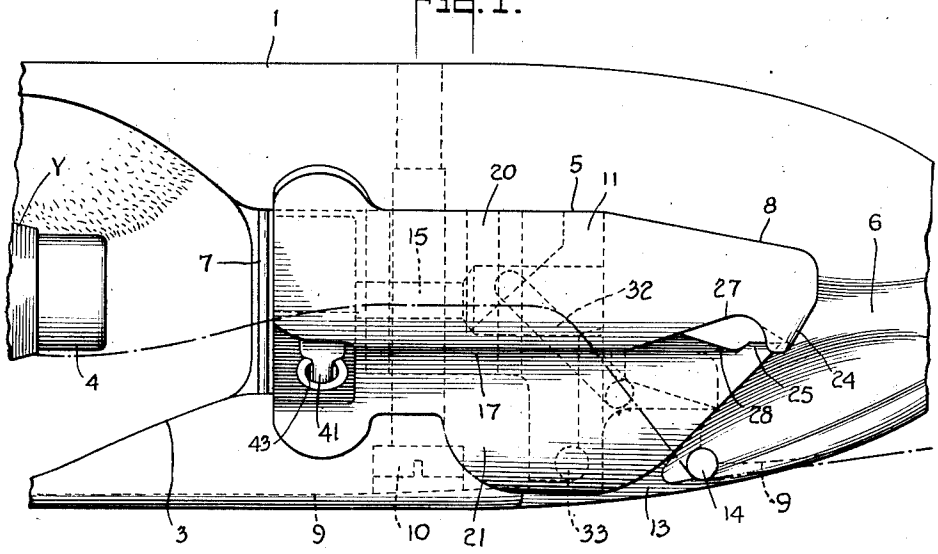


Fig. 2.

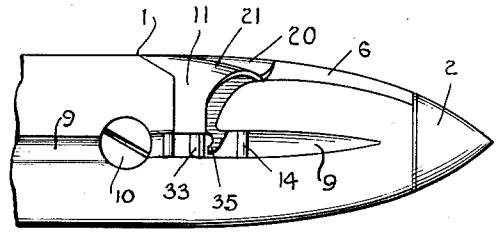
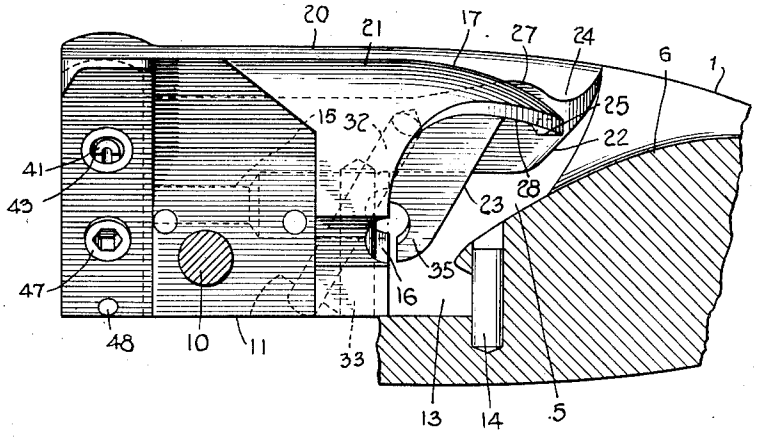


Fig. 3.



INVENTOR
NORMAN E. KLEIN
BY John Robert James
AGENT

Nov. 4, 1952 N. E. KLEIN 2,616,456

SHUTTLE EYE

Filed Dec. 1, 1949 2 SHEETS—SHEET 2

Fig. 4.

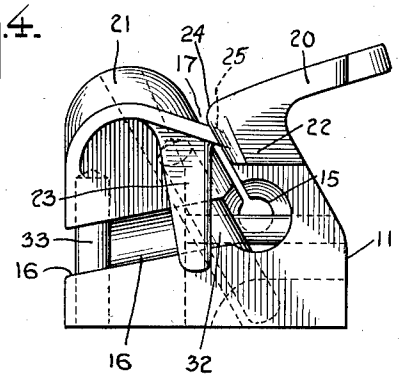


Fig. 5.

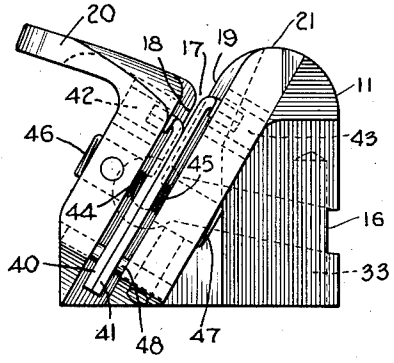
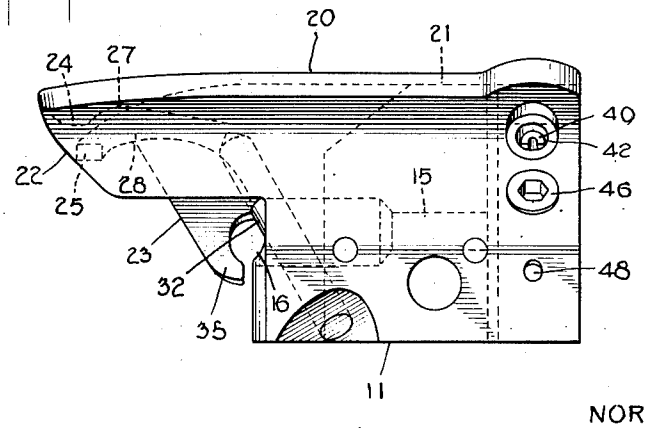


Fig. 6.



INVENTOR
NORMAN E. KLEIN
BY John Robert James
AGENT

Patented Nov. 4, 1952

2,616,456

UNITED STATES PATENT OFFICE

2,616,456

SHUTTLE EYE

Norman E. Klein, Stamford, Conn., assignor to Deering Milliken Research Trust, Greenwich, Conn., a nonprofit trust of Maine

Application December 1, 1949, Serial No. 130,472

5 Claims. (Cl. 139—223)

1

This invention relates to shuttles for automatic weft-replenishing looms, and, more particularly, to an improved threading eye for automatically threading the weft in shuttles in which the filling bobbin is automatically changed from time to time to replenish the supply of weft.

Shuttles employed on automatic weft-replenishing looms are ordinarily provided with a bobbin chamber with special bobbin-holding means which, when the filling yarn supply is exhausted, permits easy discharge of the empty bobbin therefrom and substitution of a full bobbin therefor. The shuttle body is also provided with an eye at one side for side delivery of filling yarn as weft in the fabric. Side delivery of filling yarn is essential during weaving, but it complicates considerably automatic threading of replacement bobbins, for when a new bobbin is inserted in the shuttle, the filling yarn extends not along the side but longitudinally over the forward tip of the shuttle, and thus provision must be made for threading the filling yarn into the side delivery eye.

Usually, this is done by a threading eye mounted at the forward end of the shuttle. This eye comprises a threading block provided with a curved passage which is open at the top and extends from centrally of the threading block at its rear portion to one corner of the threading block at its forward portion. One of the side walls of the passage is longer than the other, and is extended forwardly, downwardly and laterally about the other wall to form a thread-retaining lug portion at the forward end of said block, which serves to prevent the filling yarn from escaping from the longitudinal thread passage once it has slipped therein, and both side walls thereof define between them a thread entrance slot in one corner of the threading block, facing the side thereof and extending downwardly and forwardly of the threading block.

At its outer forward end, the threading block also is provided with a transverse channel extending from the longitudinal channel to the side delivery eye of the shuttle. A downwardly inclined ridge portion of said first-mentioned side wall serves to guide the thread into the transverse channel after the same has passed through the thread entrance block upon the second pick of the shuttle, while a lug portion defined by said ridge below and about said channel prevents the filling yarn from escaping from the transverse channel on the third pick of the shuttle.

When an empty bobbin is ejected from the shuttle and a new one placed in the bobbin chamber thereof, the filling yarn trails over the forward tip of the shuttle across the threading block during the first pick and should slip into the longitudinal thread channel thereof after the shuttle is boxed at the end of the pick and while the filling yarn is drawn diagonally across the shuttle eye as the shuttle is moved back in the box preparatory to making the second pick. Then, upon the second pick of the shuttle, the yarn is brought downwardly over the downwardly-inclined forward ridge portion into the transverse threading channel and out the side threading eye of the shuttle, whence it trails rearwardly along the side of the shuttle. On the third pick of the shuttle, the filling yarn engages the lug of the ridge portion and is retained in the transverse threading channel; thenceforth on both going and return picks of the shuttle the yarn follows this path.

2

Heretofore, considerable difficulty has been experienced in threading crepe filling yarn from reverse wound bobbins in shuttle eyes of the above-described type. Part of the trouble arises because the yarn is not threaded into the shuttle eye until the end of the first pick. Also, such yarn shows a strong tendency to curl and kink, and in consequence frequently fails to drop into the longitudinal passage of the shuttle eye after the first pick of the shuttle. This then leads to a tangle and filling break on the return trip of the shuttle. Moreover, in many instances, after the yarn has slipped downwardly into the longitudinal thread channel, it shows a tendency to jump out at the time the shuttle is about to make its return pick, with the same result.

Accordingly, the principal object of the present invention is to provide improved threading means for automatically weft-replenishing shuttles, comprising a threading block having a longitudinal passage of such shape and a forwardly-extending horn portion of such contour as to readily permit self-threading of filling yarns from reverse wound quills.

A further object of the invention is to provide a threading block for loom shuttles in which the body portion is made of an integral casting so shaped as to operate in an efficient and satisfactory manner.

A further object of the invention is to provide a threading block which is so shaped that the filling yarn will be initially guided therethrough to a proper operating location in a smooth and easy manner as soon as the yarn has become taut and before the shuttle has made its

first pick, whereby breaking of the filling upon replacement of the bobbin will be largely eliminated.

A further object of the invention is to provide such a threading block with a tension device of the spring-pressed plate type.

A further object of the invention is to provide in a loom shuttle of the character aforesaid improved means for adjusting the pressure of the plates which are used for imparting the tension to the filling thread.

The shuttle eye of the invention is more fully shown in the accompanying drawings, in which:

Fig. 1 is a top plan view of the threading-end portion of a loom shuttle, provided with a shuttle eye embodying the invention;

Fig. 2 is a side view on a reduced scale of the same shuttle;

Fig. 3 is another side view of the same shuttle partly broken away to show the shuttle eye;

Fig. 4 is an enlarged view of the outer or forward end of the new shuttle eye;

Fig. 5 is an enlarged view of the inner or rearward end of the new shuttle eye;

Fig. 6 is an enlarged view of the side of the shuttle eye opposite to that shown in Fig. 3.

The shuttle body 1 shown in Figs. 1, 2 and 3 is preferably made of wood and has the usual metal tip 2 at the forward end and bobbin chamber 3 in the central portion, in which chamber a bobbin 4, carrying the filling yarn Y, is held by the usual means (not shown), whereby from time to time an empty bobbin may automatically be readily discharged therefrom and a new bobbin substituted therefor as the filling yarn supply is exhausted. In the forward end of the shuttle is the chamber 5 within which is the shuttle eye of the invention. A longitudinal thread groove 6 extends along the top of the shuttle from the tip 2 to the chamber 5, and a thread traverse pin 7 is disposed between chambers 3 and 5 adjacent the shuttle eye.

The shuttle eye is held firmly in the chamber 5 by a screw 10, which pierces the base of the threading block 11 and is threaded into the far wall of the shuttle 1. The usual side delivery eye 13 of the shuttle connects the side of the chamber 5 with side channel 9 in the exterior wall of the shuttle at the forward end of the threading block. A hard steel pin 14 is placed in the shuttle wall at the forward corner of the side delivery eye 13 in order to take the wear caused by the run of the filling at that point.

The threading block 11 of the shuttle eye shown in Figs. 1 to 6 is formed of a single integral casting, preferably of a nonductile material, such as cast iron, and is provided with a longitudinal thread passage 15 and a transverse thread channel 16 running from the longitudinal passage 15 at the forward end of the threading block 11 to the side delivery eye 13 of the shuttle. Both these passages are in the lower portion of the threading block and are substantially straight throughout their length. A longitudinal thread entrance slot 17 extends downwardly, connecting the upper surface of the threading block with the longitudinal thread passage 15, and is defined by opposing substantially parallel faces or sides 18 and 19 inclined at an angle of 30° to the vertical. When the block is to be used for reverse-wound filling yarn, this slot extends downwardly from the upper right-hand portion of the threading block to the lower left-hand portion of the threading block, as shown in Fig. 5, looking forwardly of the threading block from the rear thereof, while, if used with regular-wound filling yarn, the slot extends downwardly from the upper left-hand portion of the threading block to the lower right-hand portion thereof. As shown in the drawings, the thread entrance slot 17 at its central portion is substantially narrower throughout its depth than the longitudinal thread passage 15; its width is about four times the diameter of the filling yarn to be threaded therethrough. It is not essential that the thread entrance slot be this narrow. Moreover, it may be narrow either in part or throughout its entire length, and/or depth; for example, only its very uppermost central portion need be narrow.

Integral with side wall 18 of the thread entrance slot 17 is a flange 20 extending laterally and upwardly throughout its length, and having a smooth surface, and integral with side wall 19 of the thread entrance slot 17 is a second flange 21 extending laterally and upwardly at its rearward portion, extending laterally and horizontally at its central portion, and extending laterally and downwardly at its forward portion. The flanges 20 and 21 at their rear portions define a V-shaped trough which tends to direct thread into the thread entrance slot 17 as it is drawn from the bobbin in the bobbin chamber of the shuttle. At their forward ends the flanges 20 and 21 terminate in forwardly- and downwardly-extending integral ridge portions 22 and 23, respectively; also integral with the flanges 20 and 21 are horns 24 and 25, respectively, projecting laterally and downwardly into the thread entrance slot 17. These horns are disposed in overlapping horizontal planes and define lug reentrant portions 27 and 28 at the forward end of the thread entrance slot. In consequence, the lugs cooperate to retain the filling yarn within the thread entrance slot 17 once it has slipped therein.

The under side of ridge 22 extends downwardly and inwardly at an angle of 45° to the vertical, while the under side of ridge 23 extends downwardly and inwardly at an angle of 60° from the top of the block to the transverse channel 16, forming a guide which directs the filling yarn into the transverse thread channel during the second pick of the shuttle. Pins are disposed in the outer wall of the threading block in the transverse thread channel 16, pin 32 extending generally parallel to the wall 19 and secured to the front wall of the block adjacent the point where the transverse thread channel joins the longitudinal passage and pin 33 being vertically disposed and secured in the wall adjacent the outer end of the transverse channel at the point where it meets the side threading eye of the shuttle. These pins take the wear of the filling yarn against the side walls of the channel at those points. The lowermost tip of the downwardly extending ridge portion 23 of the flange 21 describes a lug 35 which extends below and laterally of and embraces the transverse channel 16, and serves to retain the thread in the transverse channel on the third and subsequent odd-numbered picks of the shuttle.

In the rearward portion of the longitudinal thread passage 15 and thread entrance slot 17 is disposed a pair of opposed friction members 40 and 41 extending parallel to the side walls of said passage. The upper portions of these friction members are curved, to permit ready passage of the filling yarn thereover during entry into the

slot, and extend laterally into passages 42 and 43, respectively, in the side walls of the slot. (See Fig. 5.) The ends of the friction members are free to move in and out of these passages. A pin 48, whose ends are embedded in the threading block 11, extends through the lower portions of the friction members and prevents longitudinal although permitting transverse displacement of the friction members and prevents the thread within the passage from escaping downwardly from between the friction members. Two springs 44 and 45 yieldingly thrust the friction members 40 and 41 together. Set screws 46 and 47 permit adjustment of the tension in the springs and therefore the pressure at which the friction members engage each other and, consequently, the tension exerted upon the filling yarn during its passage therebetween.

The operation of the device is as follows: When a refill bobbin is placed in the bobbin chamber 3 of the shuttle, the tail of filling yarn, which is held tightly at its free end, is drawn over the top of the threading block and the thread groove 6 of the shuttle. As soon as the shuttle starts to make its first pick, the yarn becomes taut under the tension of drawing additional yarn from the bobbin, and, guided by the upwardly-extending guide flanges 20 and 21, the yarn is urged downwardly into the thread entrance slot 17, through the slot between overlapping horns 24 and 25 and then into the longitudinal thread passage 15, crossing the tip of the shuttle in the groove 6. Next, when the shuttle starts to make its second pick, the yarn slips downwardly along the ridge 23, around the outside of horn 35, which extends across the front of the transverse thread channel 16, into that channel, then around the pins 32 and 33 and out the side delivery eye 13 into the channel 9 in the side wall of the shuttle. As the shuttle starts to make its third pick, the filling yarn after running around the pin 32 engages the inside of horn 35, is retained in the channel 16 thereby, and runs around the pin 14 into the channel 9. Thenceforth, the yarn is drawn outwardly around the pin 32, through the channel 16, out the side delivery eye 13, and through the channel 9, engaging horn 35 and pin 14 on odd-numbered picks and pin 33 on even-numbered picks of the shuttle.

While the illustrated embodiment of the invention has been found to be a practical form, it will be understood that variation may be made in the threading block and in the shuttle without departing from the spirit of the invention.

The following is claimed:

1. A shuttle eye for installation in the body of a shuttle adjacent the side thread delivery eye and front thread delivery groove thereof, comprising a threading block having a longitudinal thread passage therethrough, a longitudinal thread entrance slot extending downwardly into said block connecting said passage with the top surface of said block and having opposing faces, thread tension means in said passage, said threading block having two smoothly contoured side flanges extending upwardly and outwardly from the side walls of said entrance slot adjacent the rearward end of said slot to guide the thread into the slot on the first pick of a newly replenished shuttle, and two thread-retaining outwardly- and downwardly-extending ridge portions, each of said ridge portions having horns at the free ends thereof extending into the thread entrance slot and defining therebetween a narrow reentrant lug portion in the uppermost forward end of said slot, said threading block also having at its forward end a transverse channel extending from the longitudinal passage to the side delivery eye of the shuttle, one of said ridge portions having a portion extending downwardly to said channel serving to guide the thread into the transverse channel upon the second pick of the shuttle after the thread has entered the longitudinal passage, a downwardly-extending horn of said last-mentioned ridge portion extending rearwardly below and embracing said transverse channel and forming a lug portion serving to retain the thread in the transverse channel on the third pick of the shuttle.

2. A shuttle eye in accordance with claim 1, in which the side flanges, ridge and lug portions are integral with the threading block.

3. A shuttle eye, in accordance with claim 1, in which the entrance slot connecting with the thread passage is generally inclined at a substantial angle with the vertical throughout the length of the slot.

4. A shuttle eye, in accordance with claim 1, in which the thread entrance slot is disposed substantially centrally of the top surface of the block and is defined at the forward end of the block by spaced horns respectively disposed at the free ends of said ridge portions and in longitudinal alignment with said entrance slot.

5. A shuttle eye, in accordance with claim 1, in which the horns defining the forward extremities of said ridge portions are disposed in overlapping relationship, with reference to a vertical plane, and are displaced one behind the other in the longitudinal direction of the block.

NORMAN E. KLEIN.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,257,102	Northrup	Feb. 19, 1918
1,433,208	Kelley et al.	Oct. 24, 1922
2,117,352	Park	May 17, 1938
2,407,162	Kaufmann	Sept. 3, 1946