C. J. KELLY AND H. H. SHUMWAY, JR.

SELF THREADING SHUTTLE EYE FOR AUTOMATIC LOOMS.

APPLICATION FILED MAY 21, 1921.

1,433,208. Patented Oct. 24, 1922.

2 SHEETS—SHEET 1.

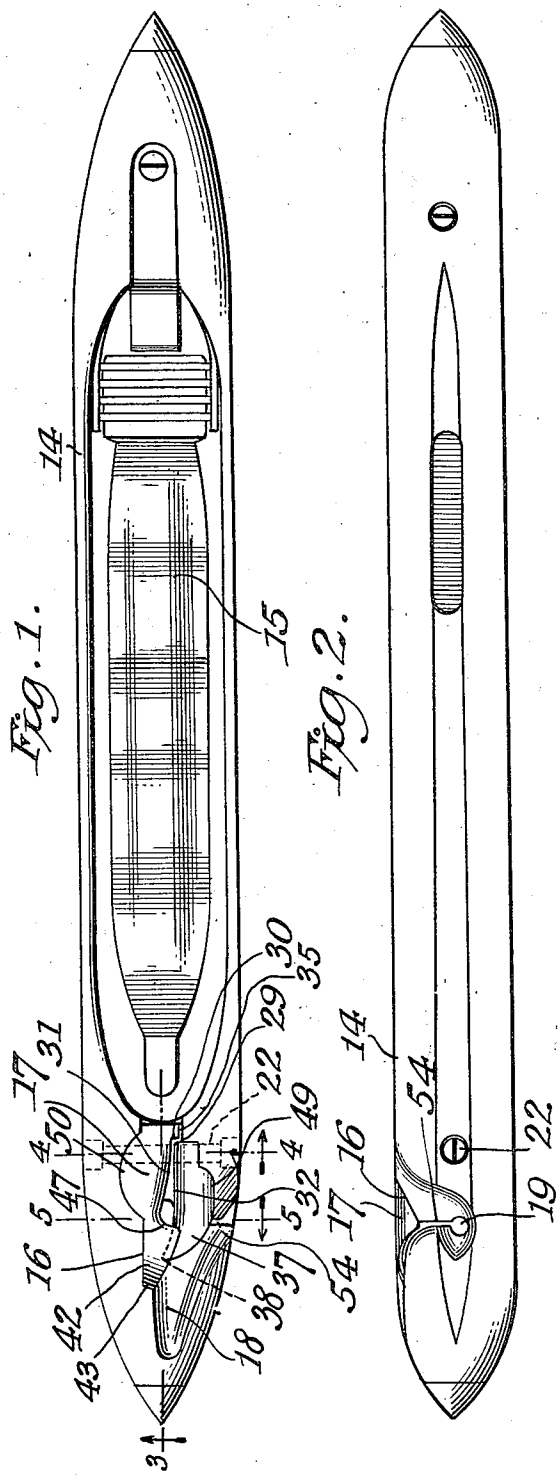


Fig. 1.

Fig. 2.

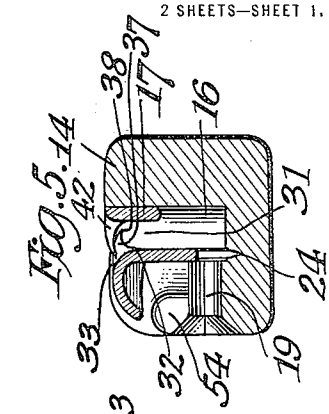


Fig. 5.

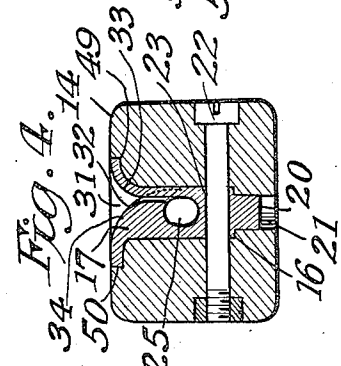


Fig. 4.

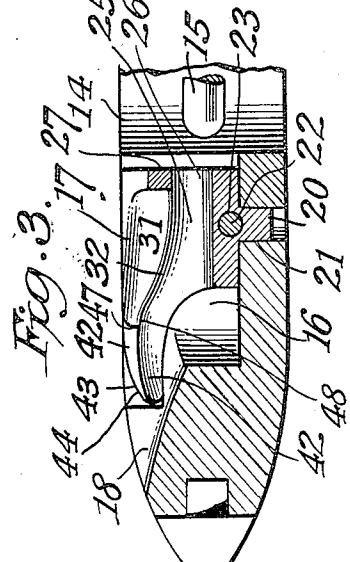


Fig. 3.

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2 SHEETS—SHEET 2.

Fig. 6.

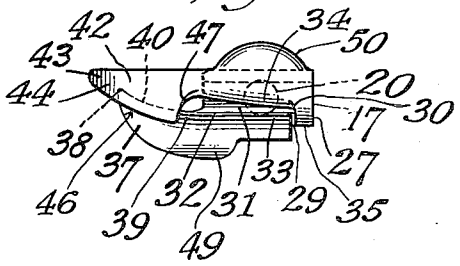


Fig. 7.

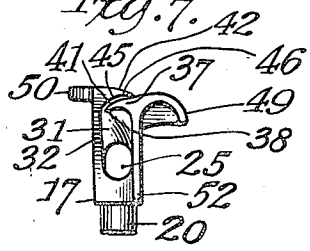


Fig. 8.

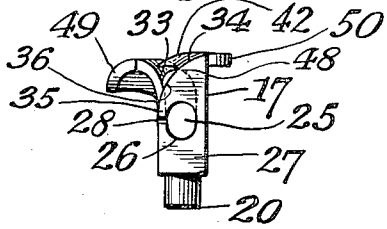


Fig. 9.

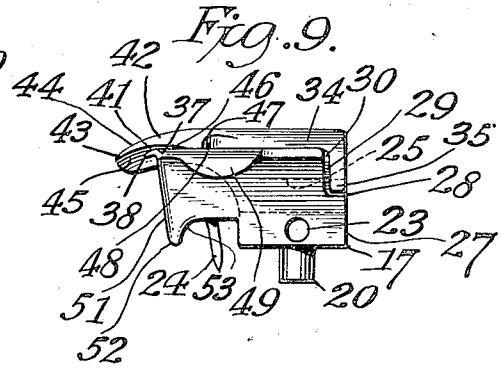


Fig. 10.

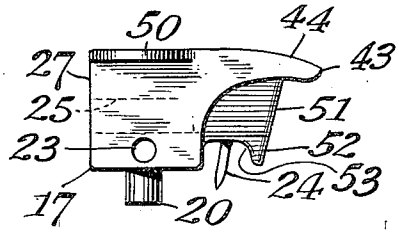
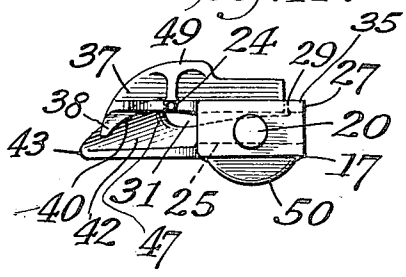


Fig. 11.



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UNITED STATES PATENT OFFICE.

CORNELIUS J. KELLY AND HERBERT H. SHUMWAY, JR., OF TAUNTON, MASSACHUSETTS.

SELF-THREADING SHUTTLE EYE FOR AUTOMATIC LOOMS.

Application filed May 21, 1921. Serial No. 471,390.

To all whom it may concern:

Be it known that we, CORNELIUS J. KELLY and HERBERT H. SHUMWAY, Jr., both citizens of the United States, and residents of Taunton, in the county of Bristol and State of Massachusetts, have invented certain new and useful Improvements in Self-Threading Shuttle Eyes for Automatic Looms, of which the following is a specification.

This invention relates to self-threading shuttle-eyes such as are employed in the shuttles used in automatic looms, and it consists of an improved threading block which constitutes the eye member of the shuttle. Our invention has for its object to provide an improved eye of this class which in its construction will under all circumstances positively and effectively retain the yarn in threaded status within the eye and preclude "looping out" or breaking of the yarn.

The self-threading shuttle-eyes in the constructions heretofore generally employed do not effectively lock the yarn within the eye at the front and rear, and the yarn frequently "loops out" during the operation of the shuttle, and also breaks, which not only causes a loss of much time and resultant expense and inconvenience in the operative service of automatic looms but results in thin and imperfect parts in the woven cloth. In such shuttle-eyes of the prior conditions in the art the action is such that the yarn is "dropped" into the eye in threading, and thus the yarn is not effectively locked or retained at the front of the eye nor is it effectively held against "looping out" at the rear.

Our invention is designed to overcome the foregoing conditions of ineffective operation and all the disadvantages encountered in the shuttle-eyes as now generally used, and the improved eye in its construction provides for the threading thereof by "pulling in" the yarn, instead of "dropping" it, the yarn being guided under the "pulling" action into its complete threaded position in the eye and thereafter securely retained against displacement therefrom or "looping out" either at the front or rear, whereby continuous uniform operation of the loom is assured and economy, convenience, and the maximum of effectiveness and efficiency is attained.

In the drawings—

Figure 1 is a top plan view of a shuttle with the improved eye in operative position therein.

Fig. 2 is a side view of the shuttle as in Fig. 1, at the delivery side thereof.

Fig. 3 is a section on the line 3—3, Fig. 1.

Fig. 4 is a cross-section on the line 4—4, Fig. 1.

Fig. 5 is a cross-section on the line 5—5, Fig. 1.

Fig. 6 a detail top or plan view of the eye member.

Fig. 7 is a detail front view of the eye member.

Fig. 8 is a detail rear view of the eye member.

Fig. 9 is a detail side view of the eye member, at the delivery side.

Fig. 10 is a detail side view of the eye member, at the side opposite the delivery side.

Fig. 11 is a detail bottom plan view of the eye member.

Corresponding parts in all the figures are denoted by the same reference characters.

Referring to the drawings, 14, designates the shuttle, which may be of any usual or adapted construction carrying the bobbin, 15, and having at its front end a conforming socket, 16, in which the shuttle-eye member, 17, is secured, said socket opening at its rear to the bobbin chamber and having an open top exposing the top surface of the shuttle-eye, and also having at its front a suitably beveled or curved extension-channel surface, 18, forming a yarn or thread guide, and a lateral opening extending through the wall of the shuttle and suitably beveled or curved to form the delivery eye, 19, at the side of the shuttle.

The improved eye member constituting our invention consists of a block, preferably cast or formed of metal in an integral piece, in the related contour hereinafter described, which is set and secured in operative position within the conforming socket or cavity 16 of the shuttle. The secured mounting of the eye member, 17, is preferably by means of a stud, 20, depending from the bottom of the body block and engaging a corresponding recess or aperture, 21, in the bottom of the shuttle-socket 16, and a cross-pin or bolt, 22, passing transversely through the walls of the shuttle at the socket 16 and through a perforation, 23, in the bottom portion of the body block above the stud 20, said fastening means being in rear of the side delivery eye 19 of the shuttle, and an addi-

tional front anchorage or fastening means is preferably constituted by a pin, 24, projectively carried at the bottom of the eye member 17 and entering the bottom wall of the socket 16 of the shuttle.

The foregoing conditions of construction are substantially the same as those usually employed in shuttle threading-eyes of the type to which our improvements relate, our invention consisting in the related features of construction as will now be described.

The improved self-threading shuttle-eye, as constructed according to our invention, has a longitudinal bore, 25, terminating in an opening, 26, at the rear wall, 27, of the block body, said terminal end opening being of substantially circular or vertically elliptical contour. In the side wall of said rear terminal end-opening portion of the bore 25 is formed a slot, 28, of slight or relatively narrow width, preferably only sufficiently wider than the yarn which is threaded to permit passage of the yarn through said slot into the bore-passage. This entrance slot is located preferably on the line of the transverse axis of the bore-opening 26.

The guide passage to the slot 28 is formed by an auxiliary slot, 29, in the wall of the bore 25 and extending upwardly from the slot 28 at approximately right angles thereto and having its mouth, as at 30, opening to the open top portion of the bore 25 which extends throughout the length thereof forwardly of said slot 29, as at 31, the bore thus constituting in its main portion forward of the rear-end opening 28 an open body-groove and having the walls thereof of suitable curved contour in cross-section, as at 32, to form a smooth guide-passage for the travel of the yarn through the eye member.

The walls of the open top portion 31 of the groove-bore 25, at the portion in front of the upwardly-extending guide-slot 29, are flared upwardly and outwardly at the respective opposite sides in a continuous convex curvature, as at 33 and 34, forming opposite scroll surfaces leading directly to the mouth 30 of the slot 29, and the side wall of the rear-end portion of the bore 25 above the lateral slot 28 and in rear of the guide-slot 29 forms a downwardly-extending lip, 35, constituting the rear wall of the slot 29 and located in rear of the scroll-surface 33 at the front of the slot 29, which lip has its outer face curved convexly downwardly, as at 36, as a continuation of the scroll surface 34 leading directly to the lateral slot 28.

The width of the upwardly-extending guide slot 29 is comparatively narrow, preferably of slightly greater width than the lateral slot 28, and the open-top portion 31 of the groove-bore 25 between the scroll surfaces 33 and 34 is of corresponding narrow width and preferably of flaring contour forwardly.

The relative construction as above described constitutes the rear portion of the improved shuttle-eye, whereby the yarn is directly guided by a "pulling in" action into locked or retained position within the rear opening 26 of the bore passage 25 and the "looping out" of the yarn therefrom is positively precluded.

In the construction at the front portion of the eye, for guiding the yarn to the groove-bore passage 25 and retaining it securely against displacement therefrom during its travel and the operation of the shuttle, the side wall of the groove-bore 25 which forms the scroll surface 33 is continued forwardly into an inwardly-projecting curved horn contour, as at 37, at the front of the eye, the terminal point, 38, of which overlies the groove-bore 25 on a top plane higher than the rear slots 28 and 29, the convexely-curved contour of the scroll surface 33 being continued forwardly, as at 39, and gradually tapered, as at 40, to the point 38 of the horn 37, and the curvature of said point of the horn is preferably inclined slightly downward, as at 41.

Said side wall and its horn extension thus constitutes one complete side wall of the groove-bore 25 and forms a continuous inwardly and downwardly extending convexly-curved scroll guide surface, from the point 38 of the horn 37 to the rear guide-slot 29, leading to the bore, said scroll surface forming a longitudinal half section of the top surface at one side of the shuttle-eye.

The other side wall of the groove bore 25 which forms the scroll surface 34 is also continued forwardly into an inwardly-projecting curved horn contour, as at 42, said horn being in the form of a finger the front end of which, 43, projects forwardly beyond the other horn, 37, and said finger extending as an overhang on a plane above the groove-bore 25. The convexly-curved contour of the scroll surface 34 is continued forwardly to the horn-finger 42 and is curved downwardly, as at 44, at the top surface of said horn and towards the front point 43 thereof.

Said horn-finger 42 projects laterally over the inwardly-projecting front end 38 of the other horn 37 and overlies the convexly-curved and gradually-tapered scroll surface 39 and 40 thereof, and the under surface of the overlying horn-finger is curved concavely in gradually tapering contour to the front end point 43, as at 45, and gradually merges into the curvature of the groove bore 25, and thus forms a reverse scroll surface approximately corresponding to the scroll surface of that portion of the horn 37 which it overlies. The scroll surfaces 45 and 40 of the respective horns 37 and 42 thus extend relatively a distance approximately corresponding to the length of the horn 37, and

the space between said surfaces forms the entrance passage for the yarn to the groove-bore 25 at the front of the shuttle-eye, said guide passage, as at 46, being of slight or relatively narrow width, preferably only sufficiently wider than the yarn which is threaded to permit passage of the yarn between the horns into the bore-passage.

At the rear of the overlying portion of the horn-finger 42 is formed a transverse shoulder, 47, the under surface of which is concavely curved and gradually tapered towards the rear point of the overlying portion of the finger 42, as at 48, and has its curvature gradually merging into the convexly and downwardly curved scroll surface 44 of the side wall of the groove-bore 25, the gradually flaring open top of the latter being thus wider immediately in rear of said shoulder 47.

The side wall which forms the scroll surface 34, and its horn extension 42, constitutes under the foregoing structural conditions the other complete side wall of the groove-bore 25 and forms a continuous scroll guide surface, from the front point 43 of the horn-finger 42 to the rear depending lip 35 leading to the lateral guide slot 28, said scroll surface forming the other longitudinal half section of the top surface at one side of the shuttle-eye.

Lateral lips, as at 49 and 50, are provided at opposite sides of the body of the eye-member 17, at the top thereof, and have their top surfaces curved to form an extension of the respective opposite scroll surfaces of the eye, in rear of the front horns, which lead as a guide-entrance to the groove-bore 25.

The front edge of the side wall of the grove-bore 25, below the point of the underlying horn 37, is inclined downwardly and rearwardly, as at 51, and terminates at its lower end in a depending point, 52, extending below the plane of the bottom of the groove-bore 25, the rear edge of which point 52 is curved concavely, as at 53, or inclined upwardly, to form a guide surface, in front of the anchoring pin 24, from which surface 53 the yarn passes to and through the side delivery eye 19 of the shuttle after it has been guided thereto through the usual curved slot, as at 54, in the wall of the shuttle socket 16 and leading to said delivery eye 19.

The operation and advantages of the improved construction of shuttle-eye, as comprised in our invention, will be readily understood by those skilled in the art of weaving and of shuttle operation. In the first condition of operation, as the bobbin is transferred from the battery of the loom to the shuttle, the shuttle is then thrown across the loom and as the end portion of the yarn which is tied or anchored to the battery "floats" or passes along over the eye member 17, under the "pulling" action or tension, it comes in contact with the shoulder-point 47 of the horn-finger 42 and is guided by the top scroll-surface 44 of the latter and the top scroll-surface 33 of the other horn 37 until it passes to the outer point 38 of the horn 37 and beneath the same and is then locked against displacement at the front of the improved shuttle-eye. The yarn, as it "floats" along the top of the eye and "pulls," is thus guided and forced through the channel or space 46 between the overlapping portions of the front horns 37 and 42, until it passes beneath the same under action of the scroll surfaces, and the narrow or slight width of said guide channel 46 in conjunction with the contour of the correspondingly closely related overlapping portions of the horns, as in our improved construction, effectively and positively precludes return of the yarn through the guide channel 46.

In the automatic threading action at the front of the eye, as just described, the yarn drops into the groove-bore 25, and simultaneously with this action, as the yarn "pulls" it is guided, by the top scroll-surfaces 33 and 34 at opposite sides of the open top portion 31 of the groove-bore, to the mouth 30 of the vertical guide-slot 29 at the rear of the eye and is drawn downwardly therein over the scroll guide-surface 34 of the downwardly-extending lip 35 to the cross-slot 28 and through the latter, under action of the scroll-surface at the same side of the groove-bore 25, into the rear-end opening 26 of said bore, in which it is then locked against displacement at the rear end of the improved shuttle-eye. The narrow or slight width of the entrance slot 28, in conjunction with the related contour of the scroll wall-surface of the bore 25 and the depending guide-lip 35, effectively and positively precludes return of the yarn through the slot 28.

The foregoing automatic threading actions at the front and rear of the eye are completed before the shuttle makes its return movement, and during the return movement of the shuttle the yarn is then "pulled" down in the action thereof and is guided downwardly over the inclined front edge 51 of the wall of the groove-bore 25 beneath the underlying horn 37 and passes under the bottom point 52 of said incline and in rear thereof, from whence it is guided by the curved slot 54 of the shuttle to the side delivery eye 19 thereof.

From the foregoing description, it will be understood that our improved shuttle-eye is self-threading under the "pulling" action of the yarn instead of the conditions heretofore employed in which the yarn is "dropped" into the eye. Our improved con-

struction not only enables the "pulling" in of the yarn, under the guide action of the related scroll-surfaces, until it passes beyond the "locks", but it thereafter effectively precludes return of the yarn through the "locks" and thus the yarn or filling cannot "loop out" either at the front or rear of the eye during the operation of the shuttle and breaking of the yarn is also precluded, whereby continuous operation of the loom is enabled and thin or imperfect parts in the woven cloth are avoided, with the resultant economy in the continuous running of the loom, the maximum product and uniform conditions in the woven output, and the conservation of required labor. In contradistinction to this operation, the conditions of the previous constructions of self-threading shuttle-eyes are such that the yarn is not retained from looping out at the rear and is not locked in at the front, as the structural conditions for self-threading are adapted to the passage of the yarn by "dropping" it into the eye instead of by a "pulling in" action, it being furthermore understood that the "pulling" action or tension is constantly active in our improved shuttle-eye under operative status of the shuttle as a threading factor to thread the yarn in the eye and retain it in normal status therein.

We do not desire to be understood as limiting ourselves to the detail features of construction and arrangement as herein illustrated and described, as it is manifest that modifications and variations therein may be resorted to in the adaptation of the invention to varying conditions of use, without departing from the spirit and scope of our invention and improvements. We therefore reserve the right to all such variations and modifications as properly fall within the scope of our invention and the terms of the following claims:

Having thus described our invention, we claim and desire to secure by Letters Patent:

1. A self-threading device for shuttles, having its yarn passage or bore terminating at the rear end in a substantially circular or vertically elliptical opening in the side wall of which on approximately the line of the transverse axis of said opening is formed a lateral slot of a width sufficient to only permit entrance passage of the yarn therethrough, and scroll guide-surfaces leading from the open top of the bore to said lateral slot.

2. A self-threading device for shuttles, having its yarn passage or bore terminating at the rear end in a walled opening, a narrow lateral passage to said walled rear end, an auxiliary passage intersecting the front end of said lateral passage at right angles thereto and extending upwardly therefrom to the open top of the bore, and scroll guide-surfaces leading to said angularly related auxiliary passage and lateral passage.

3. A self-threading device for shuttles, having at the front of its yarn passage or bore a top entrance constituted by two opposite inwardly-projecting and overlapping horn-fingers forming a narrow space or passage extending between the overlapping portions to the bore and of a width sufficient to only permit entrance passage of the yarn between said horn-fingers and the top horn-finger which overlies the under horn-finger being formed with a transverse shoulder in rear of the overlapping portions of said fingers, said bore having an open top in rear of said shoulder, and scroll guide-surfaces leading from the open top of the bore to and through said intervening narrow passage between the horn-fingers and to said shoulder.

4. A self-threading device for shuttles, having at the front of its yarn passage or bore a top entrance constituted by two opposite inwardly-projecting and overlapping horn-fingers forming a narrow space or passage extending between the overlapping portions of the fingers to the bore, said bore having an open top in rear of said overlapping portions of the horn-fingers, scroll guide-surfaces leading from the open top of the bore to and through said intervening narrow passage between the horn-fingers, the top horn-finger which overlies the under horn-finger having an inwardly projecting point at the rear entrance to said intervening passage, and a scroll guide-surface leading to said entrance point.

5. A self-threading device for shuttles, having at the front of its yarn passage or bore a top entrance constituted by opposite inwardly-projecting and overlapping portions forming a narrow space or passage extending between the overlapping portions to the bore and of a width sufficient to only permit entrance passage of the yarn to the bore, said bore having an open top in rear of said overlapping portions, and scroll guide-surfaces leading from the open top of the bore to and through said intervening entrance passage between the overlapping portions, the top portion which overlies the under portion being provided in rear of said intervening entrance passage with a transverse wall having a terminal point leading to said passage and having a scroll guide-surface leading to said terminal point.

6. A self-threading device for shuttles, having its yarn passage or bore terminating at the rear end in an opening in the side wall of which is formed a narrow lateral slot, and having at the front of its yarn passage or bore a top entrance constituted by opposite inwardly-projecting and overlapping horn-fingers forming a narrow space or passage extending between the overlap-

ping portions to the bore, said bore having an open top in rear of said overlapping portions of the horn-fingers, and scroll guide-surfaces leading from the open top of the bore to said lateral slot and to and through said intervening narrow passage between the horn-fingers.

7. A self-threading device for shuttles, having its yarn passage or bore terminating at the rear end in an opening in the side wall of which is formed a lateral slot of a width sufficient to only permit entrance passage of the yarn, and having at the front of its yarn passage or bore a top entrance constituted by oppositely inwardly-projecting and overlapping horn-fingers forming a narrow space or passage extending between the overlapping portions to the bore and of a width sufficient to only permit entrance passage of the yarn, said bore having an open top in rear of said overlapping portions of the horn-fingers, and scroll guide-surfaces leading from the open top of the bore to said lateral slot and to and through said intervening narrow passage between the horn-fingers.

8. A self-threading device for shuttles, having its yarn passage or bore terminating at the rear end in a substantially circular or vertically-elliptical opening in the side wall of which on approximately the line of the transverse axis of said opening is formed a narrow lateral slot, and having at the front of its yarn passage or bore a top entrance constituted by opposite inwardly-projecting and overlapping horn-fingers forming a narrow space or passage extending between the overlapping portions to the bore and the overlying horn-finger being formed with a transverse shoulder in rear of said overlapping portions, said bore having an open top in rear of said shoulder, and scroll guide-surfaces leading from the open top of the bore to said lateral slot and to and through said intervening narrow passage between the horn-fingers and to said shoulder.

9. A self-threading device for shuttles, having its yarn passage or bore terminating at the rear end in an opening in the side wall of which is formed a narrow lateral slot and an auxiliary slot extending upwardly therefrom to the open top of the bore, and having at the front of its yarn passage or bore a top entrance constituted by opposite inwardly-projecting and overlapping horn-fingers forming a narrow space or passage extending between the overlapping portions to the bore and the overlying horn-finger being formed with a transverse shoulder in rear of said overlapping portions, said bore having an open top in rear of said shoulder, and scroll guide surfaces leading to the mouth of said upwardly extending slot and to the intersecting lateral slot and to and through said intervening narrow passage between the horn-fingers and to said shoulder.

10. A self-threading device for shuttles, having its yarn passage or bore terminating at the rear end in a walled opening in the side of which is formed a narrow lateral passage and an intersecting auxiliary passage at right angles thereto, and having at the front of its yarn passage or bore a top entrance constituted by opposite inwardly-projecting and overlapping portions forming a narrow space or passage extending between the overlapping portions to the bore and the overlying front member being provided in rear of said entrance passage with a transverse wall leading to said passage, said bore having an open top in rear of said overlapping portions, and scroll guide-surfaces leading from the open top of the bore to said auxiliary rear passage and lateral passage and to and through said entrance passage between the overlapping front portions and to said rear wall of the overlying front portion.

In testimony whereof we have signed the foregoing specifications.

CORNELIUS J. KELLY.
HERBERT H. SHUMWAY, JR.

Witnesses:

WILLIAM A. BELLAMY,
ALONZO H. SHUMWAY.