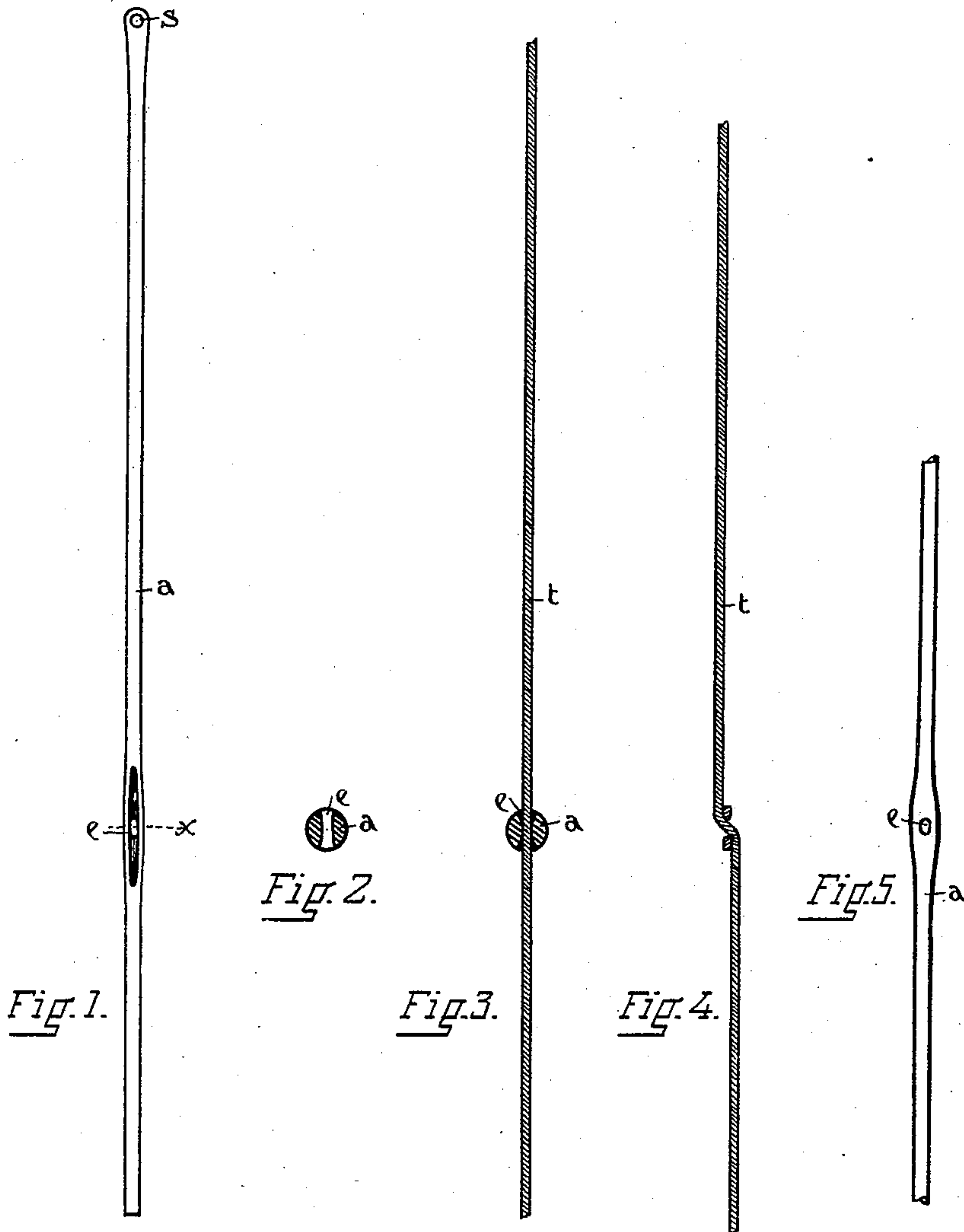


(No Model.)

G. W. STAFFORD.  
HEDDLE FOR JACQUARD LOOMS.

No. 407,620.

Patented July 23, 1889.



WITNESSES:

*Wm. S. Hague*  
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# UNITED STATES PATENT OFFICE.

GEORGE W. STAFFORD, OF PROVIDENCE, RHODE ISLAND, ASSIGNOR TO THE  
GEO. W. STAFFORD MANUFACTURING COMPANY, OF SAME PLACE.

## HEDDLE FOR JACQUARD LOOMS.

SPECIFICATION forming part of Letters Patent No. 407,620, dated July 23, 1889.

Application filed May 14, 1889. Serial No. 310,735. (No model.)

*To all whom it may concern:*

Be it known that I, GEORGE W. STAFFORD, of Providence, in the county of Providence and State of Rhode Island, have invented certain new and useful Improvements in Heddles for Jacquard Looms; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention refers to the healds or heddles used in Jacquard looms, where, owing to the great number of them required and the independent character and position of each heddle, it seems impossible or very difficult to draw down each one with a positive motion after it has been raised. For this reason long slim weights, called "lingos," are attached to the lower ends of the heddles to effect their descent, and this is the mode now in use for accomplishing this purpose; but there are several objections to this combination of heddle and lingo, one of which is on account of the knots required to make the connections, as these knots are liable to interfere with the free downward movement of the heddle and its warp-thread, and thereby cause them to miss and make floats in the work. Another objection is that the heddle-twines, where they pass through the holes in the ends of the mail-eyes, soon wear through and break off, and any partial stranding of the heddle-twine frets and injures the adjacent warp-threads. To obviate these objections it has been proposed to make a heddle and lingo all in one piece—for instance, a piece of wire long enough to have sufficient weight to draw down the warp-thread and having an opening at the upper end to attach the harness-cord to, and an eye for the warp-thread, made at the usual distance from the upper end.

My invention refers more especially to this eye for the reception of the warp-thread.

Figure 1 is an elevation of the heddle and lingo in one piece. Fig. 2 shows a cross-section of the same, taken through the eye on line *x*, Fig. 1, enlarged. Fig. 3 is a like cross-section with a warp-thread, enlarged. Fig. 4

is a cross-section of the flat style of eye with warp-thread. Fig. 5 is an elevation of a part of a heddle and lingo with a flat eye.

In attempts hitherto to make the heddle and lingo in one piece this eye *e* has been made flat—that is, by flattening the wire *a* (see Fig. 5) and punching or drilling a hole in the flattened part, (see Figs. 4 and 5;) but this form of eye is objectionable for several reasons which have so far prevented or limited its use. The broad flat shape of the eye makes it very liable, especially in weaving high-sleyed goods, to be twisted around by the pressure of the adjacent warp-threads, so as to oblige the warp-thread *t* to make a quarter-turn in going through it, (see Fig. 4, wherein *e* is the eye and *t* the warp-thread,) which interferes seriously with the passage of the thread, causing it to draw the heddle forward and prevent it from dropping freely with its warp-thread as it should do. Another objection is that after the wire has been flattened and the eye made in it the metal at the sides of the eye is so thin and narrow that it is liable to break off at the eye in handling, as it is necessarily quite long.

In forming the eye on my plan the wire *a* of the lingo and heddle is not flattened, but is grooved and punched out somewhat after the manner of making the eyes of needles, which leaves the sides of the eye of nearly full width of the diameter of the wire, in the direction of its greatest liability to be broken. (See section in Fig. 2.) This leaves the heddle at the eye of about the same diameter in all directions as it is throughout its length and does not offer the resistance to its dropping between the warp-threads that the broad sides of the flattened eye do, and which also cause the latter to turn and cramp the warp-thread passing through it, as before mentioned.

The advantage of the improved eye will be seen by looking at Fig. 4, which shows the direction of the warp-thread *t* in passing through the flattened eye, and at Fig. 3, which shows the position of the warp-thread in passing through the improved eye.

I do not confine myself to one eye for the warp-thread, as it is advantageous to have two eyes in some cases.

Having thus described my improvement, what I claim as my invention is—

As a new article of manufacture, a heddle and lingo for Jacquard looms made of a  
5 single piece, substantially as shown and described, having its upper end prepared to receive the harness-cord and having an eye for the warp-thread made in it without flattening

the body of the heddle, so that the diameter in all directions at the eye shall be about the same as the rest of the heddle. 10

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Witnesses:

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