

No. 644,371.

Patented Feb. 27, 1900.

S. SEWALL.  
HEDDLE FOR LOOMS.

(Application filed July 26, 1897. Renewed Jan. 4, 1900.)

(No Model.)

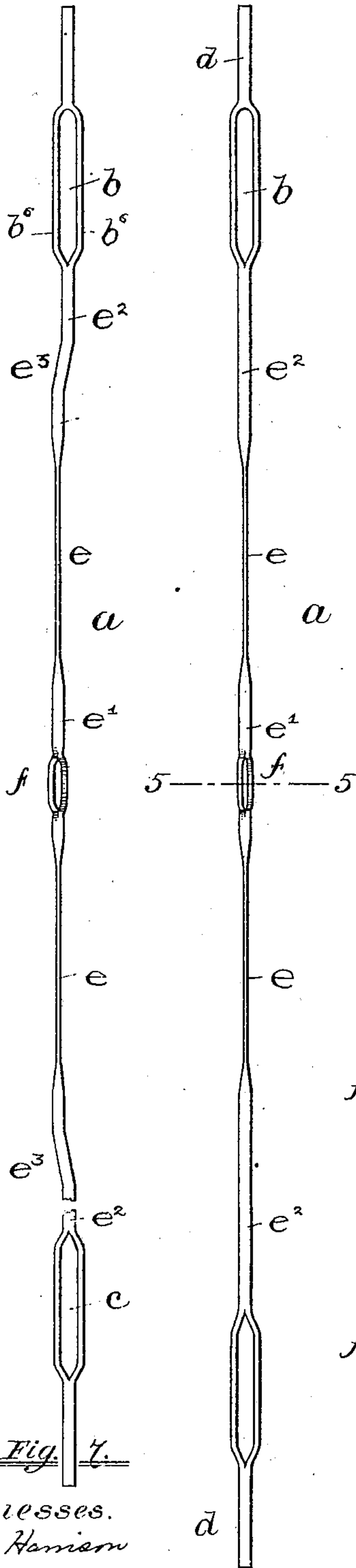


Fig. 1.

Witnesses.  
A. D. Hamern

P. W. Pezzette, Fig. 1.

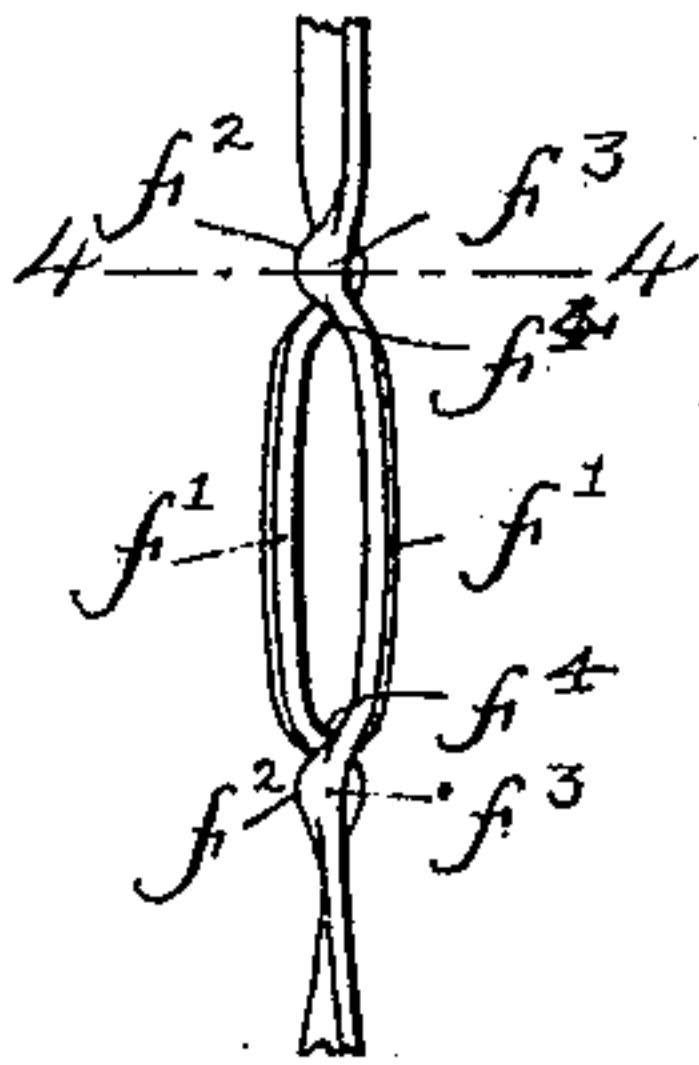


Fig. 3.

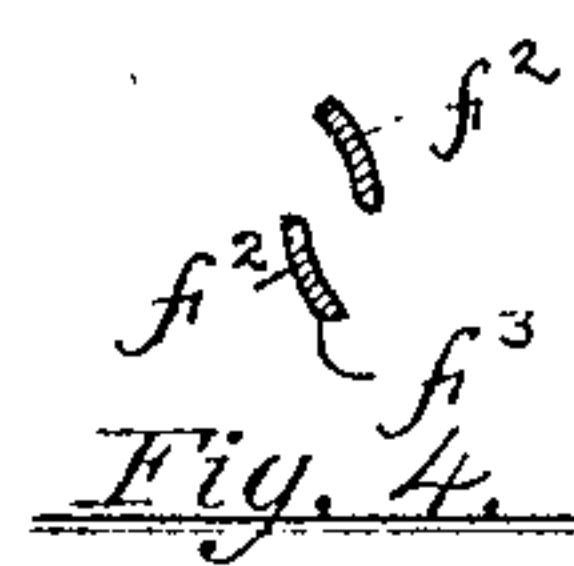


Fig. 4.

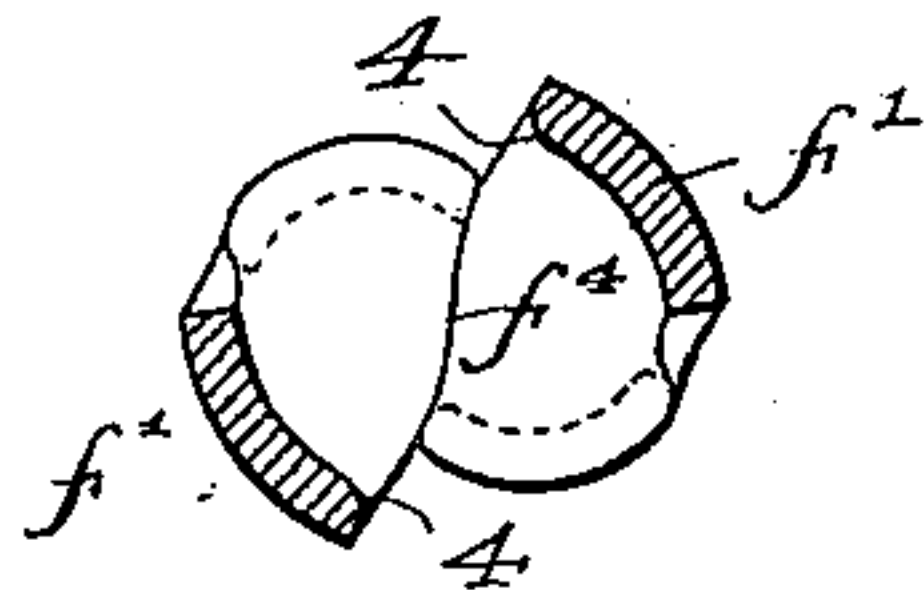


Fig. 5.

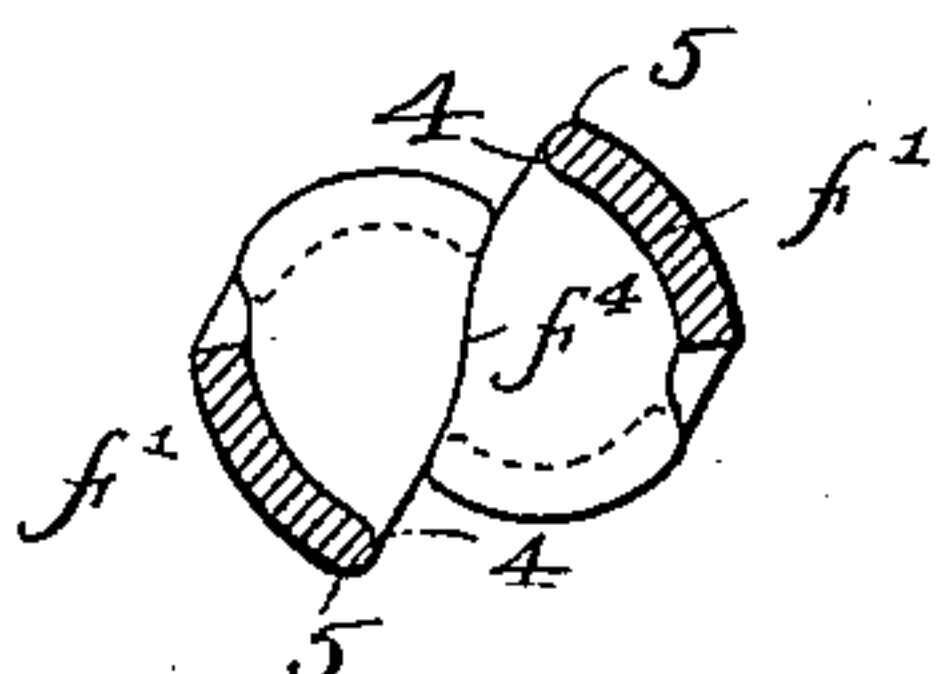


Fig. 6.

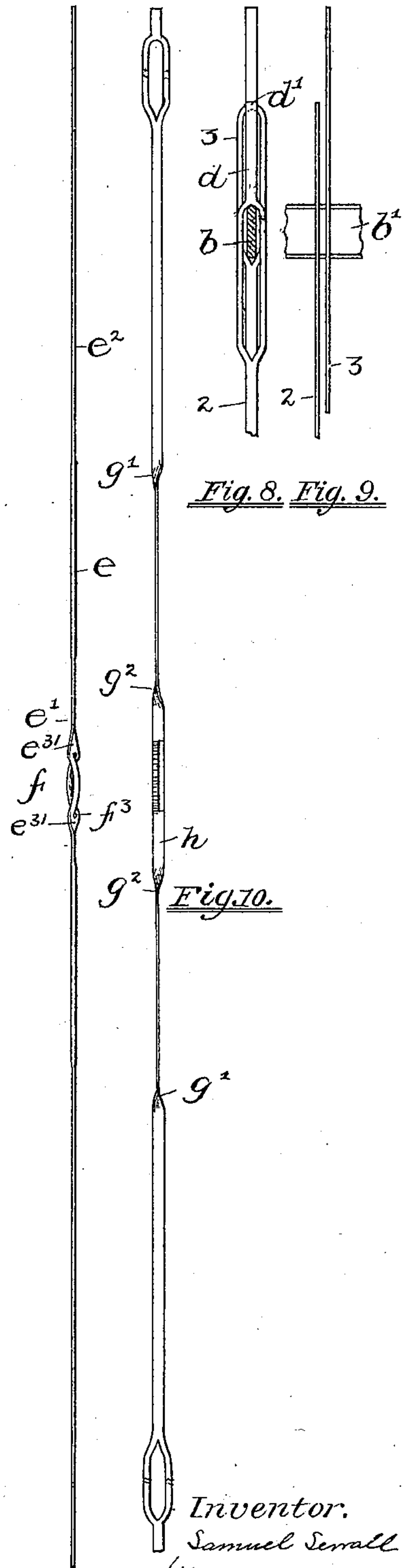


Fig. 8. Fig. 9.

Fig. 10.

Inventor.

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Fig. 2.

# UNITED STATES PATENT OFFICE.

SAMUEL SEWALL, OF TEWKSBURY, MASSACHUSETTS.

## HEDDLE FOR LOOMS.

SPECIFICATION forming part of Letters Patent No. 644,371, dated February 27, 1900.

Application filed July 26, 1897. Renewed January 4, 1900. Serial No. 394. (No model.)

*To all whom it may concern:*

Be it known that I, SAMUEL SEWALL, of Tewksbury, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Heddles for Looms, of which the following is a specification.

This invention has relation to heddles, and more particularly to that class of metallic heddles of which one type is illustrated in my previous patent, No. 226,886, dated April 27, 1880.

The primary object of the invention is to provide a metallic heddle which is resilient or yielding in lines parallel to the warp, so as to ease the threads and prevent disastrous effects in case there is a float or one of the warp-threads is knotted, and, moreover, to construct the heddle to allow it to bend or yield at points above and below and not at the eye, whereby there is no danger of the eye being bent in case the heddle is caused to give or yield to ease the threads.

Another important object of the invention is to fashion the heddle in such a way that it presents no sharp edges or obstructions to the adjacent threads, and thereby prevents them from being sheared or weakened as the harnesses are shifted to form the shed.

Other objects of the invention are to provide other improvements whereby the heddles may be arranged side by side more closely for weaving fine fabrics and whereby they may be prevented from "riding" when the harnesses are shifted and to improve the heddles in certain other ways, which will hereinafter be made apparent.

The manner in which I attain the foregoing objects and in what the invention consists will be fully described and set forth in detail in the following specification, which is descriptive of one or more embodiments of the invention selected by me for the purpose of illustration and not as being the only forms in which the invention may be expressed.

Reference is to be had to the accompanying drawings, and to the letters and figures marked thereon, forming a part of this specification, the same letters and figures designating the same parts or features, as the case may be, wherever they occur.

Of the drawings, Figure 1 represents a face

view of a metallic heddle embodying my invention. Fig. 2 represents an edge view of the same. Fig. 3 represents an enlarged edge view of the eye. Fig. 4 represents a section on the line 4 4 of Fig. 3. Fig. 5 represents a cross-section, greatly enlarged, through the eye on the line 5 5 of Fig. 1. Fig. 6 represents a similar section of a heddle, of which the eye has all the inner edges rounded. Fig. 7 represents a heddle with an offset eye. Figs. 8 and 9 represent the ends of two heddles strung on a cross-bar and the way in which they are constructed to prevent riding. Fig. 10 illustrates another embodiment of the invention.

In carrying out my invention the heddle *a* is formed from a thin sheet of metal, preferably steel, and the thread-eye is formed in the central part thereof by slitting it longitudinally and then offsetting or bending the two separated portions or sections apart in opposite directions, as will be hereinafter explained.

Near its upper end the heddle is formed with an eye or slot *b* by slitting the heddle-blank longitudinally and separating the severed portions, so as to lie in the same plane, this eye being elongated to receive a cross-rod or heddle-bar *b'*, as shown in Figs. 8 and 9, and to permit the heddle to be moved up and down relatively thereto. The sections *b<sup>6</sup> b<sup>6</sup>* are parallel and are bent at their ends to join the main body of the heddle. The lower end of the heddle is provided with a similar eye *c*, formed in substantially the same way, to receive another lower heddle-bar, these said rods forming portions of the harness-frame. Projecting beyond each eye is an extension *d*, which is of such length that when a shed has been formed it projects beyond the end of the eye or slot of the adjacent heddle, whereby its end cannot enter the said eye or become engaged therein. Referring to Figs. 8 and 9, it will be seen that the extension *d* on the heddle 2 projects beyond the end of the eye *b* in the heddle 3, so that the extreme end *d'* thereof cannot by any possibility slip into the slot and become bent when the next shed is formed. Heretofore it has been the practice to form these metal heddles of the same width, so that when the heddle was arranged with its faces parallel to the work it



could not yield longitudinally of the warp-threads, but was only free to yield and vibrate transversely thereof. It is, however, very desirable that the heddles should be capable of yielding in the direction of the warp-threads to prevent the breakage of the latter, and with this end in view I shear away a portion of each heddle both above and below the eye  $f$  for the warp-thread, so as to form a portion  $e$  greatly reduced in width. By suitable dies this portion is compressed edgewise, so that looking at the edge thereof in Fig. 2 the heddle presents the appearance of having the portions  $e e$  of a greater thickness than the remainder thereof. The said compressed or reduced portions  $e e$  do not extend entirely to the eye, but are separated therefrom by wider portions  $e' e'$ , so that the heddle is not capable of bending at the eye in the lines of the warp, but will yield at points both above and below it, whereby there is no danger of the eye being bent. In some cases I prefer to have the wider portions  $e^2 e^2$  above and below the reduced portions  $e e$  of each heddle bent outwardly, as at  $e^3$ , so that the eye  $f$  will be offset or out of the longitudinal lines of the ends of the heddles. In this way the heddles may be hung upon the flat rods with the offsets extending in opposite directions alternately, whereby the eye of one heddle will not engage the eye of the adjacent heddles, and therefore the same number of heddles can be made to occupy a smaller lateral space than they could if the eyes all lie in the same transverse plane of the warp.

The eye  $f$ , to which I have briefly referred, is formed as follows: The two sections or portions into which each heddle is divided by the longitudinal slit are bent outwardly to form the elongated eye or slot for the warp-threads. The inner edge of each portion or section  $f'$  is bent abruptly inwardly at the ends, as at  $f^2 f^2$ , to form shoulders  $f^4$ , said shoulders of the two portions overlapping or crossing each other to furnish a smooth surface for the thread. The outer edge of each portion  $f'$  is a sinuous curve, as at  $f^3$ , having the appearance of being beveled off, whereby there are no shoulders on the outer edges corresponding to those at  $f^4$ . (See Fig. 2.)

By forming the eye of the heddle as thus described the edges which come into contact with the adjacent warp-threads are sinuously curved and do not operate to chafe and weaken them as they would were they broken or formed with abrupt shoulders.

By means of suitable dies which operate not only to sever the metal, but also to compress it, the inner edges of the separated sections  $f' f'$  are rounded, as shown at 4 4 in Fig. 5, and, if desired, the outer edges are also rounded, as at 5 5 in Fig. 6. This is of the utmost importance, for if these edges were not rounded to form a smooth bearing-surface and were allowed to remain sharp they would operate to saw or sever a thread in a

very short time and would cause many breakages.

By referring more particularly to Figs. 4, 5, and 6 it will be seen that the said sections  $f' f'$  are concavo-convex with the curve outward, so that each heddle does not present a sharp edge to the adjacent threads, but a comparatively-smooth and unbroken bearing-surface. Moreover, in order to reduce the lateral space necessary for the eyes each portion  $e' e'$  of the heddle is twisted, as at  $e^{31} e^{31}$ , so that the planes of the sections are at an angle to the plane of the main body of the heddle, as shown in Fig. 2.

Various changes may be made in the heddle above described without departing from the spirit and scope of my invention. For instance, instead of shearing away and reducing the heddle at points above and below the eye to prevent entering the latter at lines longitudinally of the warp, the heddle may be given a quarter-twist at four points, as at  $g' g' g^2 g^2$ , whereby the flat side of the heddle at  $h$  lies in a plane transverse to the plane of the ends of the heddles and the eye portion thereof.

By reason of the sections  $f' f'$  being concavo-convex with the convexity outward the eye is greatly strengthened, and hence whatever weakness may have been caused by slitting the heddle is entirely overcome and guarded against.

Having thus explained the nature of the invention and described a way of constructing and using the same, though without attempting to set forth all of the forms in which it may be made or all of the modes of its use, it is declared that what is claimed is—

1. A heddle formed of a flat metal strip having an eye and end portions substantially unyielding or unbending in the direction of the warp, and having portions intermediate of the eye portion and the end portions, which are resilient or yielding in the direction of the warp.

2. A heddle formed of a flat metallic strip having an eye portion and slotted end portions unyielding or unbending in the direction of the warp, said end portions extending considerably beyond their slots, said heddle having portions intermediate of the eye portion and the end portions, which are resilient or yielding in the direction of the warp.

3. A heddle formed of a thin flat metallic strip arranged with its faces parallel to the warp, and having reduced or cut-away portions to permit the heddle to yield longitudinally of the warp.

4. A heddle formed of a thin flat metallic strip arranged with its faces parallel to the warp, and having a thread-eye, said heddle having portions thereof above and below the eye cut away and compressed to permit the heddle to bend or yield longitudinally of the warp.

5. A heddle formed from a thin metallic



strip slit at a suitable point for the eye and having the sections offset in opposite directions, said sections being curved in transverse cross-section for the purpose described.

5 6. A heddle formed from a thin slitted metal strip, the sections of which are offset in opposite directions and are concavo-convex in transverse cross-section.

10 7. A heddle formed of a flat metallic strip having an eye portion and end portions unbending in the direction of the warp, and intermediate portions capable of bending in the direction of the warp, said eye portion being twisted to have its faces at an angle to the  
15 faces of the said end portions.

20 8. A heddle formed of a flat metallic strip, having a slotted eye portion and slotted end portions, unbending in the direction of the warp, and intermediate portions capable of bending in the direction of the warp, the slot in the eye portion being out of the straight line connecting the slot in the end portions.

9. A heddle formed of a flat metallic strip,

slit intermediate of its ends to form a thread-eye and having the inner edges only of the  
25 slit portions offset to cross each other, and form shoulders for preventing the chafing of the thread in the eye, the outer edge of said slit portions being in sinuous curves to prevent chafing of adjacent threads.  
30

10. A heddle formed of a flat metallic strip slit intermediate of its ends to provide a thread-eye, said slit portions being transversely and outwardly curved, whereby the strength of the heddle is increased at its eye  
35 portion and the latter is prevented from bending, and being curved at their edges to prevent chafing of adjacent warp-threads.

In testimony whereof I have signed my name to this specification, in the presence of  
40 two subscribing witnesses, this 2d day of July, A. D. 1897.

SAMUEL SEWALL.

Witnesses:

A. D. HARRISON,  
P. W. PEZZETTI.