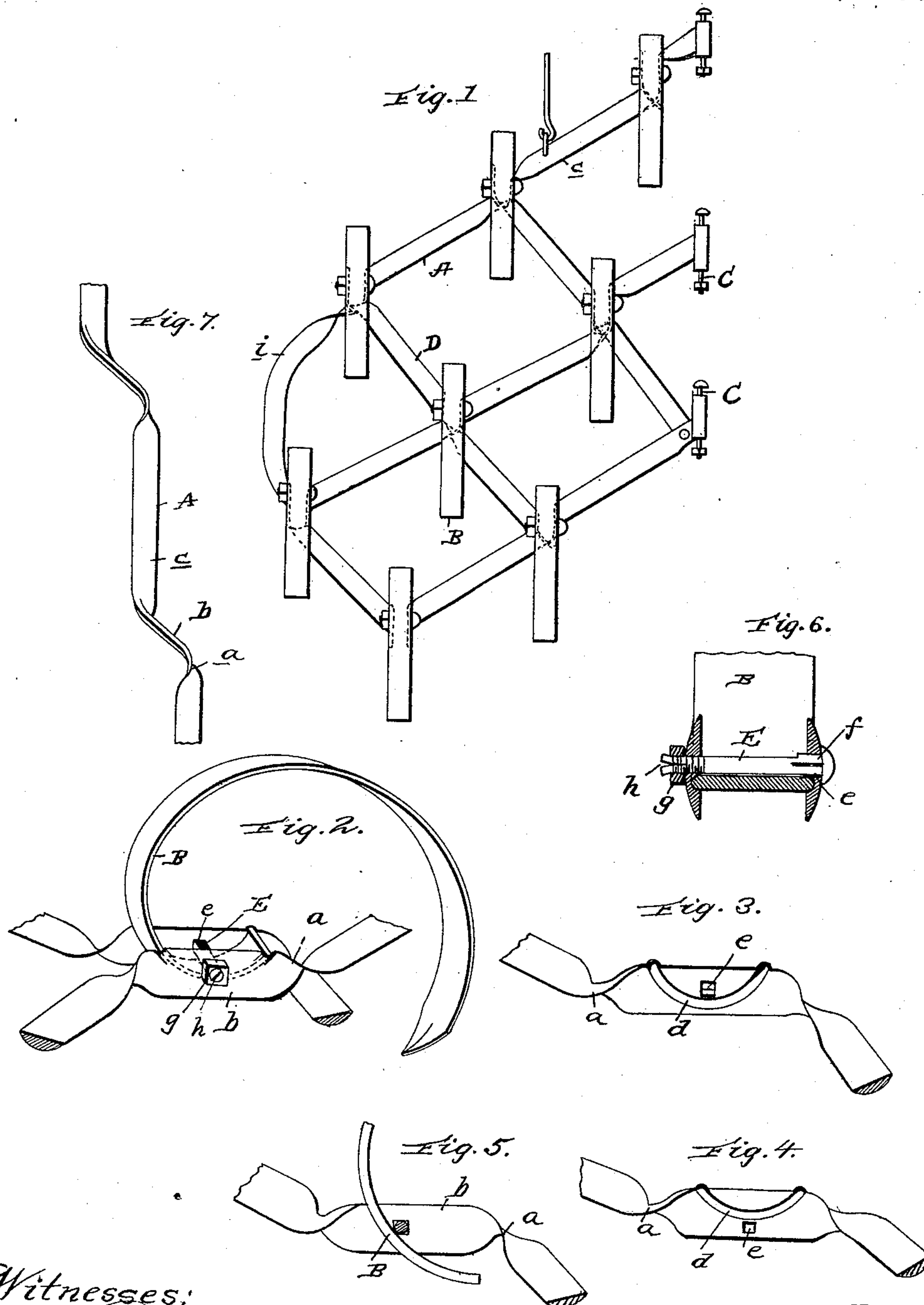


(No Model.)

V. E. RANDALL.
HARROW.

No. 484,047.

Patented Oct. 11, 1892.



Witnesses:
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VICTOR E. RANDALL, OF MARSHALL, MICHIGAN.

HARROW.

SPECIFICATION forming part of Letters Patent No. 484,047, dated October 11, 1892.

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To all whom it may concern:

Be it known that I, VICTOR E. RANDALL, a citizen of the United States, residing at Marshall, in the county of Calhoun and State of Michigan, have invented certain new and useful Improvements in Harrows; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it ap-
10 pertains to make and use the same.

This invention relates to that class of harrows having iron or steel frames and spring or flexible teeth; and, among other things, it has for its object to provide a frame which
15 will be light and durable, to adapt and arrange the parts so as to resist great strain and obviate the objections heretofore experienced in the loosening of the joints or connected parts, to provide an inexpensive and efficient
20 means for securing the teeth and quickly adjusting the same, and to provide against the draft having any tendency to loosen the parts, as well as providing an efficient means for locking the bars of the frame with the inter-
25 posed teeth.

Other objects and advantages will appear from the following description and claims when taken in connection with the annexed drawings, in which—

30 Figure 1 is a plan view of one half or section of a harrow constructed according to my invention. Fig. 2 is a detail perspective view of the same. Fig. 3 is a detail side view of one of the bars of the frame. Fig. 4 is a similar view showing the groove to receive one
35 edge of the tooth, arranged above the bolt-hole. Fig. 5 is a side view of a portion of one of the bars and tooth, illustrating a modification; and Fig. 6 is a cross-sectional view of
40 the bars and tooth, illustrating the bolt for securing the tooth in its seat. Fig. 7 is a plan view of one of the bars of the frame, partly broken away.

In carrying out my invention I take a bar
45 A, of iron, steel, or other suitable material, of a convex-plano form in cross-section, and place it with the convex side down. I then twist the bar to a quarter-turn and bend the same at the points where the teeth are to be
50 seated. In forming these seats for the teeth I twist the bar to a quarter-turn, as shown at

a, and then bend the same from the twisted portion, as shown at b, so as to bring the bent portion b relatively at right angles or at an oblique angle to the horizontal branches c. 55 These bent portions b are arranged with the plane or flat side innermost, and in the plane sides I forge a curvilinear seat or groove d to receive one edge of the tooth B, as will be presently described. These bars are arranged 60 diagonally of the frame, and in making the frame in two or more hinged sections the inner ends of one set of bars may terminate in eyes to receive bolts C, whereby they may be connected in a hinged manner with the next 65 section, although it is obvious that other means might be employed for making the hinged connection. D indicates similar bars which are twisted and bent in the same manner as the bars A, having curvilinear grooves 70 or seats d for the teeth. The bars A and D, which are arranged, relatively, at right angles to each other in forming the frame, cross each other at the twisted portions, and the flat sides, which are bent upwardly, are placed 75 parallel to each other, so that they will form an interspace to receive the tooth, and the forged grooves on their inner sides will coincide, so as to receive the opposite edges of the tooth when placed in position. These up- 80 wardly-bent portions are provided transversely with aligned apertures or holes e to receive a connecting-bolt E. The bolt E, as better shown in Fig. 6 of the drawings, is provided adjacent to its head with a square 85 shoulder f to enter a corresponding aperture in one of the bars, and this bolt, which is preferably made of spring-steel, has its opposite end threaded to receive a nut g and is split at said end, as shown at h. 90

As shown in Fig. 2 of the drawings, the forged seats or grooves d, which are of a curvilinear form, extend from the upper edges on the flat sides of the bars down and around the bolt-holes e, while in Fig. 4 of the draw- 95 ings I have shown the seats or grooves disposed above said holes, and in Fig. 5 the seats or grooves are shown as extending transversely of said bar, and although I prefer the construction shown in Figs. 2 and 3, yet it 100 may be desirable in some cases to form the seats as shown in Figs. 4 and 5, and I do not

wish to be understood as limiting myself to any of the forms shown.

The forward or outer bar A of the frame is designed to extend rearwardly on the outer side in a curved manner, as shown at *i*, which will effectually serve as a guard for the other tooth and will prevent the same from becoming injured while in operation.

In placing the teeth in the frame the butt end of the tooth is first placed in the forged grooves or seats *d*. The bolts E are then passed through the holes *e*, and after the nuts *g* have been turned up on the bolts, so as to firmly draw the two crossing bars tightly against the opposite edges of the teeth, the split portion of the bolt is opened by means of a chisel or other implement, when the nut may be firmly locked and the parts securely held together. Should the tooth become loose in operation, it is simply necessary to give the nut a further turn and further force open the split branches of the bolt. The removing and replacing of the tooth which has become impaired or injured, or the adjusting of a new or old tooth, may be very quickly and easily performed, as there is but one bolt and nut for each tooth, and by the construction which I have shown and described there is but little strain on the bolt, as any force exerted upon the teeth is communicated to the grooves or seats in the bar, the functions of the bolt and nut being simply to hold the bars together, so as to clamp the tooth between them.

While I have shown and described the bars of the frame as being of a convex-plano form in cross-section, for the sake of lightness and durability, as well as efficiency, I prefer to employ bars of that character, although it is obvious that flat bars might be employed

without departing from the spirit of my invention.

The invention will be appreciated by those skilled in the art, and I am aware that many changes might be made in the shape and arrangement of some of the parts.

Having described my invention, what I claim is—

1. A harrow-frame composed of metal bars of convex-plano form in cross-section, said bars being twisted and crossing each other at their twisted portions and bent so as to bring the bent portions vertical and parallel to each other to receive between them a tooth, substantially as specified.

2. A harrow-frame composed of bars of metal twisted and crossing each other at the twisted portions and bent so as to bring the bent portions parallel, said bent portions having a groove in their inner sides and a hole to receive a connecting-bolt, the groove being designed to receive a tooth, substantially as specified.

3. A harrow-frame composed of bars of metal of convex-plano form in cross-section, said bars crossing each other and being twisted and bent so as to bring the bent portions parallel to each other, said bent portions having grooves in their inner sides to receive a tooth and holes to receive a connecting-bolt, and the forward or outer bar of the frame extended and curved laterally, so as to form a guard, substantially as specified.

In testimony whereof I affix my signature in presence of two witnesses.

VICTOR E. RANDALL.

Witnesses:

BERT F. WELCH,
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