(No Model.)

W. S. LAWRENCE & L. C. CHAPIN.

HARROW.

No. 301,375. Patented July 1, 1884.

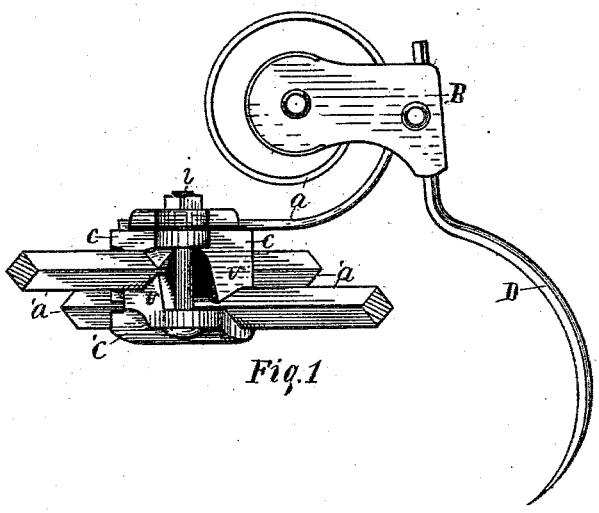
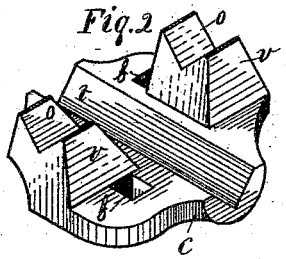
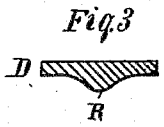


Fig. 1





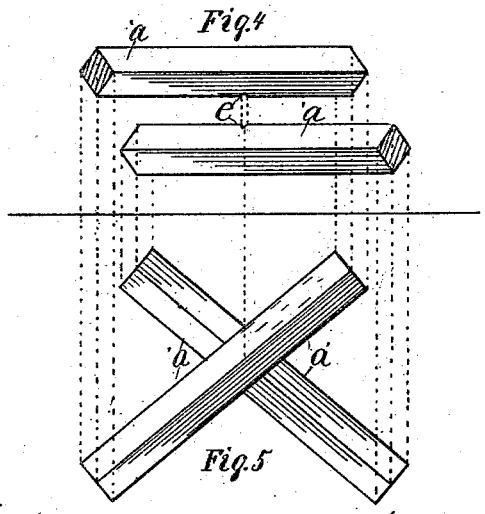


Fig. 5

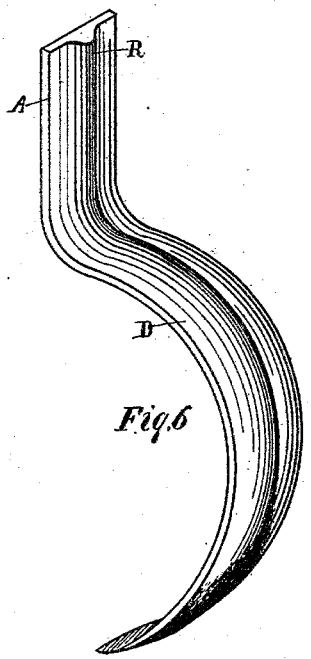


Fig. 6

Witnesses.
John C. Perkins
A. L. Chase.

Inventor.
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By Lucius C. West
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UNITED STATES PATENT OFFICE.

WILLIAM S. LAWRENCE AND LEBEUS C. CHAPIN, OF KALAMAZOO, MICH.

HARROW.

SPECIFICATION forming part of Letters Patent No. 301,375, dated July 1, 1884.

Application filed February 1, 1884. (No model.)

To all whom it may concern:

Be it known that we, WILLIAM S. LAWRENCE and LEBEUS C. CHAPIN, citizens of the United States, residing at Kalamazoo, county of Kalamazoo, State of Michigan, have jointly invented a new and useful Improvement in Harrows, of which the following is a specification.

Our invention has for its object certain improvements hereinafter described and claimed to facilitate the construction and increase the utility of such devices.

In the drawings forming a part of this specification, Figure 1 is a side elevation of the tooth and a section of the tooth-frame, partly in perspective. Fig. 2 is a detached part of Fig. 1 in enlarged perspective. Fig. 3 is a longitudinal section of Fig. 6; Fig. 4, detached parts of Fig. 1 in vertical projection, showing the construction of the tooth-frame. Fig. 5 is a horizontal projection of the same, and Fig. 6 is the harrow-tooth in enlarged perspective.

The harrow-frame consists of the metal tooth-bars a' a', crossing each other at the desired location. These tooth-bars are secured together where they cross by means of the clamps c c' and bolts i, Fig. 1. We prefer to make the tooth-bars a' a' square and cross them with their edges engaging each other, in which case, when the clamps c c' are firmly bound, said edges are embedded in each other, as shown at e in Fig. 4. In this figure the bars a' a' are separated a little, to illustrate the effect which clamping the bars tightly together by means of the clamp c c' and bolts i has upon the engaging edges at e, as before stated. The bars thus embedded and secured together cannot become misplaced by the strain upon them when in use. Such a construction and mode of use obviates any necessity of mortising the bars or of forming the notches in them when constructing them. If preferred, the tooth-bars may be of any other form, and may have notches formed in each where they cross, thus adapting each to fit the other. The clamp is composed of the upper and lower castings, c and c', and bolts i. These castings are provided with channels t, conforming to the form of the tooth-bars a' a', and with lugs v v of a proper length to extend by one bar on each side thereof and rest against the other bar, Fig. 1. The lugs v v are also provided with like channels or notches o, which receive the bar a'. Two bolts, i, are used, as indicated by the bolt-holes b b in Fig. 2.

D shows a tooth which we design using. It has an upright or straight portion, A, for connecting with a tooth-holder, B, and a lower curved portion terminating in a working end, Fig. 6. The tooth D is made from light-weight metal, and is made non-elastic by forming a central integral rib on the back side thereof. Thus the tooth is made light and rigid and a saving of steel effected.

In Fig. 1 a spring, a, is shown connected with the clamp c c' by means of a binding-plate and the bolts i. This spring a and tooth-holder B are connected together. As these parts form the subject of a prior application filed by Chapin and Rix, January 11, 1884, Serial No. 117,138, no further description of them is needed herein.

Having thus described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. The combination, with tooth-bars provided with engaging-surfaces where they cross, which are adapted to be embedded each in the other when under pressure, of a clamp device adapted to press, embed, and secure said bars, substantially as set forth.

2. The combination, with the embedded tooth-bars, the clamp having the channels and notched lugs, and the bolts and binding-plate, of the harrow-tooth and the spring connecting the tooth with the clamp, substantially as specified and shown.

3. The combination, with the square tooth-beams having the engaging edges adapted for embedding in each other, of the clamp adapted for securing and embedding said bars, substantially as set forth.

In testimony of the foregoing we have hereunto subscribed our names in the presence of two witnesses.

WILLIAM S. LAWRENCE.
LEBEUS C. CHAPIN.

Witnesses:
JOHN C. PERKINS,
A. Z. CHASE.