

(No Model.)

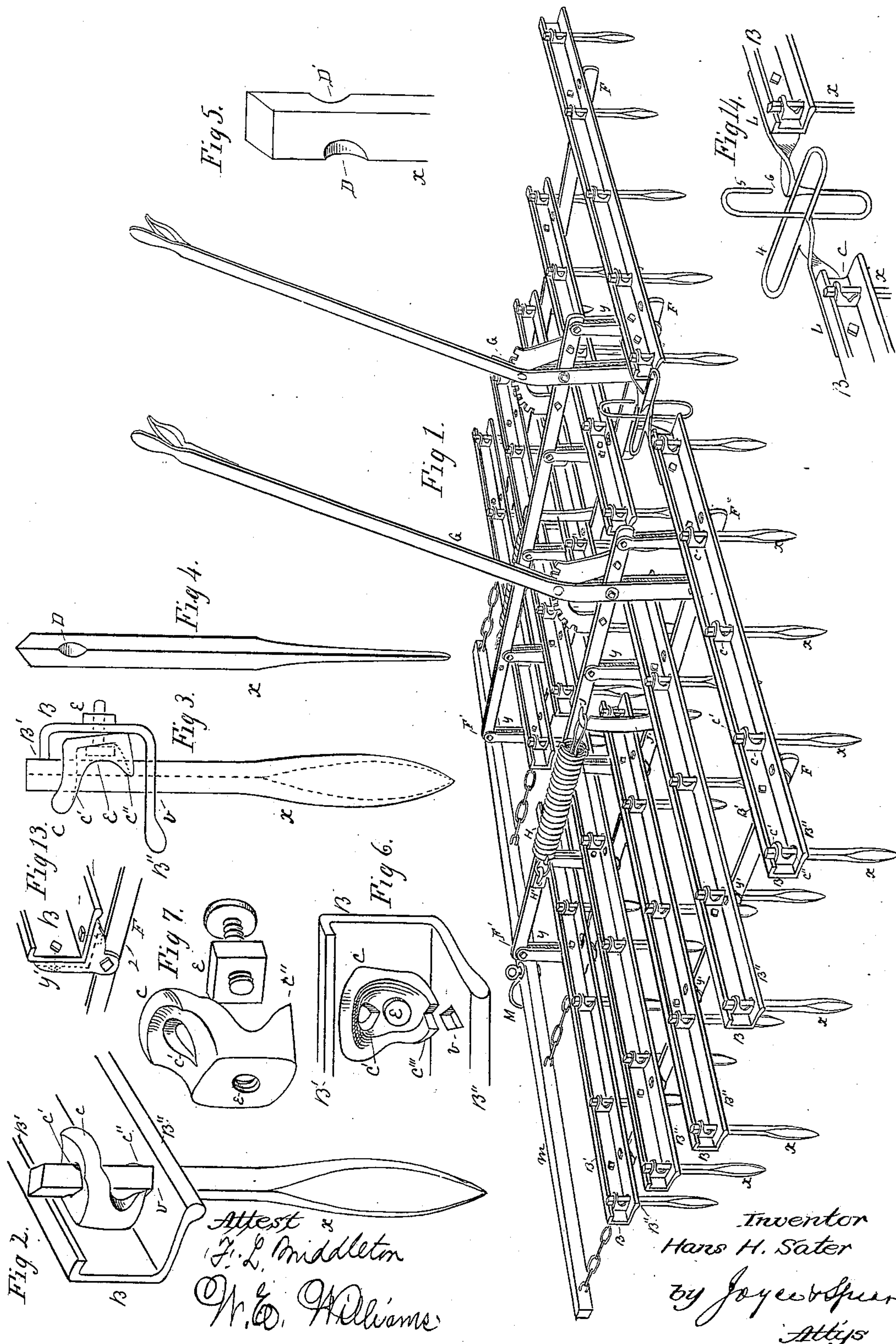
2 Sheets—Sheet 1.

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HARROW.

No. 334,054.

Patented Jan. 12, 1886.



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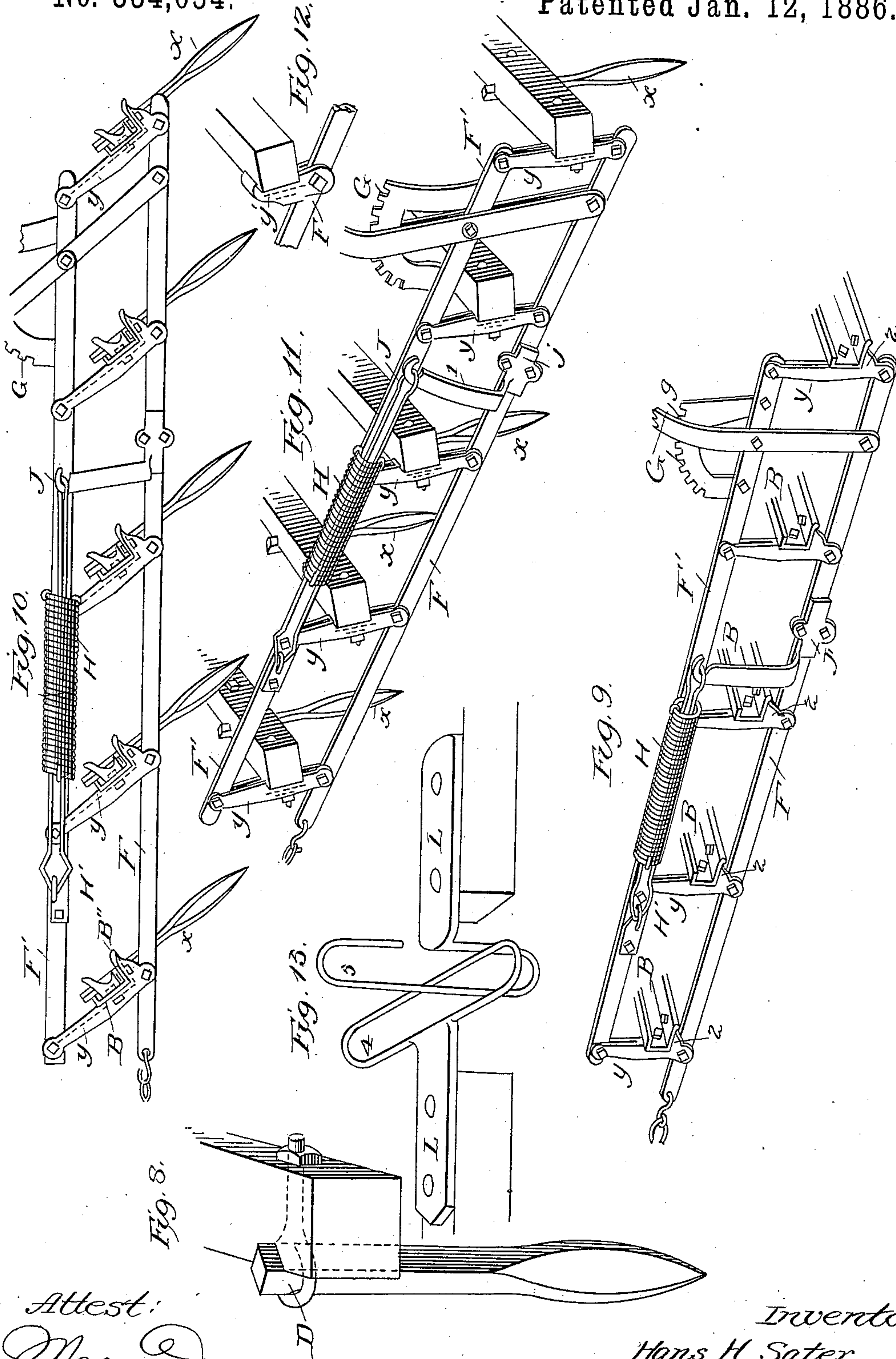
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Attest:  
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Attys.



# UNITED STATES PATENT OFFICE.

HANS H. SATER, OF DUBUQUE, IOWA.

## HARROW.

SPECIFICATION forming part of Letters Patent No. 334,054, dated January 12, 1886.

Application filed July 3, 1885. Serial No. 170,616. (No model.)

*To all whom it may concern:*

Be it known that I, HANS H. SATER, of Dubuque, in the county of Dubuque and State of Iowa, have invented a new and useful Improvement in Harrows; and I do hereby declare that the following is a full, clear, and exact description of the same.

My invention relates to harrows of that class principally which have a square central draft and work a square cut.

The invention relates to the form of beam, the shape of the teeth rendering them reversible, the connection of the teeth with the beam, and to devices for adjusting the teeth to an incline and to a vertical position, to devices for connecting the sections, and to other minor details of construction, all as hereinafter described.

In the accompanying drawings, Figure 1 is a perspective view of a complete harrow in two sections. Figs. 2, 3, 4, and 5 show the form of the harrow-teeth and the mode of connecting them with the beam. Figs. 6 and 7 show the devices for connecting the teeth to the beam. Fig. 8 shows an ordinary wooden beam and a tooth connected thereto. Fig. 9 shows the upper and lower draft-bearing in an upright condition. Fig. 10 shows the same in an inclined position. Fig. 11 shows these same parts with a wooden beam attached; Fig. 12, the wooden beam attached to the short post. Fig. 13 shows the iron beam attached to the short post. Fig. 14 shows details for connecting the sections with iron beams; Fig. 15, devices for connecting the sections with wooden beams.

The harrow-tooth shown at *a* is formed with a diamond-shaped shank and with a flattened point, the point being flattened on opposite corners, so as to leave the front and rear corners or the two other opposite corners as the edges of the teeth. The upper end of the tooth is provided on the edges or corners which form the cutting-edges with two notches, *DD'*, for connections, hereinafter explained. These notches serve to hold the tooth against vertical displacement, one when the tooth is in one position and the other when it is reversed. The beam *B*, to which the teeth are specially connected, is formed of iron or steel having a vertical web and upper horizontal narrow flange, *B'*, and a lower broad horizontal flange,

*B<sup>2</sup>*. The lower flange is provided with a diamond-shaped hole, *v*, adapted to receive the teeth which are inserted from below, and to hold them with the sides of the flattened points at right angles to the line of the beam. The teeth are held to the beam by means of a holder, *C*, formed, as shown, and having an upper opening, *c'*, and a lower notch, *c<sup>2</sup>*, adapted to receive the tooth. The face of the holder bears against the vertical web of the beam, as shown in Figs. 2 and 3. It is held to the beam by means of a bolt and nut, *e e*. The notch *D* or *D'* engages with the upper part of the holder. I preferably form the lower flange of the beam with a heavy bead to give it additional strength against the strain of the teeth bearing upon it, the strain of the teeth being against the upper edge of the flange *B'* and toward the lip *B<sup>2</sup>*.

In order to relieve the holder from strain and to throw it upon the flanges of the beam, the parts are adjusted as shown in Fig. 3, in which, when they are put together, the upper part of the holder is inclined slightly from the web of the beam, and as the nut is tightened upon the bolt the tendency is to draw the upper part of the tooth against the flange *B'* and to throw it out toward the bead of the lower flange. It will be apparent that these beams run at right angles to the line of draft. The draft-bars are represented at *F*. These are the lower or main draft-bars and are placed underneath the beams, and are pivoted thereto by suitable lugs or standards attached to the beams so that the beam may be tipped in the direction of the draft, as shown in the drawings. One draft-bar of each section, as shown in Figs. 9 and 10, has these connections extending upward to form posts *y*, to the upper end of which are connected supplemental draft-bars *F'*, the connections with the upper draft-bars being pivotal like the lower. The short connections of the beams with the draft-bar *F* are shown in Fig. 13. They are made in the shape of the bracket, and are indicated at *y'*. The lever *G* is pivoted both to the upper and lower draft-bars and is provided with a toothed segment, *g*, which is fixed to the upper rack-bar. An ordinary spring-locking bolt on the lever engages with the teeth of the segment, and by means of this the toothed bars may be moved like the sides of a parallel rule in relation to each other, so as to incline



the posts *y* and with them the beams with which they are connected. When the upper end of the lever is drawn back, the teeth are drawn into vertical position, and the reverse movement of the lever throws the teeth into an inclined position. As the first movement is against the draft, I have provided a spring, H, one end of which is attached to the upper bar and the other to the arm J, attached to the lower bar, and the spring therefore aids the attendant in bringing the teeth to a vertical position. They may be locked by the spring-locking bolt at any desired angle. The posts *y* are provided with seats 2 for the support of the beams, the beams being bolted both through the web and the lower flange.

Although I have shown metal beams as a preferred form, I may use the same form of teeth and the same construction of bars heretofore described, in connection with wooden beams, (shown in connection with Figs. 11 and 12,) the teeth being bolted to them by a gripping-bolt, as shown in Fig. 8.

The construction thus far described is capable of use as a harrow complete in itself, being connected to the draft-bars *m* by chains *o*; but it may also be made in sections, each a duplicate of the other, as shown in Fig. 1. These sections I connect by means of links 4 5, as shown in Figs. 14 and 15.

In Fig. 14 the links are bolted to arms L, which consist of flat bars of metal bolted to the webs of the metal beams. The links are at right angles to each other, and the link 5 is left open, as shown at 6, in connection or disconnection. The link 5 is vertical and the other is horizontal, so as to allow the requisite movement while holding the sections in their proper relation to each other.

Fig. 15 shows the arms L bolted to the wooden beams on top.

The metal bars heretofore described may be easily rolled out and are light, and the metal is in such shape as most effectual to resist strain which is thrown upon it.

The teeth are conveniently made from diamond-shaped bars, and are flattened on oppo-

site edges or corners, and present two opposite cutting-edges, and may be reversed when one is worn. They may be brought to a suitable point, as shown in the figures.

I claim as my invention—

1. A reversible harrow-tooth formed of one piece of metal, and having a flattened point with cutting-edges upon each side, and a shank with notches D D' in opposite edges, combined with a harrow-beam, and a holder adapted to engage with one or the other of said notches as the tooth is reversed, substantially as described.

2. In combination with the tooth having the notches D D' in opposite edges, a holder, C, adapted to engage with said notches, the metal beam having the flanges B' B'', and the bolt connecting the holder C with said beam, substantially as described.

3. In combination with the draft-bars F F' and the harrow-beams, and with the lever G, the spring H, connected at one end to the upper bar and at the other end to the projecting arm of the lower bar, substantially as described.

4. In combination with a harrow-beam, a harrow-tooth having a diamond-shaped shank, with notches D D' in the edges thereof, and a holder embracing the shank fitted to said notches and adapted to secure the tooth to the beam, substantially as described.

5. The combination, in a harrow, of a beam having a broad lower flange and an upper narrow flange, with a harrow-tooth passing through an opening in the lower flange, with its upper part bearing against the edge of the upper flange, and held in position by a suitable holder, the edge of the upper flange being practically in line with the opening in the lower, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

HANS H. SATER.

Witnesses:

ALEX. SIMPLOT,  
HENRY MICHEL.