N. STARR.

HARROW.

No. 186,064. Patented Jan. 9, 1877.

Fig. 1.

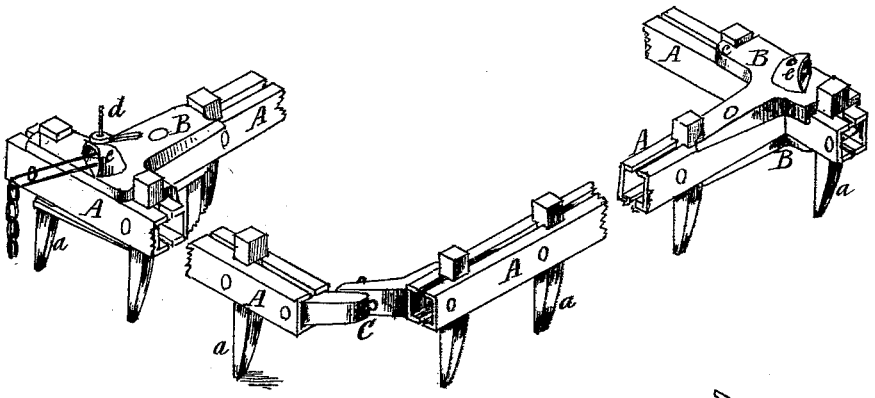
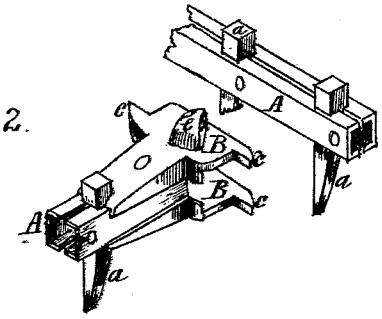


Fig. 2.



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NICHOLAS STARR, OF HOMER, NEW YORK.

IMPROVEMENT IN HARROWS.

Specification forming part of Letters Patent No. **186,064**, dated January 9, 1877; application filed January 2, 1877.

To all whom it may concern:

Be it known that I, NICHOLAS STARR, of the town of Homer, in the county of Cortland and State of New York, have invented a new and useful Improvement in Harrows, which improvement is fully set forth in the following specification and accompanying drawing.

The harrow is made with four straight bars, to contain the teeth, joined at the ends at right angles, so as to form a hollow square. These bars are united by two adjustable firm or rigid joints at opposite angles, and by flexible joints at the other angles, and in such a way that each bar may be readily detached from the others.

In the drawing, Figure 1 is a perspective view of broken parts of the harrow, so arranged as to indicate its shape and show the appearance of the various joints when united or locked. Fig. 2 is an enlarged view of disunited contiguous ends of two of the bars, which, when united, form one of the firm or inflexible joints.

A A represent the bars which contain the teeth; B B, the plates, bolted to the ends of their proper bars, which, with their bearings locked into the two teeth at the end of the contiguous bar, make the firm joint. The teeth are represented by *a a*, and the flexible joint by C. The lock-plates B B are bolted at the end of the bar A, one above and the other below the bar, and project beyond the end of the bar the distance of the width of the contiguous bar. These plates have their bearings *c c*, and are made to fit in between the two teeth at the end of the contiguous bar where they join.

Thus they may be easily locked together; and to prevent their unlocking, a bolt, *d*, as seen in Fig. 1, is passed down through the plates B B and the end of the bar A, where they unite.

This harrow may be, and in this drawing is represented as, reversible, and capable of being drawn at either of the firm joints or angles.

A very convenient mode, and the one adopted by me, is to have an elevated eye, *e*, attached to the upper plate, into which the clevis or a link of the chain may be passed and secured by the same bolt, *d*, which serves to lock the joint; but any other hook or device may be used for hitching the draft-chain to the harrow, and the elevated eye *e* may be dispensed with.

Any kind of material may be used for the teeth-bars, either wood or iron; but the best, and that which, made as herein described, I desire to secure by these Letters Patent, consists of bars made of grooved or channel iron or steel, each bar being made of two pieces, placed side by side, with the grooves or channels together. Transverse notches for the teeth are cut in the contiguous edges of these grooved strips, corresponding with each other, of such size as to fit the teeth when inserted, but not allowing the edges of the semi-sections of the bars to quite touch each other. With the teeth inserted these semi-sections of the bars A are either riveted or bolted together, so as to gripe and hold the teeth firm—bolts, almost invariably, being preferred to rivets.

Another valuable feature of my invention consists in the shape and arrangement of the teeth. They are rectangular, and sharpened to a point by making all of the curvature on two of the adjacent sides, leaving the other two sides straight, and they are so set in the harrow that lines drawn through the teeth from their straight to their curved corners are all parallel with each other and with the line of draft, and their straight corners are all set in one direction, the object being to vary the effect of the harrowing upon the soil, according as the soil is light or heavy, and as it is desired to disturb the soil thoroughly or lightly.

It will be readily seen that when the harrow is drawn in the direction of the straight corners, it will take hold much more thoroughly upon the earth than when drawn in the opposite direction.

This drag, with the flexible joints C opposite each other, possesses the advantages of accommodating itself to the inequalities of the ground, as claimed in my Letters Patent dated December 17, 1867, No. 72,334, while it has the further valuable qualities, first, of being readily taken apart for convenience of storing or transporting; second, the channel-iron is well adapted to the economy of manufacturing and, when used as herein described, affords

an easy mode of griping and securing the teeth in the bars; third, the advantages of the peculiar formation of the teeth, as heretofore described.

Having described my invention, I claim—

1. In combination with a harrow constructed with four teeth-bars, A A, united so as to form a hollow square, the rigid adjustable joint B B, locking the bars or sides of the harrow in pairs, substantially as described.

2. In combination with a harrow, the adjustable locking or rigid joint B B, substantially as described.

3. In a harrow, the teeth-bars A A, made of grooved or channel iron or steel, with notches to hold the teeth in semi-sections, bolted or riveted together, substantially as described.

4. In combination with a harrow, the rectangular teeth *a a*, having two straight sides and two adjacent curved sides, with the peculiar formation, substantially as described.

5. In a harrow composed of four teeth-bars joined at right angles, forming a hollow square, the adjustable rigid locking-joints B B at opposite angles, in combination with the flexible joints C C at the other angles.

NICHOLAS STARR.

Witnesses:

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