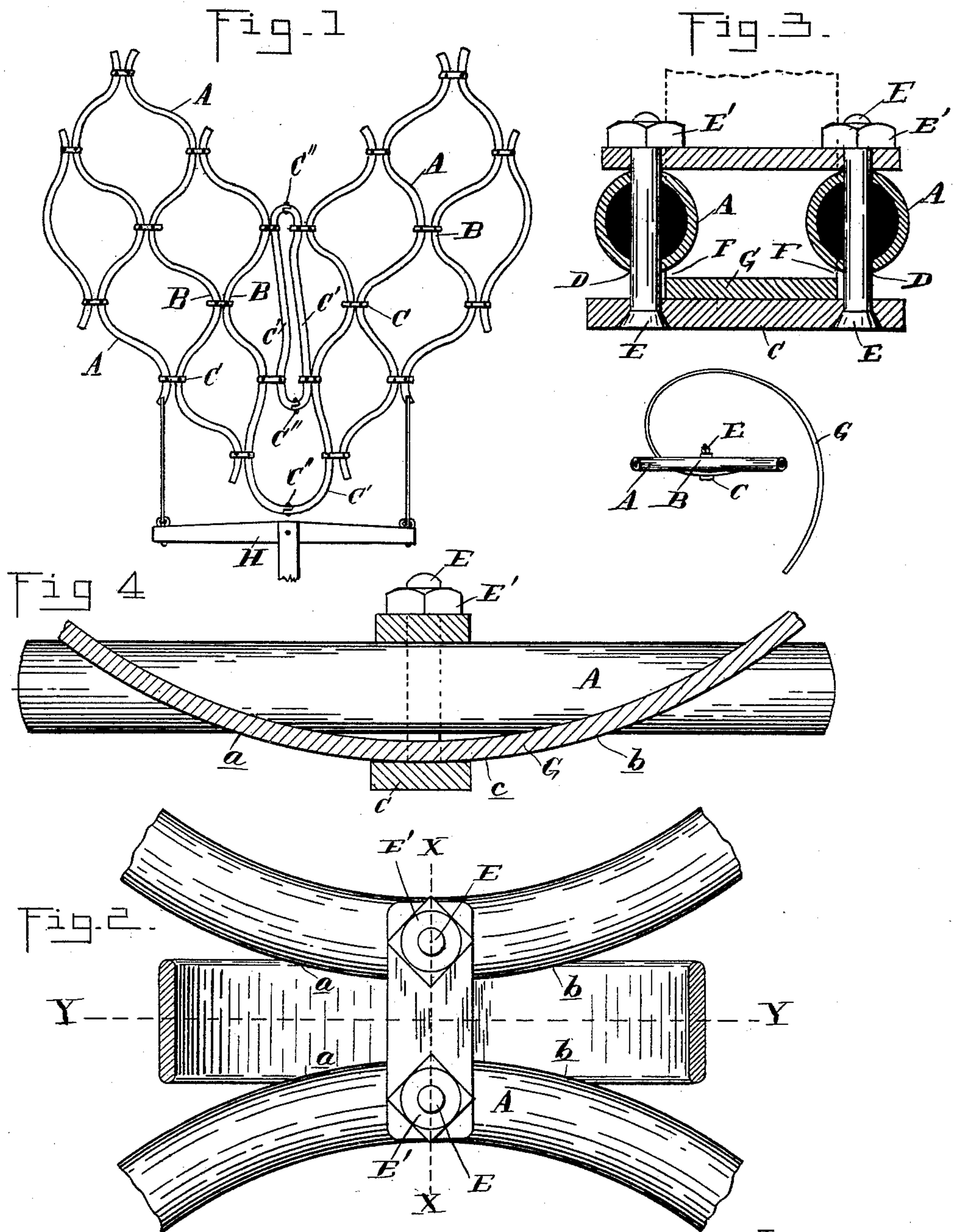


(No Model.)

F. J. NORTH & A. F. MOLITOR.
SPRING TOOTH HARROW.

No. 435,706.

Patented Sept. 2, 1890.



Witnesses

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UNITED STATES PATENT OFFICE.

FORD J. NORTH AND AARON FRED MOLITOR, OF LANSING, MICHIGAN.

SPRING-TOOTH HARROW.

SPECIFICATION forming part of Letters Patent No. 435,706, dated September 2, 1890.

Application filed July 1, 1889. Serial No. 316,182. (No model.)

To all whom it may concern:

Be it known that we, FORD J. NORTH and AARON FRED MOLITOR, citizens of the United States, residing at Lansing, in the county of Ingham and State of Michigan, have invented certain new and useful Improvements in Spring-Tooth Harrows, of which the following is a specification, reference being had therein to the accompanying drawings.

10 This invention relates to new and useful improvements in spring-tooth harrows.

The object of the invention is to construct a harrow with a tubular frame and means for securing together the sections of the frame and 15 attaching the teeth thereto, whereby a lighter, stronger, and more serviceable harrow is made than is now known.

In the drawings which accompany this specification, Figure 1 is a plan view of our 20 improved harrow with the teeth attached. Fig. 2 is an enlarged plan view of the connection of one of the teeth. Fig. 3 is a cross-section on line *xx* in Fig. 2. Fig. 4 is a section on line *yy* in Fig. 2.

25 A are the bars composing the frame of the harrow. These bars are made of piping, bending them in a horizontal plane into bends B, giving them a serpentine form, and assembling them together with the points of the 30 bends of adjoining bars approaching each other and secured in position by means of clips C, the bolts E of which pass through suitable apertures D in the bars. The central bars C' are provided with suitable apertures to receive a bolt C'' to secure the two 35 halves of the frame together. The clip-bolts E are made suitably long to pass through the bars, the clip-plates, and the nuts E'; also, to leave the space F between the lower clip-plate and the bars in which to insert the 40 curved end of the tooth G. The two upward bends of the harrow-tooth are wedged between the sides of the bars, which at their points of connection form a double-wedge-shaped bearing, as shown in Figs. 2 and 4. 45 It is evident that the spring-tooth has bearing at the points *a* and *b* only, and in tightening up the nuts E' the bend *c* of the spring is put under compression, and its resiliency

tends at all times to hold the nuts against accidental displacement. The bearings *a* and *b*, holding the tooth between, assist in making the frame perfectly rigid, as the bars of the frame cannot have an end motion upon each other without lessening the distance between the bends, which is impossible on account of the intermediate section of the spring. No extra castings are required to 55 attach the spring to the frame, as the frame itself by the bends described, with the addition of the clips, form the necessary bearing for the spring-tooth. The bolts C'', being arranged in line, make a pivotal connection between the two halves of the harrow. It is a suitable draft attachment. With this construction it simply requires the loosening of 60 the nuts E' to put the harrow in a knock-down condition. 65

In use there are no parts to rattle, as all the clips and bolts are held firmly in place by the clamping of the clips upon the bend *c* of 70 the spring, as before described. It is evident that it is easier to bend the bars into a curve than into a right-angled bend, and the curve gives a better result in construction. 75

What we claim as our invention is—

1. In a harrow, the combination of sets of serpentine bars having the points of the bends approaching each other and spring-teeth held at two points in their length directly between the bends of the bars and 80 clamped by direct contact between the teeth and the surfaces of two contiguous bends of the bars, with horizontal clips having vertical bolts to clamp the teeth and bars together, substantially as described. 85

2. In a harrow, the combination, with the tubular bars A, having bends B, assembled together with the points of the bends approaching each other, of the clips C, whose 90 bolts E pass through the apertures D in the bars, the space F between the lower clip-plate and the bars, and the spring-teeth G, clamped in the space F, substantially as described. 95

3. In a harrow, the combination of tubular bars having bends assembled together connected by clips with the points of the bends

approaching each other and forming a double wedge-shaped bearing for the spring-teeth and the bends in said spring-teeth, the parts being arranged and constructed to
5 operate substantially as and for the purpose described.

In testimony whereof we affix our signa-

tures, in presence of two witnesses, this 29th day of May, 1889.

FORD J. NORTH.

A. FRED MOLITOR.

Witnesses:

A. F. PORTER,

W. L. GROVE.