(No Model.)

G. C. BILLUPS.

HARROW.

No. 555,424. Patented Feb. 25, 1896.

Fig. 1

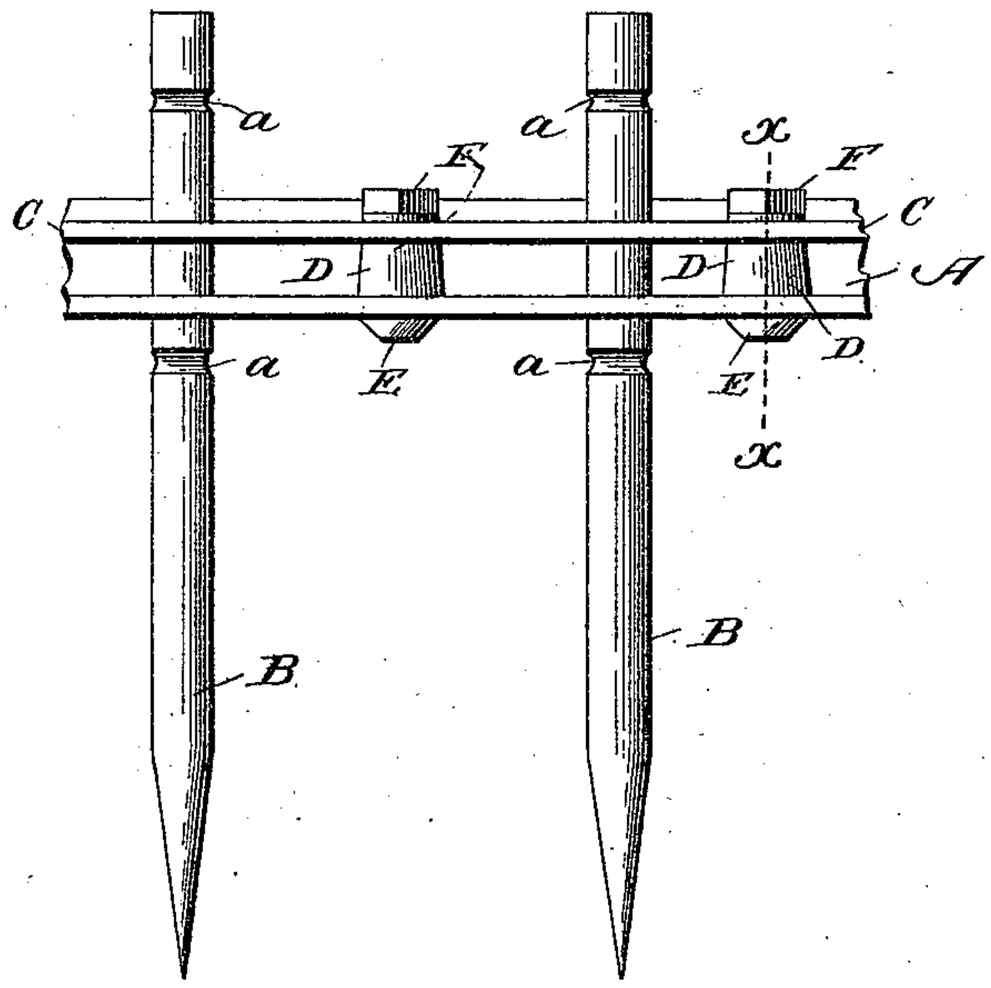
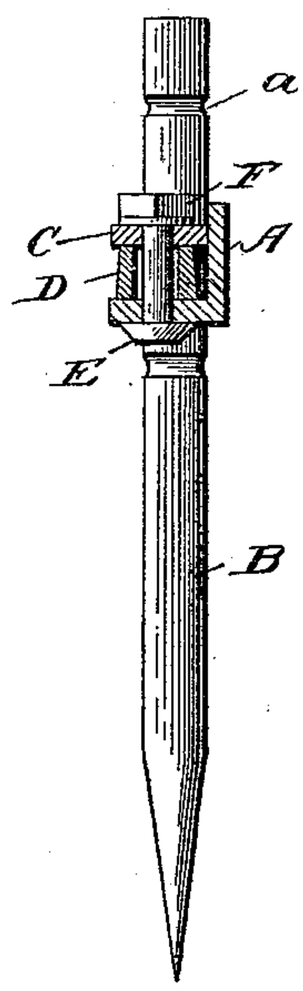


Fig. 2



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UNITED STATES PATENT OFFICE.

GEORGE C. BILLUPS, OF NORFOLK, VIRGINIA.

HARROW.

SPECIFICATION forming part of Letters Patent No. 555,424, dated February 25, 1896.

Application filed March 10, 1893. Serial No. 465,387. (No model.)

To all whom it may concern:

Be it known that I, GEORGE C. BILLUPS, a citizen of the United States, residing at Norfolk, in the county of Norfolk and State of Virginia, have invented certain new and useful Improvements in Harrows; and I do hereby 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 appertains to make and use the same.

My invention relates to certain improvements in harrows, and particularly to that class known as "metal-frame tooth-harrows," and more particularly to that class in which the teeth are held in the frame so as to render them capable of vertical adjustability.

My invention has for its object to provide a simple and economic construction and at the same time to secure, if desired, a rotary motion of the teeth, that they may free themselves of earth, trash, sticks, &c., and more thoroughly pulverize the ground; and, further, my invention has for its object to construct a metal-frame tooth-harrow in which the teeth are so securely held as to reduce to a minimum the possibility of same being lost, even though one or more securing-bolts may become loosened, and at the same time, as before indicated, to secure the advantage when desired of vertical adjustability and rotary motion of teeth, or either, in the event that both may not be desired. It is a well-known fact that the greatest defect in metal-frame tooth-harrows, especially those in which each tooth is held by a distinct clamp or cuff, has heretofore been the sure loss of teeth so soon as the clamps become loosened even in the slightest degree, and to remedy this evil is one of the main objects of my invention; and with these ends in view my invention consists of the details of construction and the arrangement of parts, all as will be hereinafter described and specifically claimed.

In order that those skilled in the art may fully understand my invention I will proceed to describe the construction and arrangement, referring by letters to the accompanying drawings, in which—

Figure 1 represents a side elevation of a portion of a harrow embodying my invention. Fig. 2 is a vertical section at the line $x\,x$ of Fig. 1.

Similar letters of reference denote like parts in both figures.

A represents the frame proper of the harrow, which, as will be more clearly seen at Fig. 2, is composed of bars of right-angle form in cross-section. These bars may be of any suitable number arranged at suitable distances apart and connected together by cross-bars of substantially flat construction in any ordinary or desirable manner, which it is not necessary to particularly describe, as it constitutes no part of my improvement.

B B are series of harrow-teeth, preferably round in cross-section and formed or provided with any desired number of circumferential grooves or depressions a when a rotary motion is desired. It is obvious, however, that these teeth may be made non-rotary when desired by providing them with one or more grooves which extend only partially around the same, and yet at the same time serve to firmly hold them in place in the frame.

C are flat bars or plates with openings b adapted to fit around the teeth B and within the grooves a in said teeth.

The bars C have interposed between them and the horizontal portion of the angle-bars A bushings or separators D, through which and the bars A C pass screw-bolts E, which are secured in place by nuts F.

It is obvious that the flat bars C may be placed above the horizontal portions of angle-bars A, as in Fig. 1, or the said bars may be reversed, bringing their horizontal portions uppermost, in which case the flat bars C would lie under the same. These plates or bars may be in one piece running entire length of angle-bars A, or they may be divided into sections, as preferred. By either construction and arrangement it will be seen that the two bars A C are held at a predetermined distance apart and that the teeth B, which pass freely through the bottom of the angle-bar A and are held within the opening b in the flat bar C, are free to rotate axially when made round with one or more grooves, and that, owing to the series of grooves a in the head of the teeth, the latter may be adjusted vertically to

shorten or lengthen the teeth and compensate for wear.

What I claim as new, and desire to secure by Letters Patent, is—

In a harrow the combination with the angle-bars A constituting the main frame, and having tooth-openings in the horizontal portions thereof, the teeth B formed with circumferential grooves *a*, horizontal bars or plates C, having tooth-slots *b* in one edge thereof, vertical clamping-bolts E, bushings D and nuts F, substantially as and for the purpose set forth.

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

GEORGE C. BILLUPS.

Witnesses:
HENRY C. WATKINS,
H. N. POULSON.