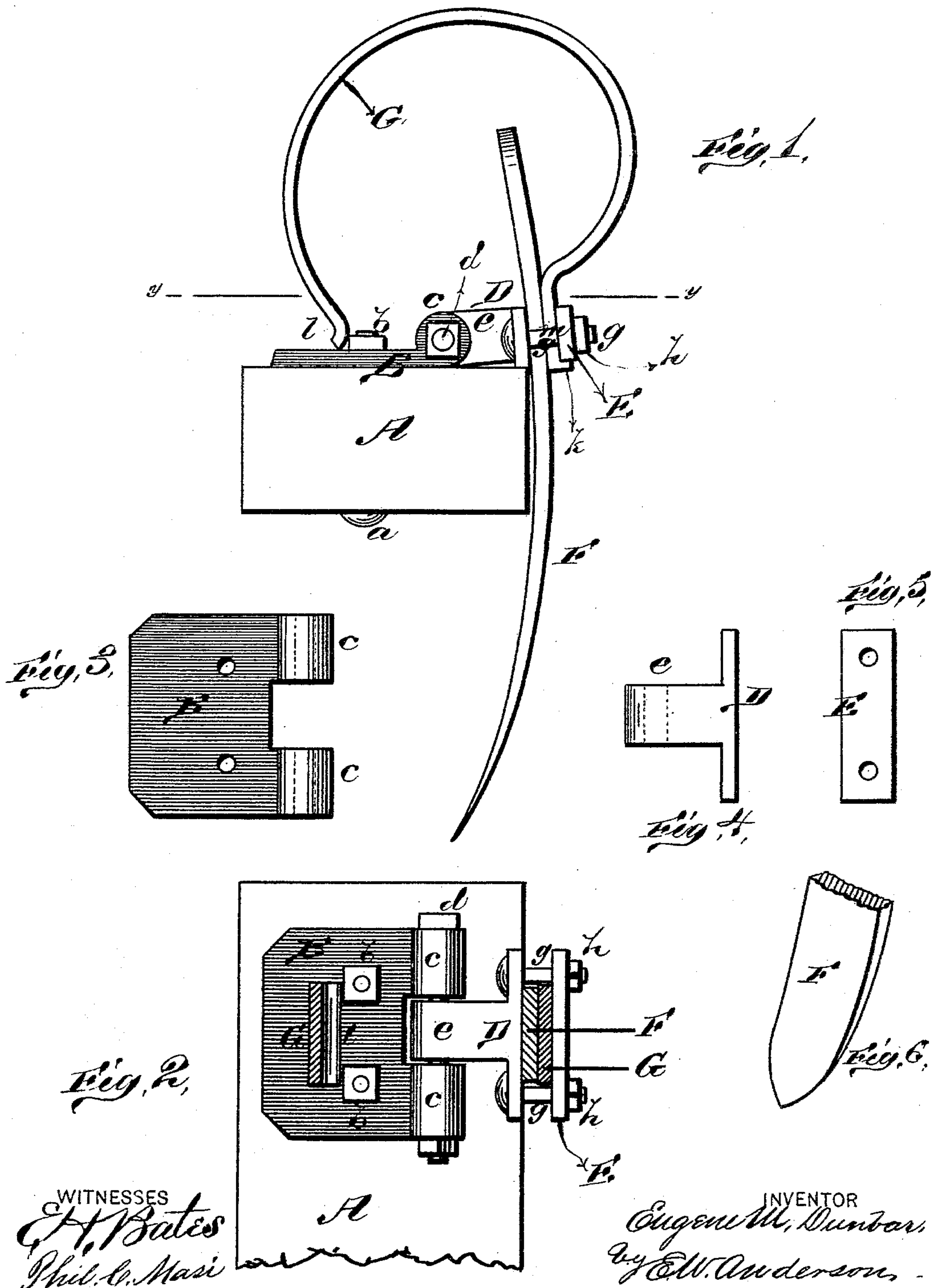


E. M. DUNBAR.
Harrow.

No. 211,003.

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WITNESSES
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EUGENE M. DUNBAR, OF KALAMAZOO, MICHIGAN.

IMPROVEMENT IN HARROWS.

Specification forming part of Letters Patent No. **211,003**, dated December 17, 1878; application filed June 1, 1878.

To all whom it may concern:

Be it known that I, EUGENE M. DUNBAR, of Kalamazoo, in the county of Kalamazoo and State of Michigan, have invented a new and valuable Improvement in Harrows; and I do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the annexed drawings, making a part of this specification, and to the letters and figures of reference marked thereon.

Figure 1 of the drawings is a representation of a side view of my improved harrow. Fig. 2 is a horizontal section of the same, taken through the line *y y* of Fig. 1; and Figs. 3, 4, 5, and 6 are details.

This invention has relation to harrows; and it consists in the construction and novel arrangement, with a harrow-tooth and spring, of the hinged shackle or clamp, forming a bearing in which said tooth is readily adjustable, and which is held down to its work by the pressure of the spring, all as hereinafter fully shown and described.

In the accompanying drawings, the letter A represents a beam of the harrow-frame, and B the base-plate of the hinged shackle or clamp, which is connected to the beam by means of bolts *a* and nuts *b*, the same bolts and nuts usually serving to fasten together the joints of the harrow-frame. The plate B is formed with two eyes, *c*, for the passage of the hinge-bolt *d*, whereby the knuckle *e* of the shackle-plate D is connected, forming the hinge-joint. The shackle-plate D is horizontally extended on each side of its knuckle, and is perforated, as shown, for the passage of the clamping-bolts *g*. These bolts extend through the rear clamp-plate, E, which is set up by means of the nuts *h* to hold the tooth F. This tooth is flattened from front to rear, and slightly curved, as shown. It is made without notches, holes, or projections, being smoothly finished on its faces and edges, so as to have all the strength of which the material is capable, to resist the strain and shocks to which it is subject in use. It is easily adjustable to cut at any desired depth by loosening the nuts in rear of the clamp-plate,

setting the tooth, and then fastening the same by turning up the nuts.

G indicates the curved or C spring, which is employed to put the proper tension on the tooth, while allowing it to yield when striking stones or other obstructions in its path. It is preferably made in the loop or C form shown, being a plain steel band without notches, holes, or projections except the bearing-offsets *k l* at its ends. In this manner the entire elastic power of the spring is preserved, and it is rendered less liable to fracture under sudden strain. It is applied by fastening its heel *m* in the shackle between the tooth and the rear plate, E, the under edge of which is engaged by the end offset, *k*, of the spring, whereby the latter is secured from casual disarrangement. The spring is bowed over the upper end of the tooth, and its forward end engages with a bearing upon the base-plate B. Usually the nuts on the ends of the bolts by which this plate is secured to the beam will serve as a bearing for this end of the spring, as shown in the drawings.

The tooth applied in the manner above described will, when working, continually tremble, and thus more thoroughly pulverize the soil, and will also, when caught by any root, stone, or other obstruction, turn backward enough to let the tooth pass over such obstruction and immediately enter the soil again.

Having described this invention, what I claim, and desire to secure by Letters Patent, is—

1. The combination, with the tooth F and spring G, of the shackle or clamp, consisting of the front plate, D, having the hinge-knuckle *e* and a bolt-hole on each side thereof, the rear plate, E, having corresponding bolt-holes, the bolts *g*, and the nuts *h*, adapted to clamp said tooth and spring, substantially as specified.

2. A harrow-beam having the base-plate B bolted thereon, a tooth-shackle hinged to said base-plate, and a tension-spring bearing upon said tooth-shackle and said base-plate.

3. The combination, with a hinged shackle and a base-plate fixed to the harrow-beam, of the loop or C-spring G, bearing upon the

shackle and base-plate, and bowed over the tooth clamped in said shackle, substantially as specified.

4. The combination, with the hinged shackle, its rear plate, E, and the harrow-tooth, of the tension-spring having the offset *k*, engaging under the plate E, substantially as specified.

In testimony that I claim the above I have hereunto subscribed my name in the presence of two witnesses.

EUGENE M. DUNBAR.

Witnesses:

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WILLIAM M. SHEAR.