(No Model.) 2 Sheets—Sheet 1.

DE WANE B. SMITH.

HARROW.

No. 567,321. Patented Sept. 8, 1896.

Fig. 1.

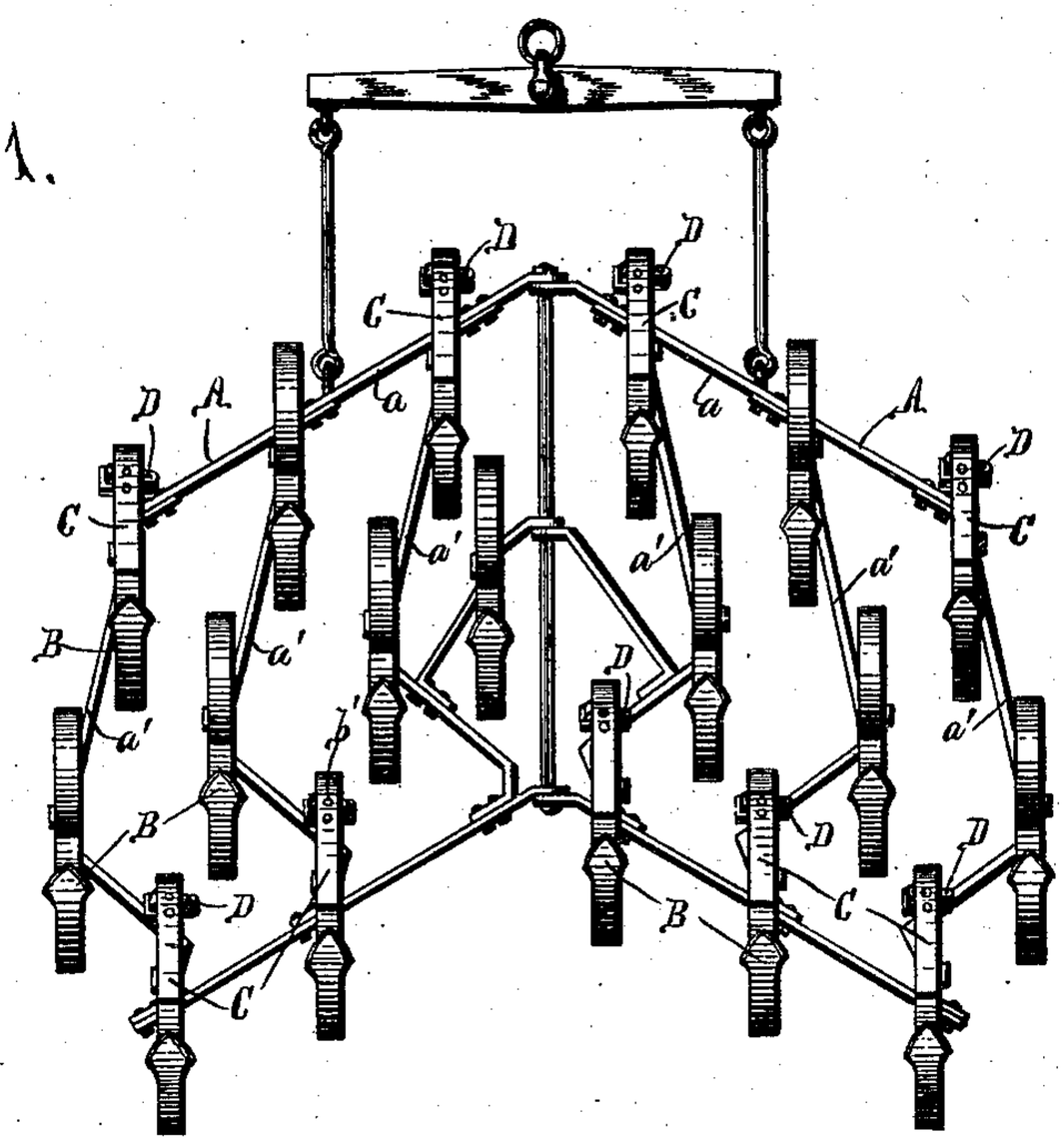


Fig. 2.

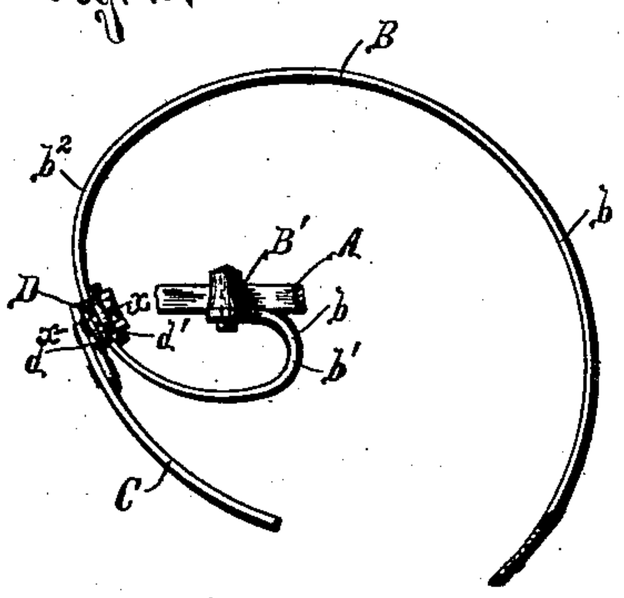


Fig. 3.

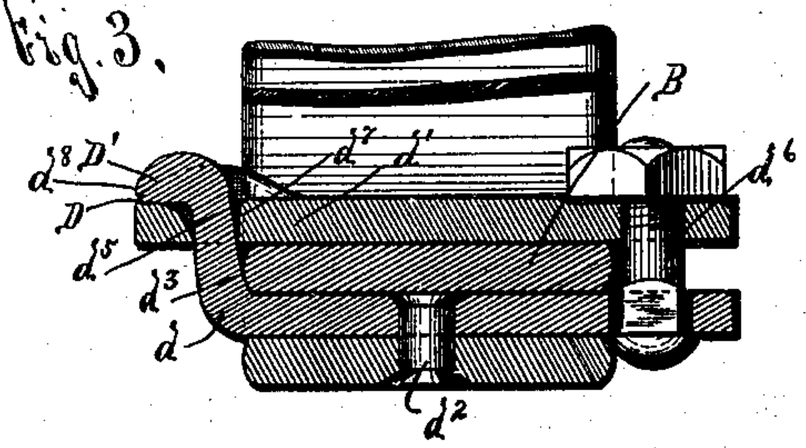
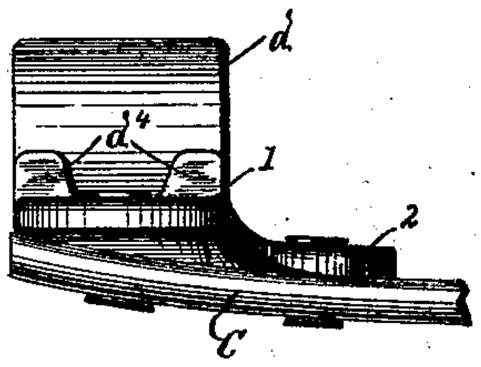


Fig. 4.



WITNESSES:
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H. E. Chase,

INVENTOR
De Wane B. Smith
BY
Hey Wilkinson & Sawyer
ATTORNEYS

(No Model.) 2 Sheets—Sheet 2.

DE WANE B. SMITH.

HARROW.

No. 567,321. Patented Sept. 8, 1896.

Fig. 5.

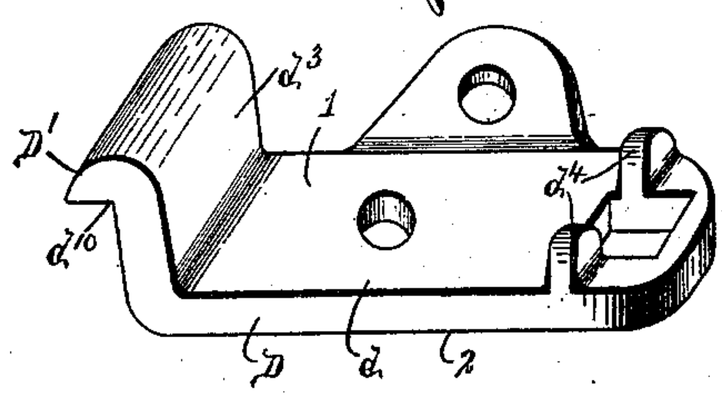


Fig. 6.

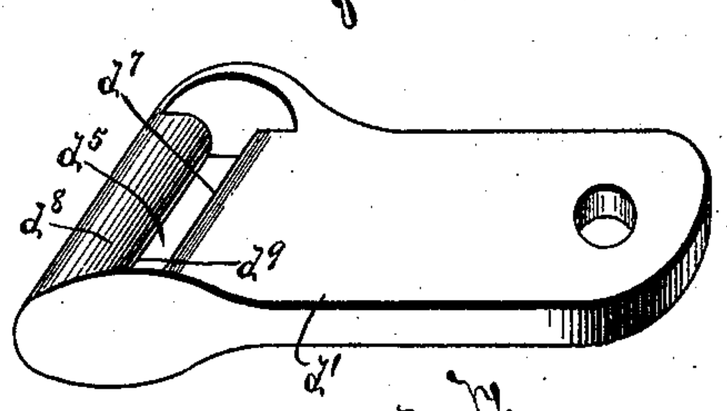


Fig. 7.

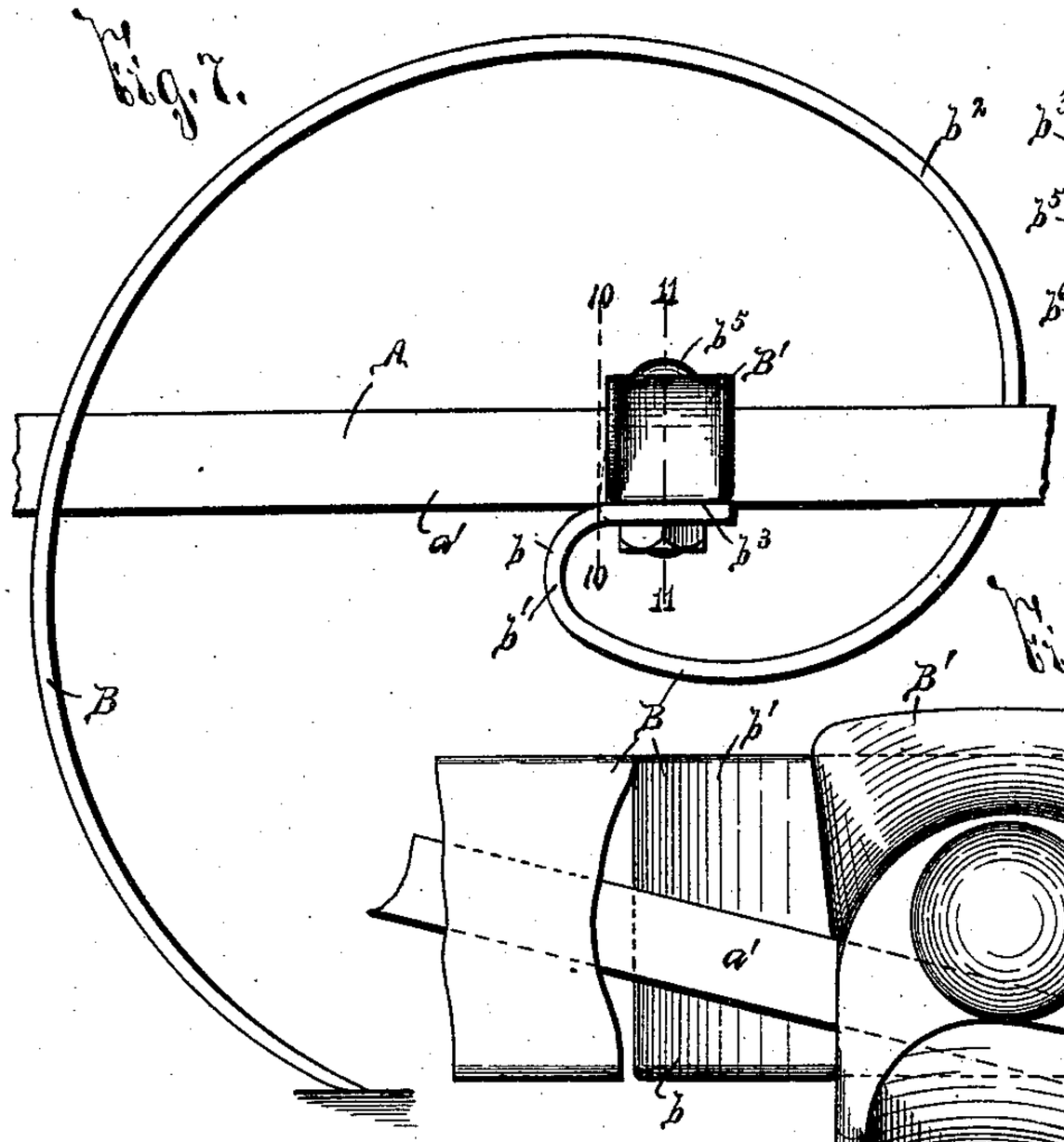


Fig. 9.

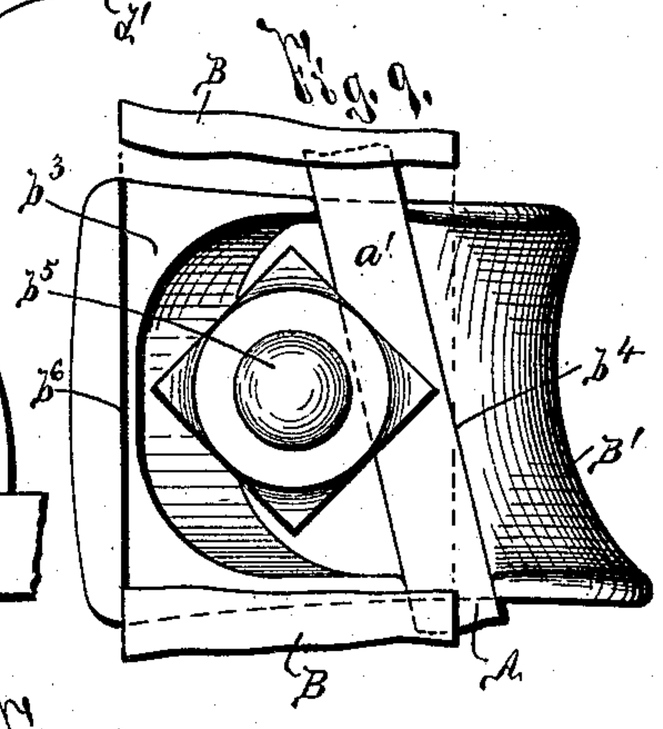


Fig. 8.

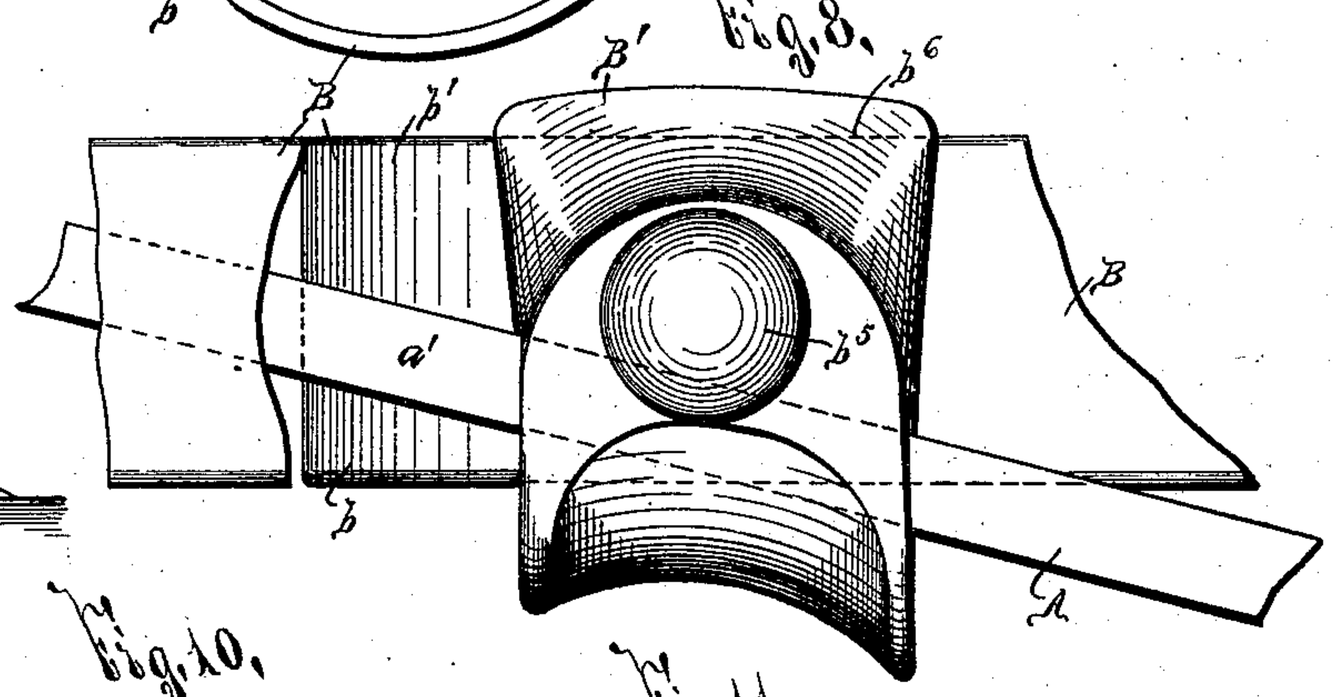


Fig. 10.

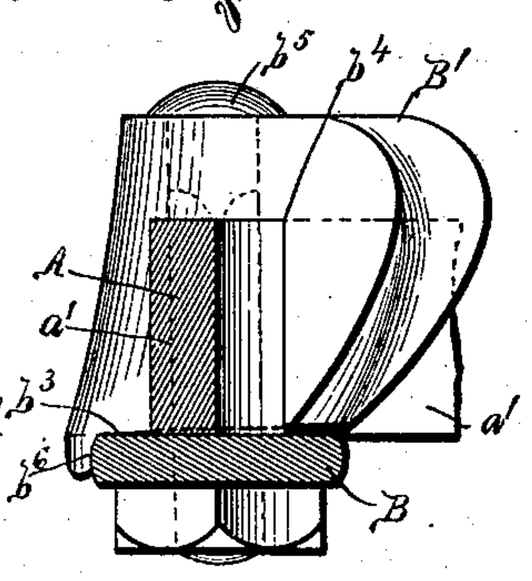
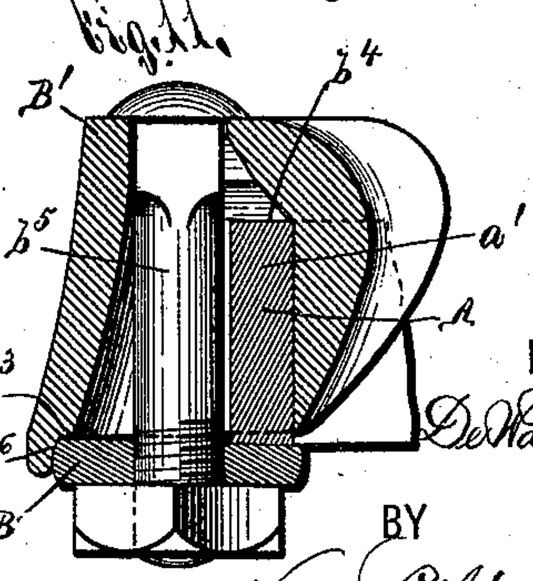


Fig. 11.



WITNESSES:

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H. E. Chase,

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DeWane B. Smith

BY

Hey Wilkinson & Parsons

ATTORNEYS.

UNITED STATES PATENT OFFICE.

DE WANE B. SMITH, OF DEERFIELD, NEW YORK, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE NATIONAL HARROW COMPANY, OF JERSEY CITY, NEW JERSEY.

HARROW.

SPECIFICATION forming part of Letters Patent No. 567,321, dated September 8, 1896.

Application filed November 14, 1890. Serial No. 371,411. (No model.)

To all whom it may concern:

Be it known that I, DE WANE B. SMITH, of Deerfield, in the county of Oneida, in the State of New York, have invented new and useful Improvements in Harrows, of which the following, taken in connection with the accompanying drawings, is a full, clear, and exact description.

My invention relates to improvements in harrows, and has for its object the production of a simple and effective gage adjustably secured to the harrow-frame for varying its height from the ground and the consequent depth of the cut; and to this end the invention consists, essentially, in a frame, harrow-teeth supported on said frame, and gages supported at the forward and rearward extremities of the frame.

The invention also consists in a gage-bar secured to a yielding support, and preferably the forward-bent extremity of the tooth, and inclining upwardly at its forward extremity for facilitating passage over stones, lumps, and other obstructions, and in the particular construction of clip for securing the gage-bar.

The invention furthermore consists in the construction of clip for securing the teeth to the frame and in the detail construction and arrangement of the parts, all as hereinafter more particularly described, and pointed out in the claims.

In describing this invention reference is had to the accompanying drawings, forming a part of the specification, in which like letters indicate corresponding parts in all the views.

Figure 1 represents an inverted plan view of my improved harrow. Fig. 2 is a sectional view showing a single harrow-tooth operatively secured to a portion of the frame, with the gage-bar also operatively mounted. Fig. 3 is an enlarged transverse sectional view on line $x\,x$, Fig. 2. Fig. 4 is an end view of the detached extremity of the gage-bar and one of the clip-plates operatively secured thereon. Figs. 5 and 6 are isometric perspectives of the detached clip-plates for securing the gage-bar in position. Fig. 7 is an enlarged side elevation of a portion of one of the frame-bars, the tooth-seat mounted thereon, and a harrow-tooth shown as secured by said tooth-seat to the frame-bar, the runner for the tooth being omitted in this figure. Fig. 8 is a top plan view of the tooth-securing clip mounted on a portion of a frame-bar, and a tooth, partly broken away, being shown as secured by the clip to the frame-bar. Fig. 9 is an inverted plan view of the tooth-socket, a portion of the frame-bar and tooth being shown by dotted lines. Fig. 10 is a transverse sectional view taken on line 10 10, Fig. 7; and Fig. 11 is a transverse sectional view taken on line 11 11, Fig. 7, representing the socket, frame-bar, and tooth in section.

As heretofore constructed harrows are either formed with floating or elevated frames. The frame for a floating-harrow rides upon the ground and gages the depth of the cut by the projection of the harrow digging-point beneath the frame, but in this case all stones, lumps, and other obstructions continually encounter the harrow and vary its position, create great friction, and produce undue wear and draft. On the other hand, in a harrow having an elevated frame great difficulty is experienced in practically and economically governing the depth of cut of the harrow-teeth, although the passage over obstructions is more readily effected without detrimental results.

In order to regulate the depth of the cut and to afford stability to an elevated harrow-frame, there have been devised several harrows in which a depressed bar is used at the front of the frame. This, however, does not effect the desired result, since there is more or less liability of the bar burying itself and defeating the purpose for which it was designed, and, even with the best results, the bar occasions a considerable amount of friction and draft.

My improved harrow is designed to possess all the advantages of the elevated-frame harrows with none of their disadvantages, and is so constructed as to enable the operator to readily and quickly govern the depth of cut to the desired extent and with a minimum amount of exertion.

A represents the harrow-frame, which may be of any desirable form, size, and construction, the one illustrated being that known as

a "steel" frame, which is composed of draft-bars a, disposed at an angle to the line of draft, and angularly-bent cross-bars a' between the draft-bars. The tooth B may also be of desirable form, size, and construction, but is here illustrated as having its forward extremity b bent into a loop b' beneath the harrow-frame and secured thereto by a clip or clamp B′ of suitable form, size, and construction. The opposite extremity b^2 of the tooth is bent backwardly and downwardly into a plane beneath that of the forward extremity. As illustrated, the clip B′ consists of a plate having a bearing or seat b^3 on its under face for the tooth and a second seat b^4 consisting of a socket extending inwardly from said lower face and disposed or extending at an angle to the former face b^3, whereby, although the harrow-bar is disposed angularly, the tooth is held parallel to the line of movement of the harrow. A bolt b^5 extends through the clip, and a nut on its lower face bears against the bottom face of the tooth extremity and secures the clip to the frame-bar and the tooth to the clip. In order to prevent the tooth from lateral movement, I provide on the lower face of the clip a shoulder b^6, which abuts against the edge of the tooth extremity and effects the desired object. As seen in the drawings, the lower face b^3 of the tooth-clip is tapered inwardly toward the seat b^4, and upon reference to Figs. 10 and 11 of the drawings it will be noted that the frame-bar projects slightly beyond the adjacent surface of said seat b^3 and causes the tooth to bear against the frame-bar and the outer edge of the seat b^3, and thus be more firmly held by the tension occasioned by tightly screwing down the nut on the bolt b^5. By this construction a single bolt suffices to hold the tooth-clip to the frame-bar and the tooth to the clip, and thus produces a simple, economical, and effective construction.

C represents the gage, secured to the frame with its lower extremity adjustable up and down beneath the frame for governing or regulating the depth of cut. This gage C may be of any desirable form, size, and construction capable of producing the desired result, but, as here illustrated, it is composed of spring metal and is yieldingly supported on the frame, being shown as secured to the upwardly-extending loop b^2 of the harrow-tooth, whereby, as said gage-bar is moved up or down on the loop, its lower extremity is raised or lowered and the depth of cut increased or decreased. By using a yielding gage the shock occasioned by contact with obstructions is greatly lessened and the wear upon the harrow materially decreased and its life lengthened. It will also be noted that the gage or bar C is inclined upwardly at its forward extremity. This upward inclination forms the same into a runner, which greatly reduces the friction developed during the movement of the harrow and enables the same to ride easily and with a minimum degree of jar over obstacles which would otherwise afford considerable resistance. Moreover, this upward inclination tends to constantly force the gage-bar to the top of the ground and prevents it from burying when used in mellow soil. It will also be noted that the gage engages the tooth intermediate its ends and is secured to a curved portion of the tooth which extends forward of the tooth-supporting bar and forward of the point, so that if the gage strikes an obstruction it will bend rearwardly and at the same time will positively elevate the point of the tooth, thus facilitating the passage of the tooth over the obstruction and decreasing the liability of breaking the tooth. The gage C is illustrated as secured to the forward bend of the harrow, but it is obvious that if desired it might be secured to the rearward free extremity. Experience has demonstrated, however, that the best result is produced by mounting the gage as shown, since its lower bearing extremity, when encountered by an object, moves upwardly and yieldingly supports the frame with a minimum amount of strain upon either the tooth or the frame, whereas if secured to the free extremity of the tooth there would be great liability of unduly wrenching or straining the same.

D represents the clip for securing the gage to the tooth. As illustrated, the clip consists of the separate plates d and d', one of which, d, is secured to the gage-bar by suitable rivets or bolts d^2. Formed upon the clip-plate d are shoulders d^3 and d^4, which abut against the opposite sides of the harrow-tooth and prevent lateral movement of the gage-bar. These shoulders d^3 and d^4 are preferably inclined slightly toward each other in order to permit of a tight draw of the tooth thereagainst when the opposite clip-plate d' is operatively engaged with the tooth. As best seen in Fig. 4, the upper and lower faces 1 and 2 of said clip-plate d diverge one from the other in order that the desired altitude may be given to the gage-bar. The shoulder d^3 is extended upwardly and provided with a lateral extension D′, to which the opposite clip-plate d' is hinged by means of a slot d^5, formed at one extremity thereof. The opposite extremities of the plates d and d' are drawn together by a suitable clamp or bolt d^6, as best seen in Fig. 3. As the bolt d^6 draws these extremities together the opposite extremity of the plate d' bears against the under face of the lateral projections D′ and the inner shoulder d^7 of the slot d^5 bears against the inclined shoulder d^3 and a very tight impingement is effected. The outer face d^8 of the slot d^5 is rounded at its upper extremity and provided at its lower extremity with a corner d^9, which, when desired to remove the upper clip-plate d', is registered with the corner d^{10} of the lateral projection D′ on the shoulder d^3. As illustrated in Fig. 1, I prefer to use these gage-bars at the forward and rearward extremities of the harrow-frame and use only

such a number of them as is sufficient to support the harrow. Only eight of these gages are shown at Fig. 1, and when required to vary the depth of cut the operator is obliged to vary only eight gage-bars instead of varying every tooth, as is the case with the ordinary harrow. The position of the gage-bar is readily adjusted by placing the frame right side up on the floor or other level support, then loosening the bolt d^6 until the clip can be moved along the loop b^2 of the harrow-tooth, whereupon by measuring the distance between the lower extremity of the gage-bar and the floor each bar may be adjusted the same height, and be then firmly held in position upon tightening the bolt d^6. On the contrary, in order to adjust the cut of an ordinary harrow having adjustable teeth, it is necessary that the tooth be mounted on an adjustable seat or be adjustably mounted in a stationary seat, which requires an adjustment for each tooth, necessitating additional expense. Moreover, it is with great difficulty that each tooth can be adjusted to the same cut, owing to their number and their independent fastenings.

It is also obvious that with my improved harrow the teeth may be readily and cheaply secured to the harrow-frame, and, owing to the great adjustment permitted with the use of a gage-bar mounted on the forward loop of the tooth, a great amount of the tooth can be used.

The operation of my invention will be readily perceived from the foregoing description and upon reference to the drawings, and it will be understood that I greatly enhance the durability and effectiveness of the harrow, render its construction more simple, economical, and its operation more practical and easy. It will be evident, however, that the detail construction and arrangement of the parts of my invention may be somewhat varied from that shown and described. Hence I do not limit myself to its precise form and construction.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination with the spring harrow-tooth having a curved portion between its support and its point, extending forward of its support and point, of a gage secured to said forwardly-extending portion of the tooth said gage extending downwardly from said portion for regulating the depth of the tooth whereby a rearward pressure upon said gage will elevate the tooth-point, substantially as described.

2. In a harrow the combination with the frame-bar and tooth of a clip having a seat for the tooth, a recess extending into the base of the tooth-seat for receiving the frame-bar, said recess being of less depth than the width of the frame-bar, and a bolt for drawing said tooth into its seat and into engagement with an edge of the frame-bar, and clamping said parts together, substantially as described.

3. The combination with a spring harrow-tooth having a flexible portion between its support and its point extending forward of its support and point, of a downwardly-extending gage secured to said flexible portion of the tooth, whereby pressure upon said gage will bend said tooth and elevate the point thereof, substantially as described.

In testimony whereof I have hereunto signed my name, in the presence of two attesting witnesses, at Utica, in the county of Oneida, in the State of New York, this 18th day of October, 1890.

DE WANE B. SMITH.

Witnesses:
M. V. B. McGRAW,
GEO. S. HUGHES.