(No Model.) 4 Sheets—Sheet 1.

B. C. CONVERSE.

HARROW.

No. 346,895. Patented Aug. 10, 1886.

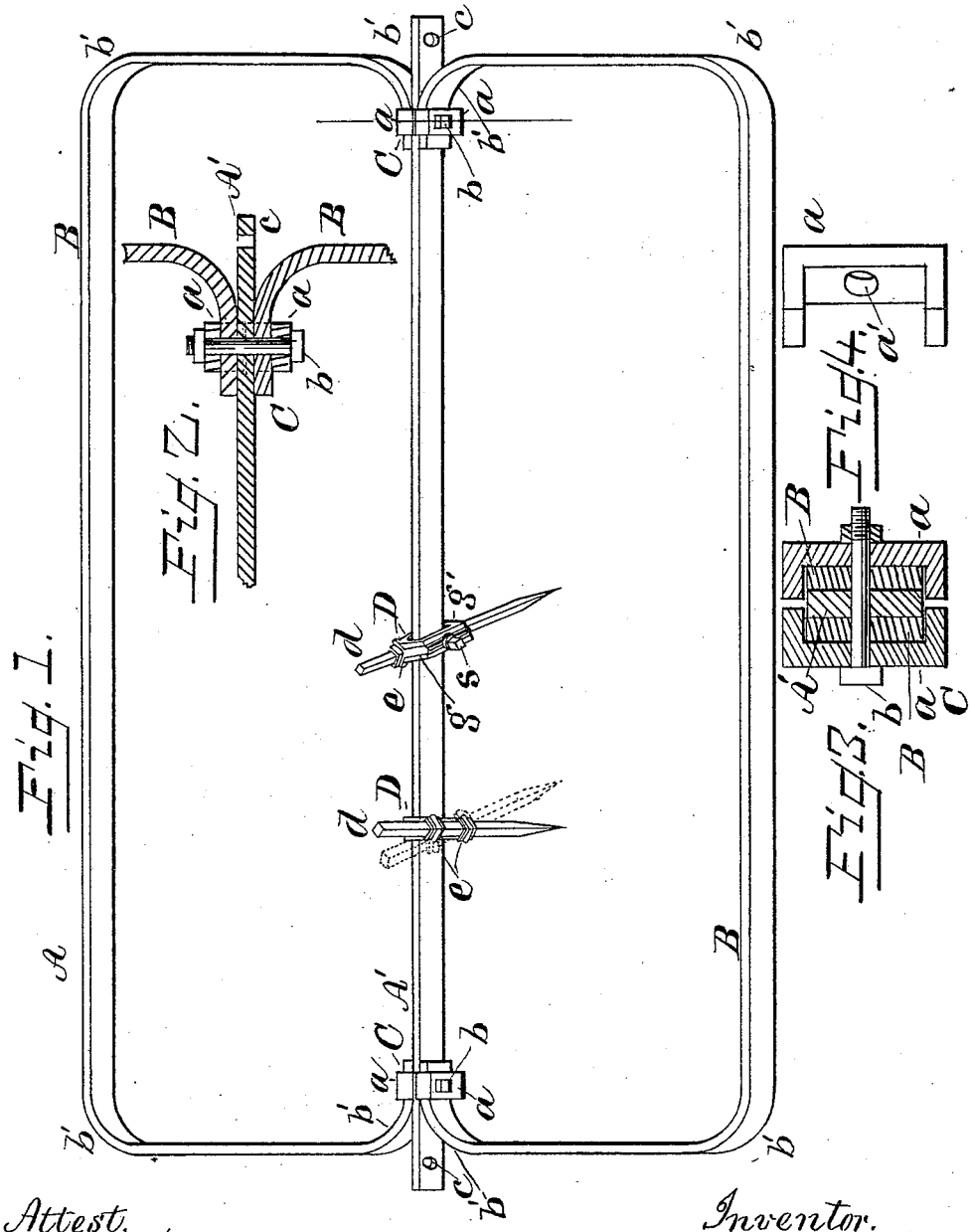

Fig. 1.

Fig. 2.

Fig. 4.

Fig. 3.

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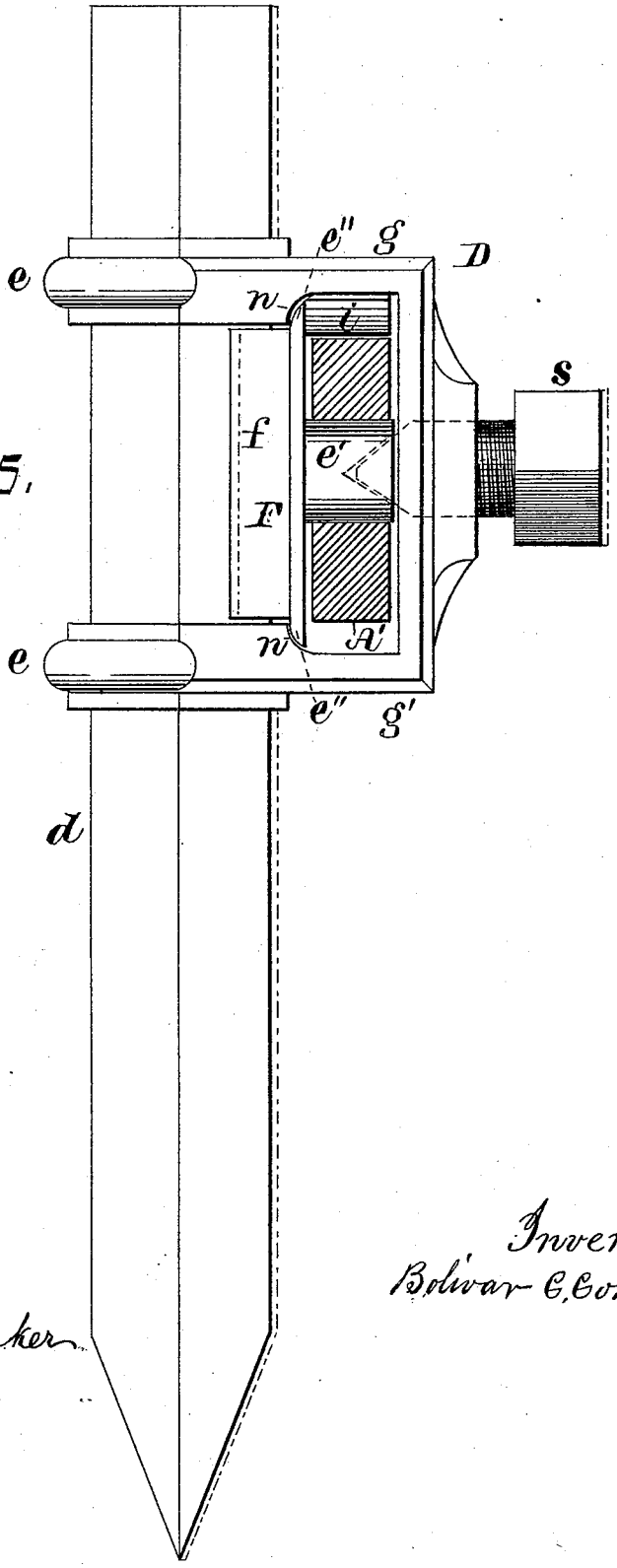
Fig. 5.



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B. C. CONVERSE.

HARROW.

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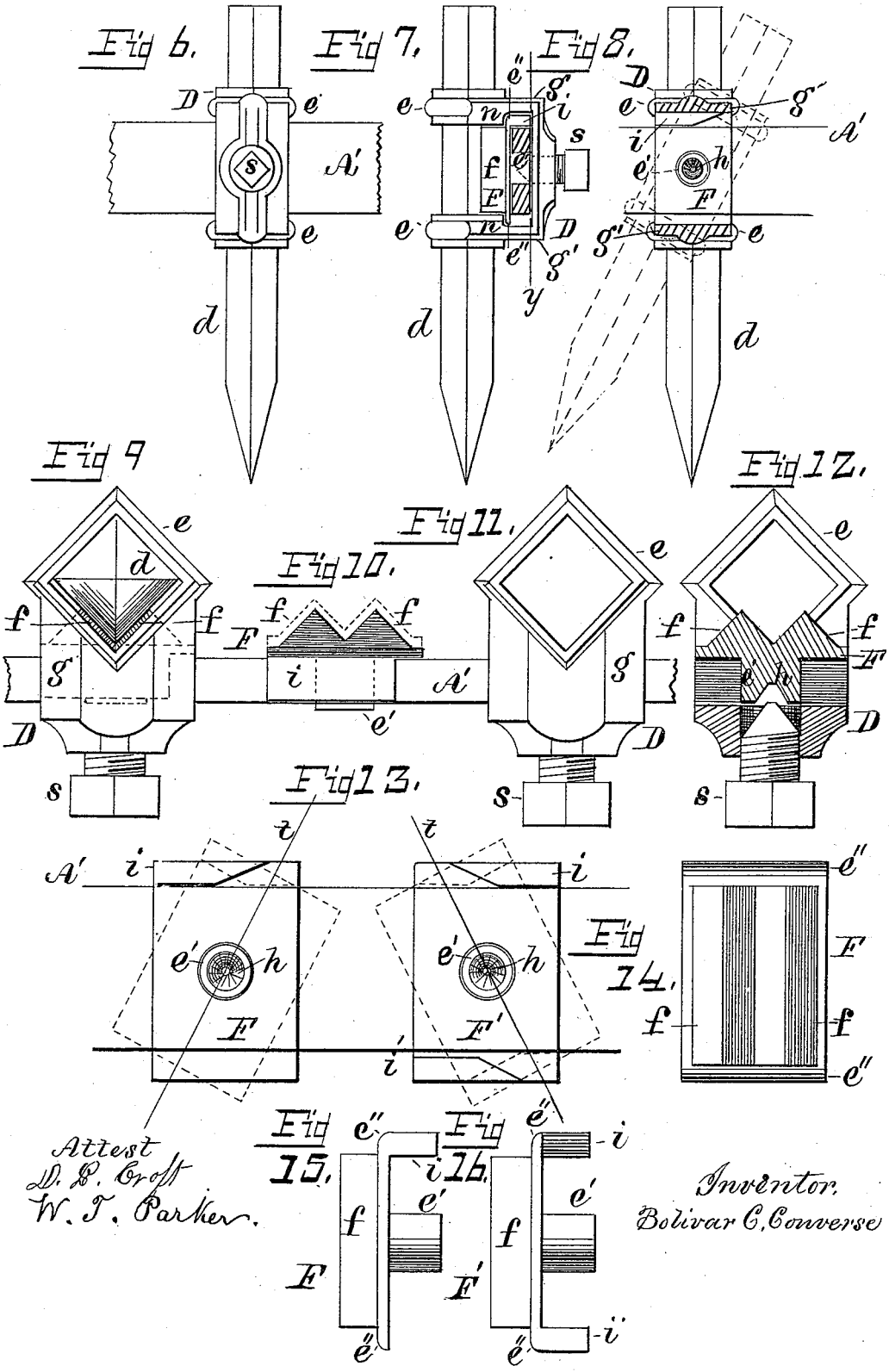

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B. C. CONVERSE.

HARROW.

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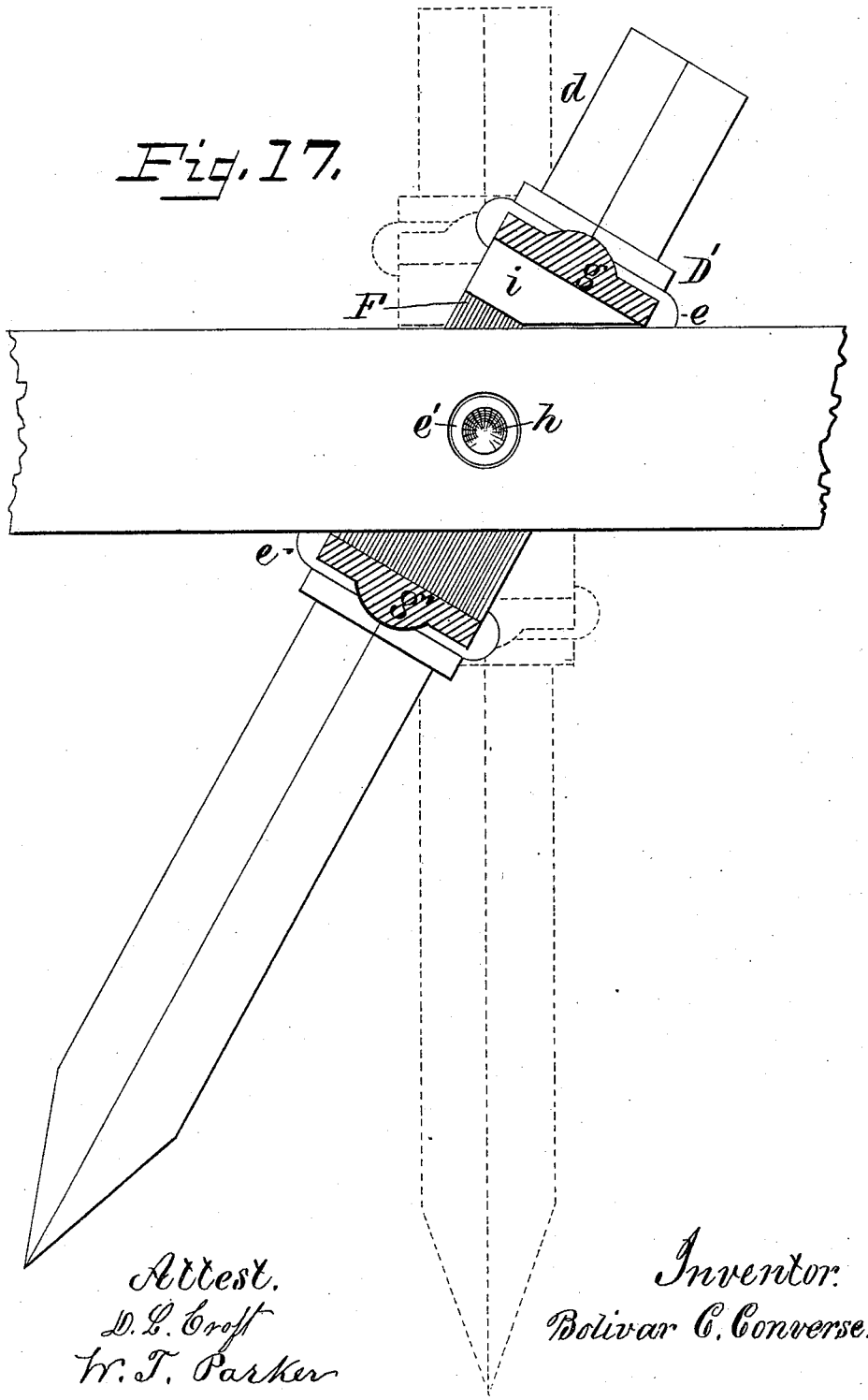
Fig. 17.



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UNITED STATES PATENT OFFICE.

BOLIVAR C. CONVERSE, OF SPRINGFIELD, OHIO.

HARROW.

SPECIFICATION forming part of Letters Patent No. 346,895, dated August 10, 1886.

Application filed February 23, 1886. Serial No. 192,864. (No model.)

To all whom it may concern:

Be it known that I, BOLIVAR C. CONVERSE, a citizen of the United States, residing at Springfield, in the county of Clark and State of Ohio, have invented certain new and useful Improvements in Harrows; and I do 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, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

My invention relates to improvements in harrows, as described in the specification and more particularly pointed out in the claims.

My invention embraces, first, improvement in the frame; second, in the tooth-holder, the method of attaching it to the frame or beams of the latter, its adjustment, and operation.

My improvement in the frame is particularly applicable to harrow-frames constructed in sections. It can, however, be readily applied to harrows which are made with a single frame.

To illustrate my improvement in harrow-frames a single section with three beams is shown. The section described may be duplicated wholly or in part at will.

Figure 1, Sheet 1, is a perspective view of a section of a harrow-frame with my improvement embodied therein. It also shows two of my improved tooth-holders attached thereto. The teeth are represented as being upon opposite sides of the beam. Fig. 2 is a horizontal longitudinal section of the frame through the part where the bars are clamped together. Fig. 3 is a cross-section through the same on line *x*, Fig. 1. Fig. 4 is a perspective view of one section of the clamp or clip by which the frame is fastened together. Fig. 5, Sheet 2, is a side elevation of the harrow-tooth holder with its inclosed tooth, a cross-section of the beam being shown also. Fig. 6, Sheet 3, is a view in elevation of the tooth-holder and tooth with a portion of the beam as seen from the adjusting side of the tooth-holder. Fig. 7 is a side elevation of the same, this view showing the reverse edge of the locking-plate of the tooth-holder from that seen in the enlarged view, Fig. 5. Fig. 8 is a vertical section through line *y*, Fig. 7. It also shows the inclination of the tooth in dotted lines. Fig. 9 is a top view of the tooth-holder with its inclosed tooth in position on a portion of a harrow-beam. Figs. 10 and 11 represent top views of the two sections of the tooth-holder, the first is the locking-plate, shown as attached to the beam, and the last is the frame of the tooth-holder which is drawn over the locking-plate before inserting the tooth therein. Fig. 12 is a horizontal section through the center of the tooth-holder. Fig. 13 shows two views of the locking-plate. In both views the plate is seen from the rear or pivot side. One of the plates is intended for one side of the beam and the other for the opposite side. The parallel lines, drawn horizontally across these two plates, represent the upper and lower lines of one of the harrow-beams. The dotted lines indicate the movements of the plates, which are seen to be in reverse directions, which shows that when placed on opposite sides of the beam the movement of both would be in the same direction. The lines *t*, drawn through the center of each plate, represent the line of a tooth when attached. Fig. 14 is a front or face view of the locking-plate, this being the engaging side with relation to the tooth. Figs. 15 and 16 are opposite edge views of the two plates seen in Fig. 13. Fig. 17 is a view of the tooth inclined. The tooth-holder frame is seen in vertical section.

A is the harrow frame or section. It is in the form of an oblong square. It is constructed of ordinary flat bar-iron. All the angles are curved.

A′ is a straight bar, which forms the central beam of the section and extends from end to end. The two side beams, B, are each bent to form the ends as well as the sides of the frame, the ends being at right angles with the sides. A radius of about three and one-half inches is preferably used for the curved angles *b′ b′*. The object in thus forming the bars B B of the frame is to obviate danger of breaking or cracking the bar, (which, if bent at a true right angle, would take place,) to allow the bar to be shaped in a cold state, and to add to the strength of the frame, which is admitted to be greater with curved angles. From

the ends of the frame bars B B have their ends again bent inward toward each other, extending parallel with the central bar, A′, upon which they lap a sufficient distance to allow them to be inclosed with said central bar, A′, by the clamps C C. These clamps consist of two right-angled sections of ⌊⌋ shape, with a central hole, *a′*, in each, as seen at *a a* in Figs. 1, 2, 3, and 4. These two sections *a a* are made to fit closely over the three frame-bars B B and A′ from each side, a little space being left between the ends of the two sections of the clamp, which lap onto the middle bar, A′, but do not touch each other. These clamps or clip-irons are drawn tightly over the united bars by a bolt, *b*, extending through the two sections and the inclosed ends of the bars and secured by a nut. The clip-irons are of heavy wrought-iron preferably, and the frame is firm and strong, and, as seen by the views and particularly by the views Figs. 2 and 3, it is much stronger than a right-angled frame of the usual construction and of like weight of material. The frame is stiff and free from deflection in the middle, as the lapped ends of bars B on either side of bar A′, in connection with the clip C and its fastening-bolt, tend to render this part of the frame even stronger than the sides. The ends of the middle bar, A′, extend beyond the line of the frame ends, and are pierced with holes *c*, for a hitching-point at each end of the harrow-section. The frame A is secured together before the tooth-holders D D are attached to it. These latter are necessarily made in two parts, the object being to allow them to be easily attached to or detached from the frame, which latter being inclosed at the ends the tooth-holders could not be applied thereto when constructed of a single piece (with a horizontal opening for the beam and a vertical opening for the tooth) without taking the frame to pieces, nor could either one of them be removed in case of being broken for the same reason, and the removal of one tooth-holder having its frame in a single piece would require the removal of others adjacent to or on either side of it. The tooth-holder is made in two separable parts or sections, one part being nearly a rectangular frame with one side open to allow it to be placed sidewise astride the beam and the ends formed into bands to receive the tooth. The other part of the tooth-holder consists of a locking-plate fitting into the open frame behind the tooth, and formed with prism-like ledges straddling the latter on the engaging or face side of the locking-plate. On the opposite side, and extending centrally therefrom through the beam, is a stud, which latter is engaged by a set-screw to lock the plate against the tooth.

D is the tooth-holder, constructed of the frame D′, open on one side to allow it to straddle the beam A′ from one side of the latter, and having its two ends formed into bands *e e*, with the openings of said bands registering one with the other to receive the tooth *d*, inserted therein, as seen in the figures. The opening in the tooth-holder frame, as seen in Figs. 5 and 7, is much longer behind the bands *e e* than the vertical width of the beam A′, and longer than the space between the bands, leaving shoulders *n n* at the top and bottom of the opening. Within this opening, and in juxtaposition with the tooth *d*, is the locking-plate F, (seen in Figs. 5, 7, 8, 9, and 12,) and separate from the frame D′ in Figs. 10, 13, 14, 15, and 16. This plate as viewed from front and rear is of an oblong square form with two long vertical and triangular or prism-like shaped ledges *f f* on its front or engaging side. These two ledges extend forward from the flat body portion between the bands *e e* and straddle the tooth *d*. The ends *e″ e″* of the plate F, above and below the ledges *f f*, are slightly rounded to conform to the shape of the inner shoulders, *n n*, of the frame D. At the top the plate F has a flat lug, *i*, extending horizontally over the top of beam A′ at right angles with the body of the plate. This lug is integral with the plate F, and serves to retain the tooth-holder in a vertical position when the harrow-frame (seen in Fig. 1) is drawn to the right, and also in Fig. 8, supposing the beam A′ to be drawn toward the left. The upper and under surfaces of the lug *i* are horizontal and parallel, the former fitting in the top of the frame-opening and the latter lying on the beam.

To allow the tooth-holder frame to swing upon its pivot *e′*, the lug *i* is nearly one-half cut away to allow the tooth-holder frame D′ to swing to an angle sufficient for the upper and lower bars, *g* and *g′*, respectively, to touch the beam A′ on opposite sides of the holder at the same time when the tooth is inclined, said bars forming the stops to arrest the movement. The cut across the lug *i* is made diagonally through, as seen in the several figures. In plate F′ an additional lug, *i′*, on the lower end, as seen in Fig. 13, may be used where greater strength is required in the tooth-holder, as in stumpy ground, when the harrow-teeth are operated vertically. The stud *e′* is, however, made strong enough, in combination with lug *i*, to resist all ordinary strain in operating the harrow. It will be noticed by reference to Fig. 10, and in the dotted lines, Fig. 9, that the stud *e′* is longer than the thickness of the harrow-beam, allowing for the requisite amount of adjustment in forcing plate F forward against the tooth *d*, as seen in Figs. 5, 7, and 9, the dotted lines in Fig. 5 indicating the movement of the plate F, the tooth, and the adjusting-screw.

To preserve the proper relation between the screw *s* and the stud *e′*, pivoting the locking-plate to the beam, the stud *e′* is provided with a conical hole, *h*, drilled centrally and longitudinally into its end. The end of screw *s* engaging stud *e′* is made conical to fit hole *h*. By this construction the stud and screw are kept directly in line, allowing the latter when driven forward to force the plate F against

the tooth and to firmly clamp it between the ledges *f f* and the bands *e*. This movement frees the plate from contact with the beam, thus preventing undue friction and giving ease to the tooth in reversing its operation, and, as the conical end of screw *s* enters some distance into the stud *e'*, the screw takes up a portion of the shock and strain thrown upon the stud in the operation of the harrow.

I claim as my invention—

1. As an article of manufacture, a harrow frame or section consisting of a straight middle longitudinal beam, a beam on either side of said middle beam having its respective ends bent toward the latter to form the ends of the frame or section, and again bent inward toward each other parallel with said middle beam, lapping thereon, and secured thereto by clips, said middle beam extending beyond each end of the frame or section, and provided at its respective ends with a hole for a hitching-point to allow the frame or section to be drawn in either direction.

2. In a harrow, a frame rectangular in form, each side beam and one-half of the respective ends of said frame being formed of a single bar, the ends of said bar being bent inward at the middle line of the frame, and lapped upon a central longitudinal beam and secured thereto.

3. A harrow frame or section composed of a straight central longitudinal beam and the two side beams, each of the latter being bent to form the ends of said frame or section, the respective ends of each bar forming said side beams and ends, being bent inward toward each other and lapped upon an intermediate central bar, and secured to the latter by a two-part clip and a nutted bolt.

4. In a harrow-frame, the combination of the bars B and B, each forming a side beam, and one-half of each end of the harrow frame or section, and having inner curved angles next to the intermediate central bar, A', and the clips C, encircling the three bars at their points of union, and having a bolt and nut securing said clips and the bars together.

5. A harrow-frame consisting of angularly-bent and straight bars, said bent bars being turned inwardly and lapped upon the straight bar or bars, and secured thereto by overlapping clips and bolts, as set forth.

6. In a harrow, a frame having a straight central longitudinal beam, side bars or beams parallel with the latter, bent to form the ends of said frame, and having the respective ends of each side bar turned inwardly from said frame ends in a line parallel with the sides of said frame, and lapped onto the central or intermediate beam, and secured thereto by overlapping clips and bolts, as set forth.

7. In a harrow-frame, a straight central bar extending from end to end, a side bar on either side of said central bar and parallel therewith, said side bars being bent at an angle to the same to form the ends of said frame, and having their opposite ends bent inward toward each other along said central bar, and secured to the latter, the angles of said frame being circular or curved to allow of the bars being bent cold to avoid breaking, and to impart greater strength to said frame, as set forth.

8. In a harrow-frame, a straight central longitudinal bar, side bars of rectangular form on either side of the latter, each bent from a single bar, and having their ends lapped onto said central longitudinal bar, a two-part clip-iron, each section of which extending over the side bar and lapping onto said central bar incloses and secures said bars together, and a nutted bolt passing through said clip-iron and the trio of frame-bars, substantially as set forth.

9. In a harrow-frame, the central bar, A', and the bent side bars, B B, having their ends curved inward and lapped upon said central bar, in combination with the two-part clip or clamp, clamping the trio of bars together, and a nutted bolt extending through said clip and the inclosed frame-bars, whereby the deflection of any one of the latter from the plane of the frame is prevented.

10. In a harrow, a detachable tooth-holder having bands with vertical openings to receive the tooth, a locking-plate pivoted to the beam in rear of the latter, and an adjusting-screw engaging said locking-plate to force it forward, and thereby clamp the tooth.

11. In a harrow, a tooth-holder having an open frame, vertical openings in the ends of the latter above and below the beam to receive the tooth, a locking-plate in rear of the latter having a groove registering with said openings and engaging said tooth between the end bands of said tooth-holder frame, said locking-plate being pivoted to the harrow-beam, and an adjusting-screw engaging the pivotal stud of said locking-plate, whereby the latter is forced forward, and the tooth is thereby clamped between said plate and the inner front angles of the bands of said tooth-holder.

12. In a harrow, a tooth-holder in two sections having parallel bands with vertical openings to receive the tooth, a locking-plate in rear of the latter pivotally attached to the beam and straddling said tooth, and an adjusting-screw engaging the pivotal stud of said locking-plate, whereby said tooth is clamped in the holder and the locking-plate is freed from frictional contact with the harrow-beam.

13. In a harrow, a detachable tooth-holder, consisting of a frame open on one side to allow it to straddle the beam, vertical and parallel openings in its ends to receive the tooth, a pivoted plate having prism-shaped ledges straddling the latter, and an adjusting-screw engaging the pivotal stud of said pivoted plate to force the latter against the tooth, and thereby secure it in the tooth-holder.

14. In a harrow, a tooth-holder having one section pivoted to the harrow-beam, another section straddling the latter and inclosing the pivoted section, and an adjusting-screw extending through the inclosing-section and engaging the pivotal stud of the pivoted section,

whereby the latter is forced against the tooth and the latter secured in the tooth-holder.

15. In a harrow, a tooth-holder in two separable sections, one section being axially pivoted to the beam and the other section inclosing the beam and the pivoted section, and having bands to inclose the tooth with vertical and parallel openings, and an adjusting-screw engaging the axial stud of the pivoted section to fasten the tooth in the holder.

16. In a harrow, a detachable tooth-holder in two separable sections, one section consisting of a plate first pivotally attached to the harrow-beam, and having a right-angled lug resting on the latter, whereby said tooth-holder is held in a vertical position, and the other section consisting of a frame open on one side to allow it to straddle the beam from one side of the latter, whereby it may be slipped over and connected with said pivoted section, for the purpose set forth.

17. In a harrow-tooth holder, the combination of a tooth-holder frame open on one side, with parallel bands to receive the tooth, a longitudinally-grooved plate adapted to engage said tooth, between said bands a central stud pivoting said plate to the beam of the harrow provided with a central conical hole, and an adjusting-screw having a conical end engaging the latter, as and for the purpose set forth.

18. In a harrow, a frame closed at the ends and sides, in combination with a detachable tooth-holder having a pivoted section adapted to be first attached to the harrow-beam, and a frame-section open on one side to allow it to be slipped sidewise over the beam to connect it with the pivoted section.

19. In a harrow-tooth holder, a separable pivoted plate having an overlapping lug on each end above and below the harrow-beam.

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

BOLIVAR C. CONVERSE.

Witnesses:
S. W. RAY,
H. S. SHOWERS.