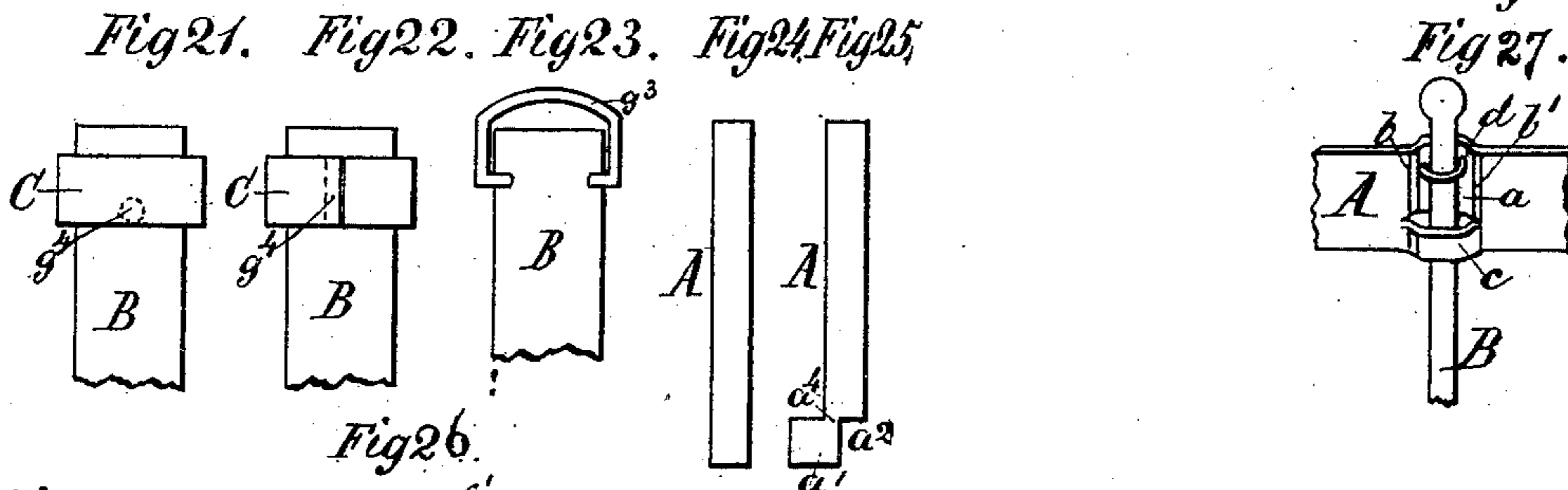
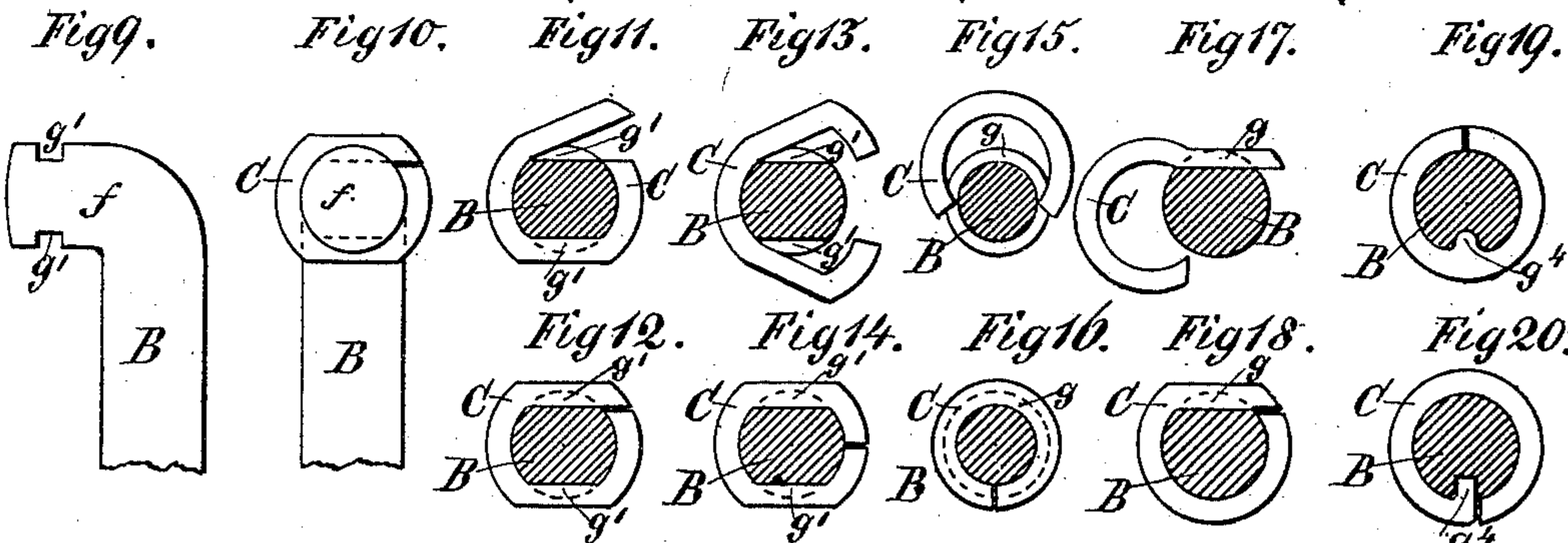
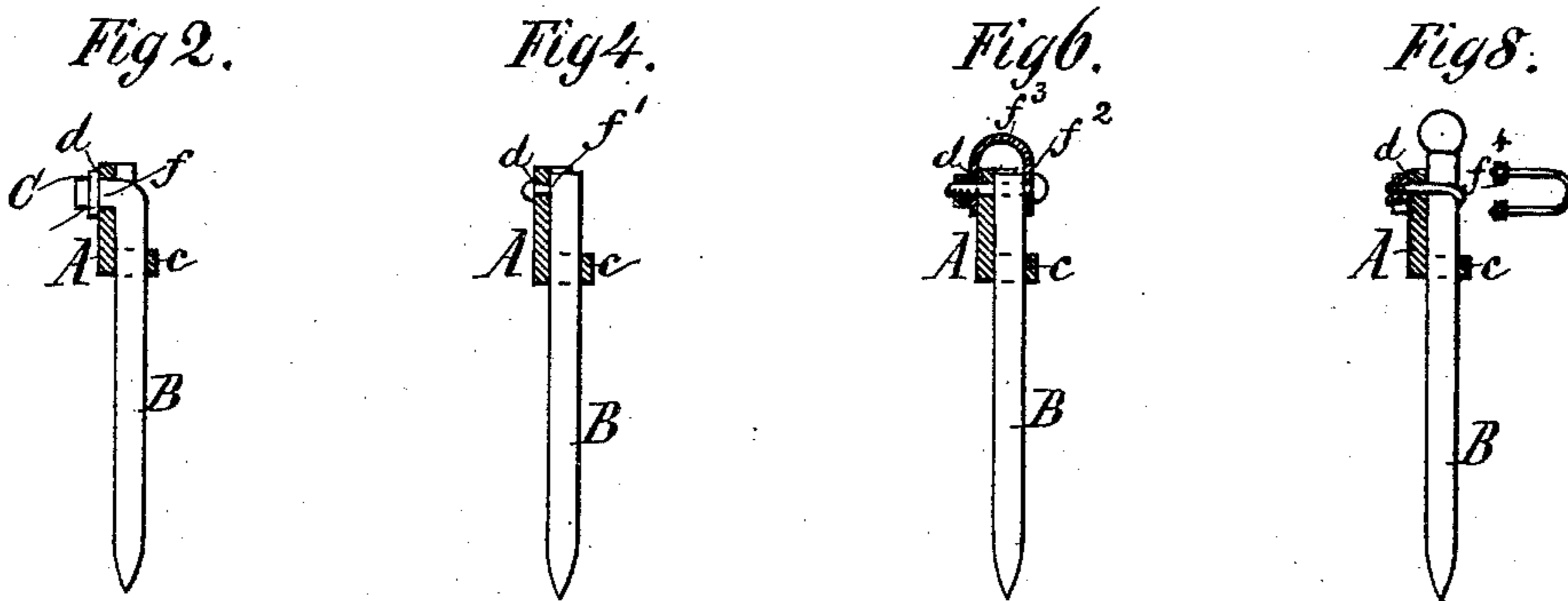
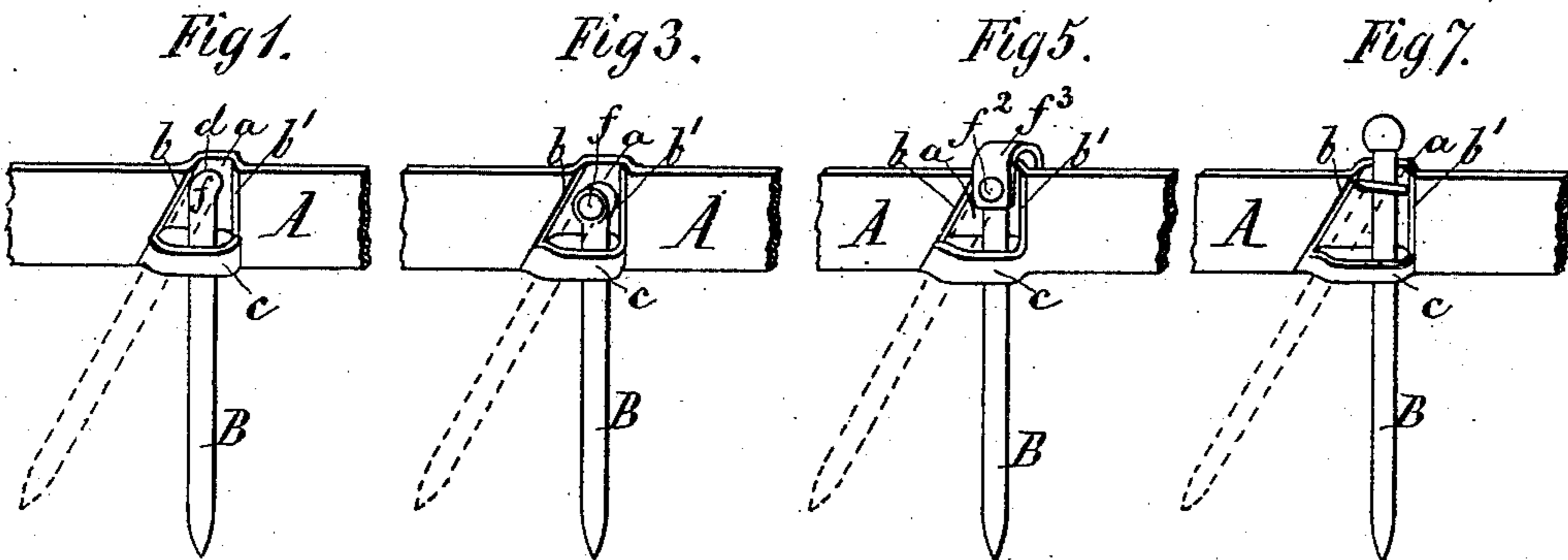


J. H. BARLEY.

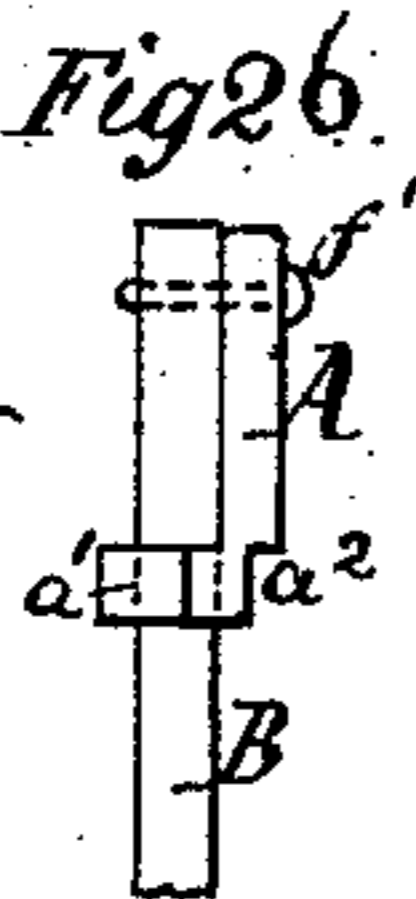
HARROW.

No. 360,407.

Patented Apr. 5, 1887.



Witnesses:
Robt. S. Fenwick.
Henry J. Rogers.



Inventor:
James H. Barley
by his Atty.
Mason, Fenwick & Lamme

(No Model.)

J. H. BARLEY.

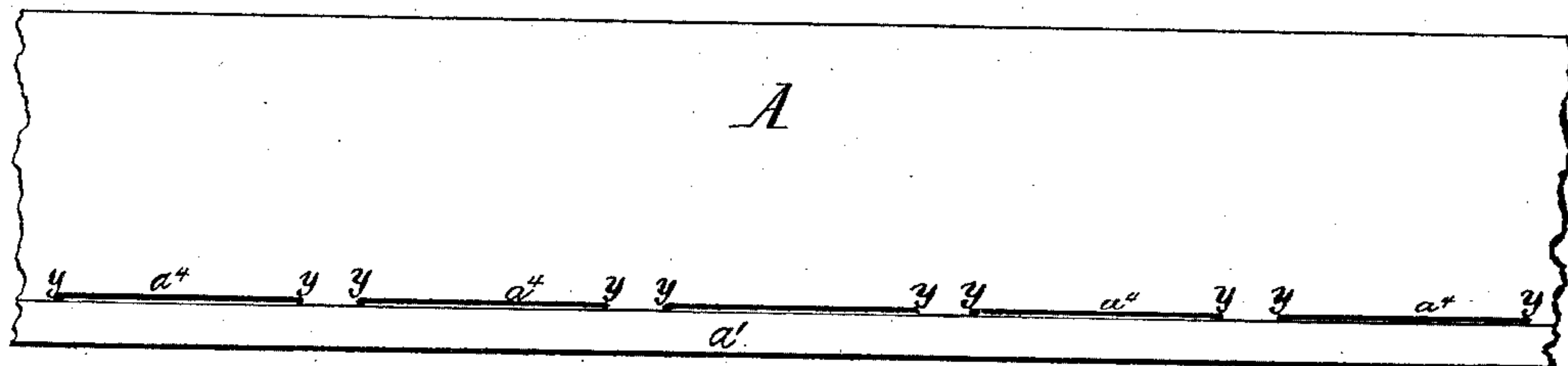
2 Sheets—Sheet 2.

HARROW.

No. 360,407.

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Fig 28.



Witnesses:

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UNITED STATES PATENT OFFICE.

JAMES H. BARLEY, OF SEDALIA, MISSOURI.

HARROW.

SPECIFICATION forming part of Letters Patent No. 360,407, dated April 5, 1887.

Application filed October 30, 1886. Serial No. 217,586. (No model.)

To all whom it may concern:

Be it known that I, JAMES H. BARLEY, a citizen of the United States, residing at Sedalia, in the county of Pettis and State of Missouri, 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 the tooth-supporting wrought-metal frame bars or rails and the teeth of field drag-harrows patented to me under Letters Patent No. 326,704; and it consists in certain novel constructions and combinations of parts, as will be hereinafter described, and pointed out in the claims.

In the accompanying drawings, by Figures 1, 2, and 3 up to Fig. 27, I have illustrated my invention in various forms and combinations, and shall, in order to avoid repetition and prolixity, refer specifically to each of the several views in the body of the specification, setting forth the construction of the parts. Fig. 28 shows an enlarged view of a section of frame-bar.

A in the drawings designates a portion of a wrought-iron harrow-frame having the main novel feature of my invention formed on it integral therewith, said feature of invention comprising a tooth-seat flared, preferably, downwardly, forming a depression, *a*, stop or controlling shoulders *b b'*, bottom bridge or loop, *c*, and a pivot-aperture, *d*, the same being produced, mainly, by either a forging, rolling, swaging, or other analogous process, in contradistinction to a casting process, thus furnishing much lighter, stronger, and more enduring harrow-frame bars or rails with integral seats for harrow-teeth, and affording a means for confining and staying the harrow-teeth in any position at which they may adjust themselves, or are set for use—that is, holding them either vertical with or oblique to the horizon.

B is a harrow-tooth, either elliptical, round, or polygonal in cross-section and provided with a suitable pivotal connection, *f*, at its upper end. In Fig. 1 the pivotal connection *f* is formed directly on the tooth at right angles to the body thereof, and the end of this con-

nection is formed with notches *g'*, as shown in Figs. 9 and 11, and is passed through the punched or drilled pivot-aperture *d* near the top of the frame bar or rail A, and has a detachable clamp-head, C, formed of a ductile, malleable, flexible, or other analogous metal, applied around its notched portion. By thus constructing the tooth and providing it with a detachable clamp-head, and combining it with the frame bar or rail A, formed with the tooth-seat depression *a*, or with any other construction of frame-bar, it can adjust itself to an angle or inclination with respect to the horizon or bottom of the harrow-frame. The clamping collar or head C, by being bent or otherwise properly applied around the notched portion of the pivot end of the tooth, fastens the tooth removably and adjustably upon the harrow-frame bars or rails without interfering, when desired, with its freedom to articulate on the pivot-connection *f*.

In Figs. 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, and 23 I have shown various ways in which the detachable, ductile, malleable, flexible, or other suitable metal clamp-head C may be applied to the upper end of the harrow-tooth, and by Figs. 24 and 25 I have illustrated the shapes of the metal bars from which the constructions shown in Figs. 1 to 8, inclusive, may be most readily produced by the forging, swaging, rolling, or other analogous process, and by Fig. 25 the shape of the bar is shown from which the construction, Fig. 26, can be best produced.

In Figs. 3 and 4 an illustration is given showing that the horizontal upper end of the tooth may be dispensed with, and that the tooth may be straight up and down, perforated at its upper end, and provided with a horizontal pivot-rivet, *f'*, passed loosely through the tooth, tightly through pivot-aperture *d*, and riveted.

In Figs. 5 and 6 an illustration is given showing that instead of the rivet *f'* (shown in Figs. 3 and 4) a pivot screw-bolt, *f''*, with nut, and a yoke-shaped spring nut-binding washer, *f'''*, may be employed, and in Figs. 7, 8, and 27 an illustration is given showing that the pivot, screw-bolt, nut, and washer may be dispensed with, and a U-shaped pivot clamp-bolt, *f''''*, with two nuts, may be used, and that with this construction, Fig. 7 and 8, the tooth may be set higher or lower on the bars or rails A,

turned or swung forward or back, and clamped tight at any desired inclination or in a vertical position, as circumstances require. In Fig. 27 the tooth cannot be set at an inclination with respect to the horizon, because the tooth-seat is not made flaring; but it can be set up or down and clamped securely.

In the views running from Figs. 12 to 23 it will be seen that the harrow-tooth has either a neck, notch, notches, groove, or depression, g , equivalent to the notches g' , (shown in Figs. 2, 9, 10, and 11,) and that the detachable clamp-head C (shown in Fig. 2) is constructed to suit the slight variation in the forms of the depressions g g' of the teeth. The neck, notch, notches, groove, or depressions g g' may be formed by any suitable means—such as, for instance, a milling saw or saws, or wheel or wheels, or by chisel-edge die and clamp, or by swaging.

In Fig. 23 an arched or cap-shaped clamp-head, g^3 , is sprung over the top of the tooth and fastened into two notches formed in its periphery near its top.

In Figs. 19 and 20 the clamp-head C is formed with a dowel projection, g^4 , on its inner circumference, which enters a corresponding recess in the tooth, and in Figs. 21 and 22 the dowel projection is made oblong and with rectangular sides.

In Figs. 15 and 16 the depression g is in the form of an annular groove very similar to the neck in Fig. 16, and the forms shown in the other views, being readily understood from the drawings, need not be described particularly.

Referring to the bars A used in the construction of the harrow-frame, it will be understood that the preferable form of the bar to be employed is medium thick bar-plate, or thick sheet metal having two plain or flat surfaces, as illustrated in Fig. 24. This metal can be slitted, so as to free the metal above the top edge of the loop, and upon it can be swaged or otherwise similarly formed the loops c , harrow-tooth seat-depressions a , and lateral stop-shoulders b b' ; and the harrow-bar when thus formed with loops c , seat-depressions, and shoulders will present a corrugated construction, as illustrated in Figs. 1, 2, 3, 4, 5, 6, 7, 8, and 27, which construction, while the bar is light, renders it very strong. I however propose, as an equivalent of my harrow-bar, formed as shown in said figures, to first make the metal from which the improved harrow-bars are produced with a projecting bottom rib, a' , and thereafter to form a bridge or loop, c , as follows: The bar A, Figs. 25 and 26, is rolled with the projection or rib a' , rabbets a^2 , and thin portion a^4 , and this bar is slitted at intervals, as indicated at y , Fig. 28, same as in Fig. 1, and the portions of metal below the slits, and of the length of the slits, are then set out horizontally by any of the ordinary processes of swaging or other analogous forging operations, thereby forming loops on the lower edge of the harrow-bar similar in char-

acter, but differing slightly in form, to the loops shown in Fig. 1. As the metal bars are made thin at a^4 , these thin portions can be very easily slitted or cut through for the purpose of making the loops c , and by slitting the bars they can have the loops swaged upon them with comparatively slight force. These bars, thus formed and provided with loops, are not shown with lateral shoulders and harrow-teeth seat-depressions above the loops; but they might be formed not only with side projecting loops at their lower edges, but also with lateral shoulders and harrow-teeth seat-depressions above the loops; but still the angularly-bent teeth and pivoted straight teeth can be used advantageously with such bars.

What I claim is—

1. A metal harrow-tooth rail or bar having a series of side projecting tooth-supporting loops, c , which extend, respectively, over each tooth, said loops having no metal in rear of themselves and each of their ends formed integral with the lower portion of said bar at opposite sides of each tooth, forming the respective tooth-seats and supports for the lower portion of said teeth, and a harrow-tooth inserted between said loops and rail or bar, and attached thereto at or near the top edge thereof, substantially as described.

2. A metal harrow-tooth rail having depressions in its side surface, forming tooth-seats and tooth-supporting loops or bridges on the lower portion thereof, which extend over or across the bottom side of said depression, and a harrow-tooth inserted between said loops and rail and attached to the side thereof, substantially as described.

3. A metal harrow-tooth rail having depressed tooth-seats formed in its side surface and horizontal projecting tooth-supporting loops or bridges, which extend over or across the lower portion of said depressions, said loops or bridges having each of their ends formed integral with said bars or rails in which said depressions are formed, substantially as described.

4. A metal harrow-tooth rail having depressed open-sided tooth-seats formed in the upper portion of its side surface and integral side projecting tooth-supporting loops formed on the remaining bottom portion thereof corresponding with the lower portion of said depressions, and a harrow-tooth inserted between said loops and rail and pivotally attached thereto at or near the top edge thereof, and supported at different angles, substantially as described.

5. The combination, with a harrow-tooth rail having integral tooth-supporting loops formed on the lower portion thereof and corresponding depressions forming open-sided tooth-seats in the remaining upper portion of the side surface of said rail, of the tooth inserted therein, said tooth having its upper end formed or bent at or near a right angle and passed through a perforation formed in the side of said rail, and suitable means for hold-

ing the upper end of said tooth in place, substantially as described.

6. The metal harrow-tooth rails having perforations in their vertical sides to receive the support for the upper ends of the teeth, and the harrow-teeth attached to or near the top edge of said rails, in combination with the side projecting tooth-supporting loops *c*, which extend, respectively, over each tooth, said loops having no metal in rear of themselves and each of their ends formed integral with the bottom portion of said bar at opposite sides of each tooth, forming the respective tooth-seats and supports for the lower portion of said teeth, substantially as described.

7. A wrought-metal harrow-tooth rail having its bottom edge portion bent or projecting out horizontally from one side thereof, forming integral tooth-supporting loops, and the remaining upper portion of said rail, having perforations therein, bent and projecting from the opposite side thereof, whereby corresponding depressions are formed in the opposite side surfaces of said rail, substantially as described.

8. The combination, with a harrow-tooth having a notch or recess formed in its side near the upper end thereof, of a detachable circumferential clamping-head, which is disconnected from the bar or rail to which the said tooth is attached and applied around said tooth and adapted to fit in said recesses, substantially as described.

9. A harrow-tooth provided with an open-sided detachable ring or link shaped clamp-

head which enters a suitable notch or recess formed in said tooth near the upper end thereof, whereby said tooth is held in place, substantially as described.

10. A harrow-tooth having its upper end formed or bent at or near a right angle and provided with suitable notches or recesses in its side near the outer end thereof, and an open-sided detachable metal clamp-head, applied around said tooth, fitting in said notches, substantially as described.

11. The combination, with a harrow-frame bar or rail provided with means for supporting a pivoted self-adjusting tooth at different angles, of the harrow-tooth, pivot, and yoke-shaped washer *f*³, substantially as and for the purpose described.

12. The metal bar or rail for harrow-tooth frames, having its lower longitudinal edge portion, *a*¹, set off, projecting laterally on one side of said bar, forming a rabbet, *a*², in the lower outer corner of the opposite side thereof, substantially as described.

13. A metal tooth-bar for harrow-frames, having a lower rear rabbet, *a*², and a lower front edge rib, *a*³, whereby a small or thin connecting portion, *a*⁴, is produced, substantially as described.

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

JAMES H. BARLEY.

Witnesses:

CHRIS. W. SCHLEGEL,
JOHN P. WARREN.