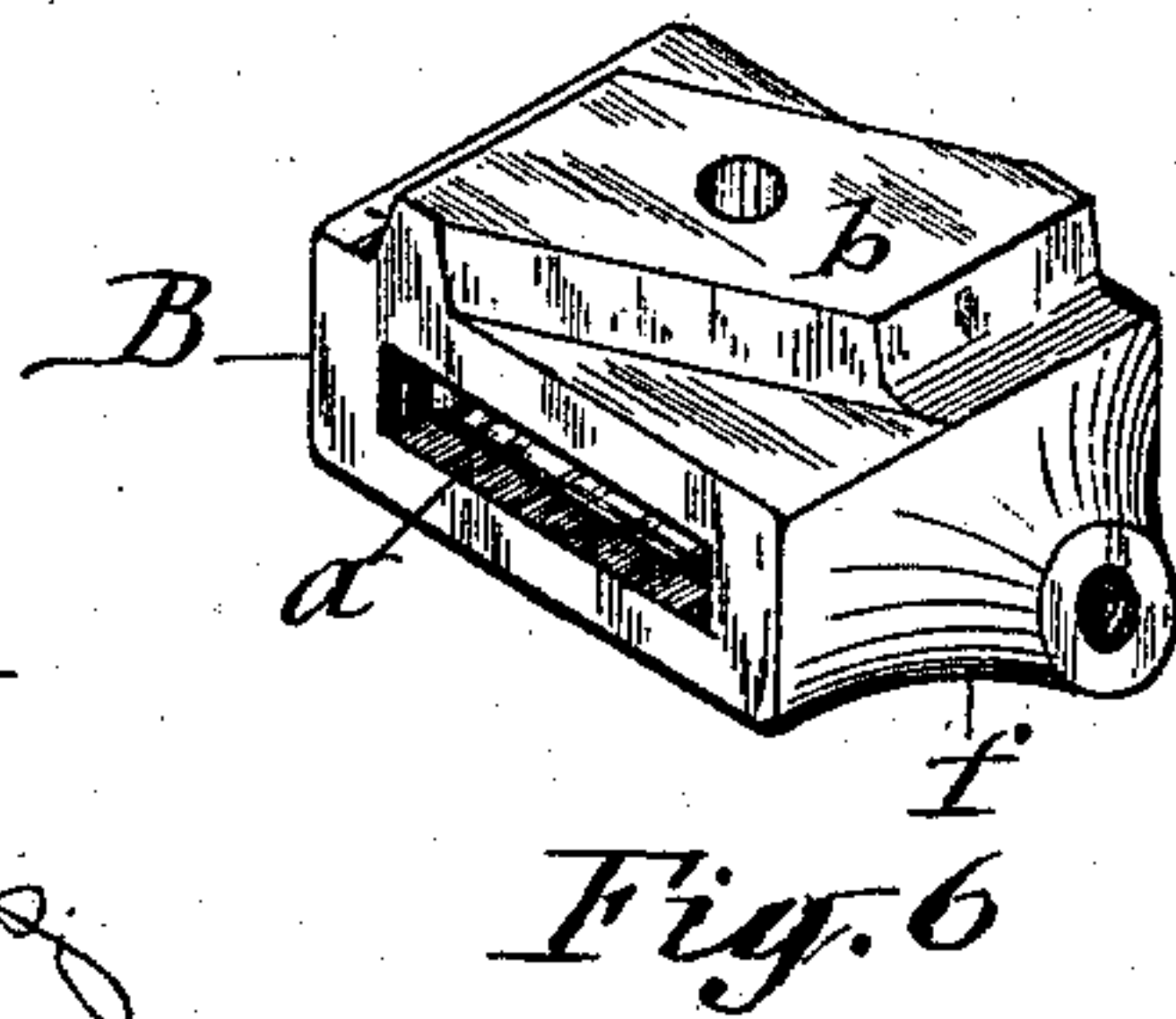
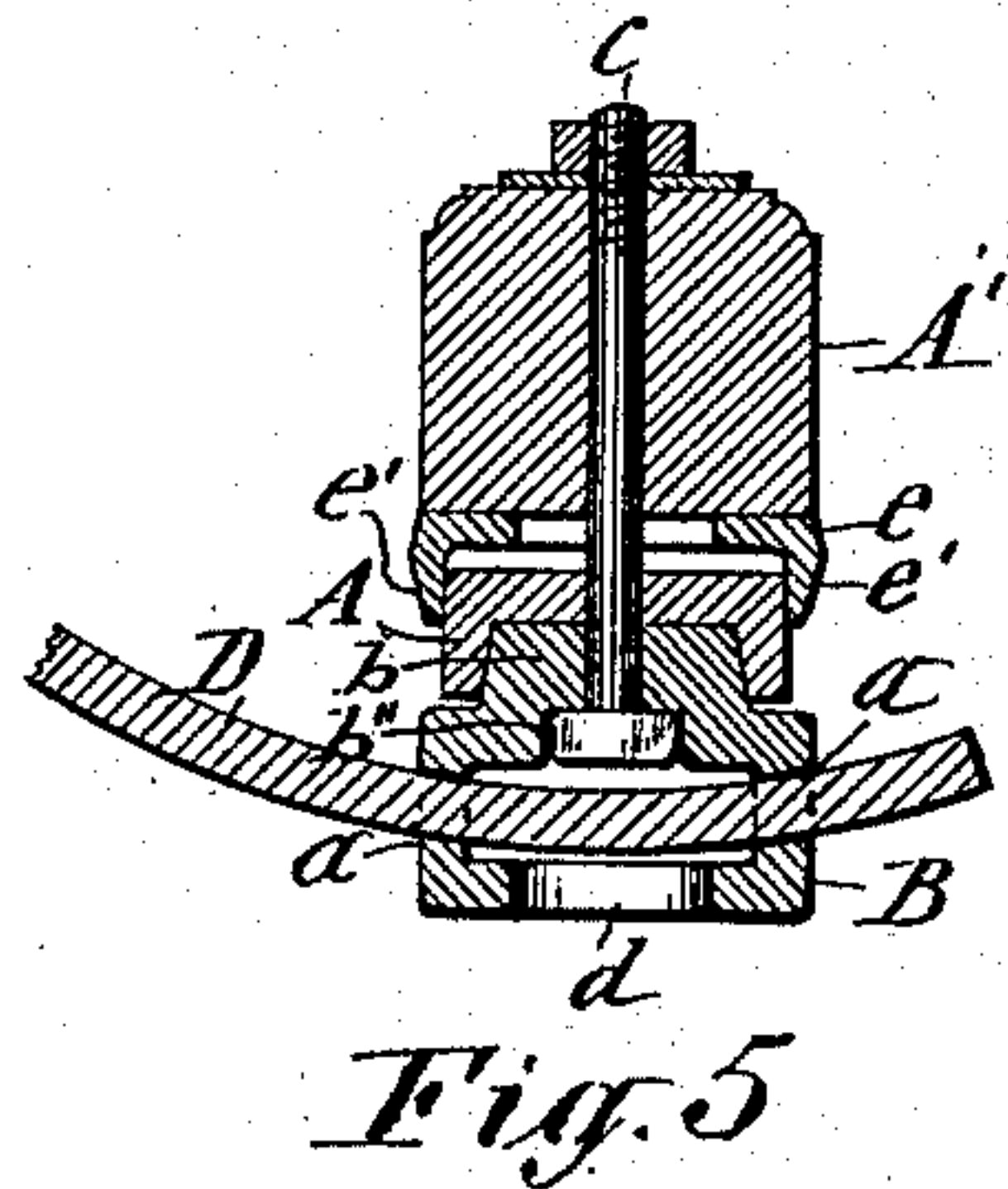
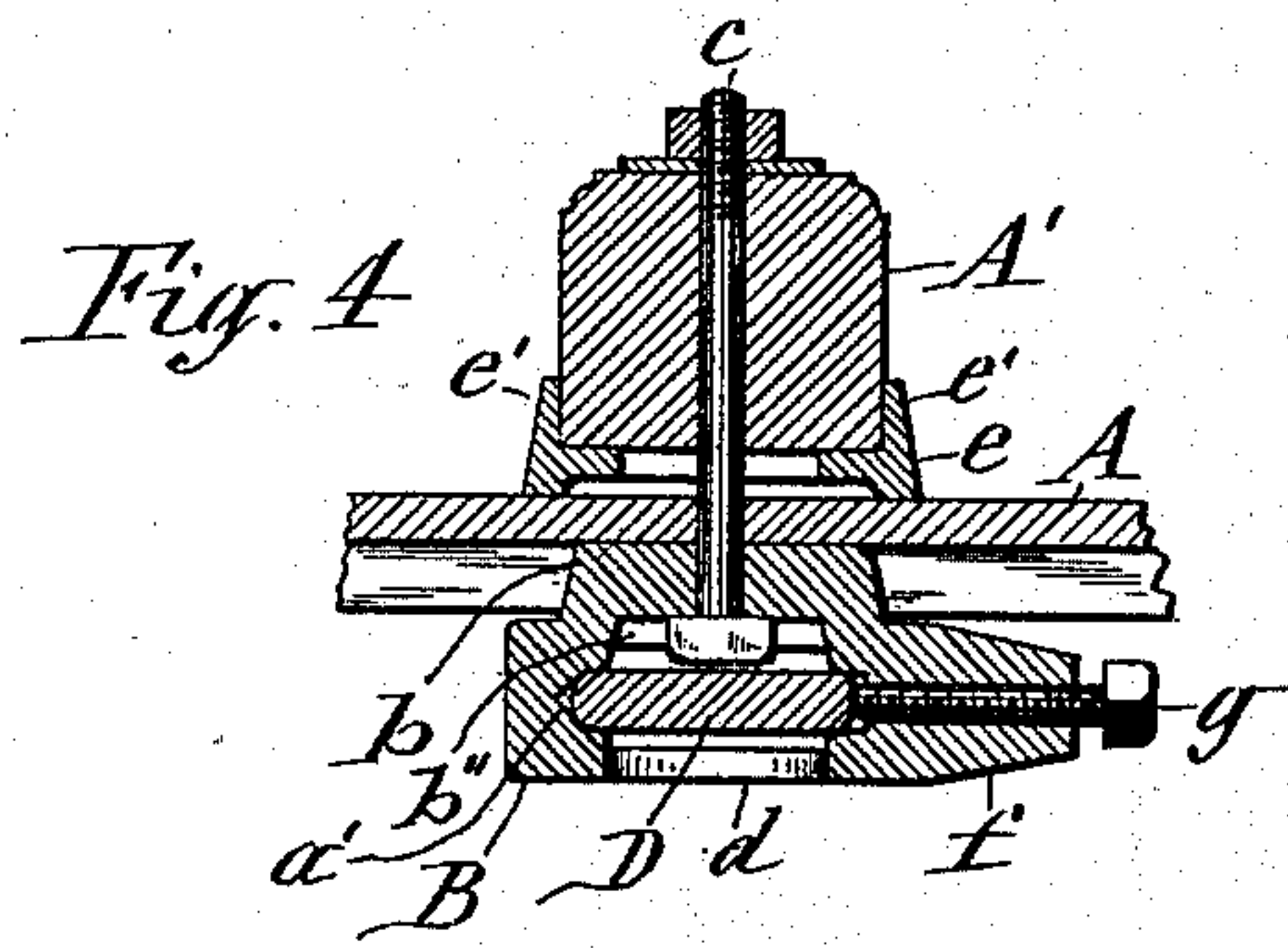
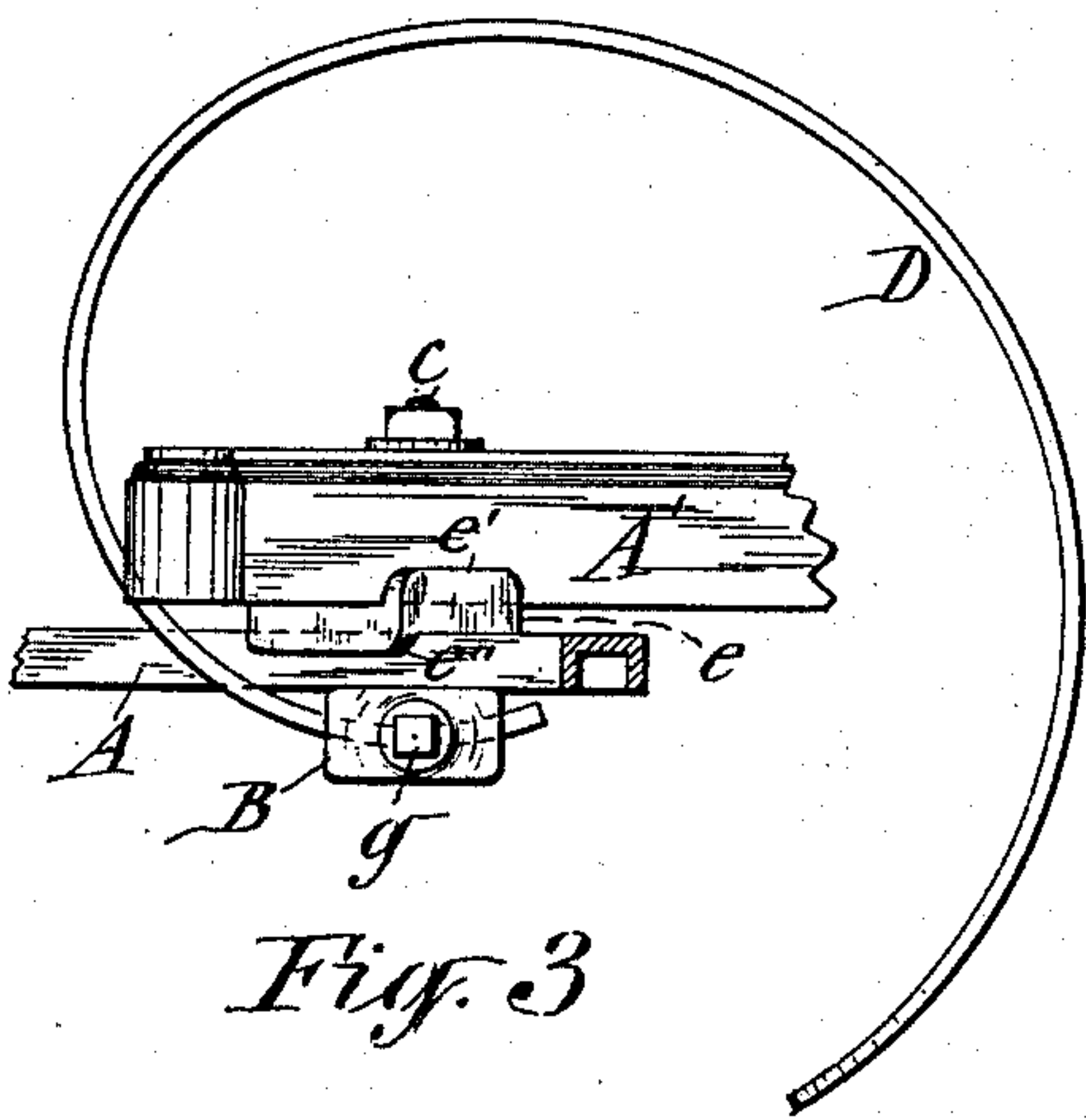
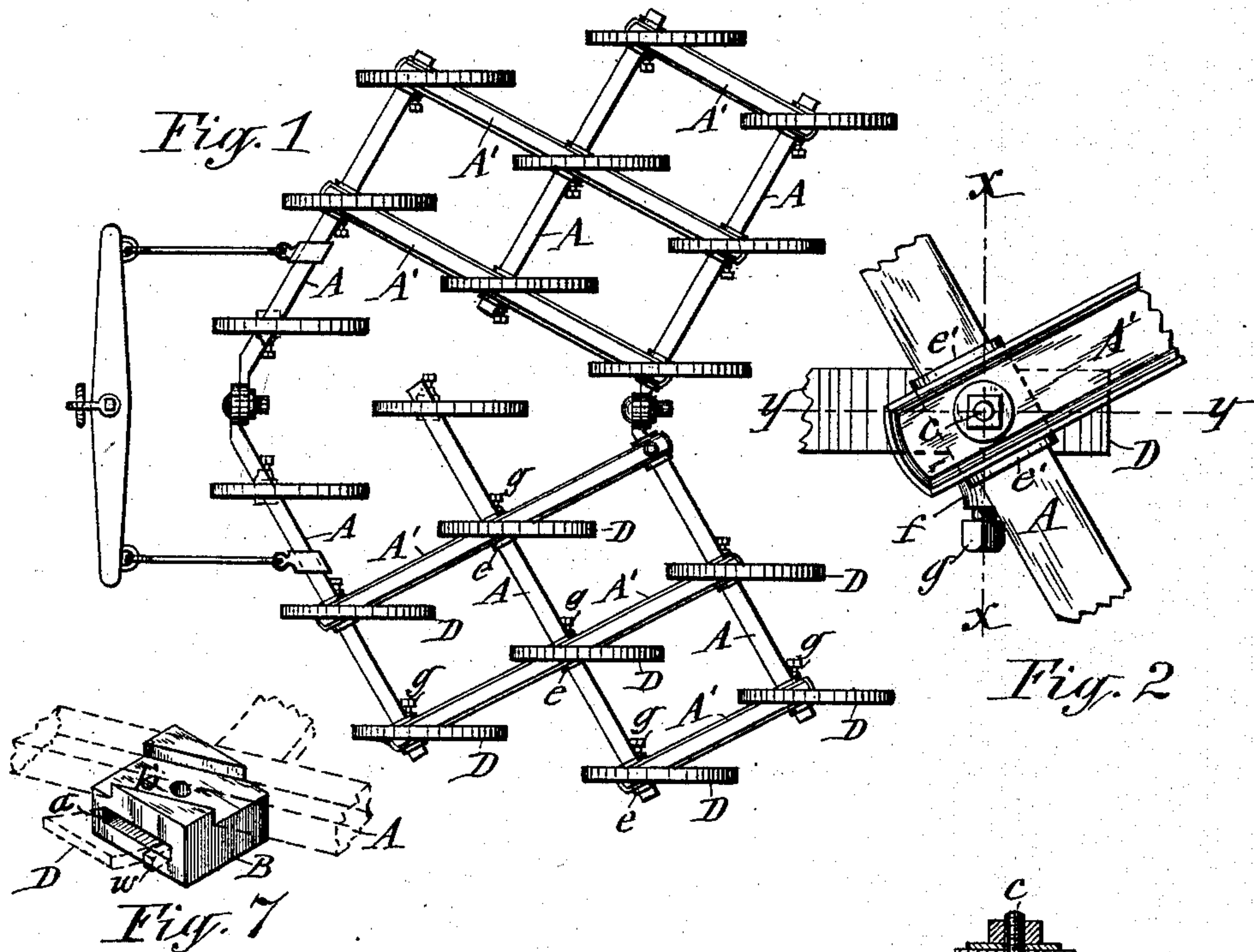


(No Model.)

A. DOWNWARD.  
HARROW.

No. 413,499.

Patented Oct. 22, 1889.



WITNESSES:  
C. L. Bendixon  
J. J. Gaass

INVENTOR  
Andrew Downward  
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ATTORNEYS



# UNITED STATES PATENT OFFICE.

ANDREW DOWNWARD, OF UTICA, NEW YORK, ASSIGNOR TO THE EUREKA  
MOWER COMPANY, OF SAME PLACE.

## HARROW.

SPECIFICATION forming part of Letters Patent No. 413,499, dated October 22, 1889.

Application filed May 20, 1889. Serial No. 311,353. (No model.)

### *To all whom it may concern:*

Be it known that I, ANDREW DOWNWARD, of Utica, in the county of Oneida, in the State of New York, have invented new and useful  
5 Improvements in Harrows, of which the following, taken in connection with the accompanying drawings, is a full, clear, and exact description.

This invention relates to the attachment to  
10 harrow and cultivator frames of the class of teeth which are formed of spring-steel bars curved in vertical planes, so as to present forwardly-inclined points toward the ground; and the invention consists in the novel construction and combination of parts hereinafter described and specifically set forth in the claims.

In the accompanying drawings, Figure 1 is a top plan view of a harrow equipped with teeth  
20 of the aforesaid class. Fig. 2 is an enlarged plan view of the attachment of one of the teeth. Fig. 3 is a side view of the same. Figs. 4 and 5 are further enlarged sectional views, respectively on lines  $x x$  and  $y y$ , Fig. 2. Fig.  
25 6 is a detached perspective view of the shoe by which the tooth is attached to the harrow-frame, and Fig. 7 illustrates a modification of my invention.

Similar letters of reference indicate corresponding parts.

30 A A represent the draft-bars, and A' A' the cross-bars, of the harrow-frame. The said draft-bars are preferably composed of metal, and may be of any suitable form in cross-section, but preferably channeled longitudinally either in their under sides or in their upper sides, according to the location of the attachment of the teeth, which are formed of flat bars of steel bent into the usual scroll or  
40 C shape, so as to present their flat sides transversely. To these draft-bars I attach the teeth-retaining shoes B B, which are preferably formed in one piece of cast or malleable iron, and are each formed with a slot  $a$ , extending completely through the shoe, and into which slot the shank of the tooth D is inserted and retained by a suitable tightener pressing against one edge of the tooth-shank and crowding the same with its opposite edge  
45 against the adjacent side of the slot. Said tightener may consist of a wedge  $w$ , inserted

into the shoe at one of the edges of the tooth-shank, as illustrated by dotted lines in Fig. 7 of the drawings; but I prefer to employ for said tightener a set-screw  $g$ , inserted into an  
55 internally-screw-threaded tubular boss  $f$  on the side of the shoe, as best seen in Fig. 4 of the drawings.

In order to obtain a more secure hold on the tooth-shank, I form the side of the slot  $a$   
60 opposite the set-screw  $g$  V shape or otherwise wedge-shaped, as shown at  $a'$ . The set-screw, crowding the tooth-shank edgewise into the wedge-shaped side of the slot  $a$ , binds the said tooth-shank firmly in the shoe B. However,  
65 I do not limit myself to the said wedge-shaped form of the slot, inasmuch as a set-screw properly tightened is capable of holding the tooth with almost any form of bearing on the opposite edge of the tooth-shank.  
70 When the draft-bar A is channeled longitudinally, I form the shoe with a tenon  $b$ , by which tenon the shoe is seated in the channel of the bar A and is fitted snugly therein, so as to effectually prevent the shoe from turning.  
75 When the bar A is of a plain rectangular shape in cross-section, I form the shoe B with a recessed seat  $b'$  for said bar, as shown in Fig. 7 of the drawings.

The bars A and A' are provided with vertical bolt-holes at the center of their crossing,  
80 and the top plate or tenon  $b$  of the shoe is provided with a corresponding bolt-hole terminating in the cavity of the shoe, and through the bolt-holes of the said three parts passes  
85 the bolt  $c$ , by which the shoe is secured to the frame.

In order to allow the bolt to be inserted from the under side of the shoe, I provide the bottom plate of the latter with an aperture  $d$   
90 for the passage of the bolt and its head, and the under side of the top plate or tenon  $b$  of the shoe I form with a recess  $b''$  for the reception of the head of the bolt, said recess being of such shape and dimensions as to prevent  
95 the head of the bolt from turning, and thus facilitate the application of the nut on the upper end of the bolt, and also guard in a great measure against the accidental loosening of the bolt. The shoe B, with the tooth-  
100 shank passing through it beneath the bolt-head, completely houses the head of the bolt,



and thus prevents wear and abrasion of the same by contact with the earth when the harrow is in operation.

Between the two bars A A' is interposed a metallic saddle *e*, which is provided with downward flanges *e' e'*, embracing the sides of the bar A, and with upward flanges *e'' e''* transverse of the bar A and embracing the sides of the bar A', said saddle being also provided with an aperture for the passage of the bolt *c*. It will thus be observed that a single bolt ties the two bars together at their point of crossing and fastens the tooth-retaining shoe B to the frame, and the construction and combination of the said parts is such as to form a structure of superior stability and durability.

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

1. In a harrow or cultivator, an attachment for the transversely-flat spring-tooth, comprising a shoe formed with a slot through it, the tooth having its shank inserted in said slot, and a tightener inserted in the shoe at the edge of the tooth-shank to crowd the said shank laterally with its opposite edge against the adjacent side of the slot, substantially as set forth.

2. In a harrow or cultivator, an attachment for the transversely-flat spring-tooth, comprising a shoe formed with a slot through it and with a screw-threaded eye horizontally through the side of the shoe intersecting the slot, the tooth having its shank inserted in said slot, and a set-screw in the aforesaid screw-threaded eye engaging the edge of the tooth-shank, as set forth and shown.

3. In a harrow or cultivator, a spring-tooth attachment comprising a shoe having a slot extending through it and one side of said slot formed wedge-shaped, a tightener in the opposite side of the shoe, and the tooth having its shank inserted in the slot of the shoe and crowded into the wedge-shaped side of the slot by the aforesaid tightener.

4. The combination, with the frame, of a spring-tooth-retaining shoe provided with a bolt-hole vertically through its central portion and terminating in the cavity of the shoe, and a bolt passing through said hole and frame and fastening the shoe to the frame, as set forth.

5. The combination, with the frame, of a spring-tooth-retaining shoe provided with a bolt-hole vertically through the central portion of its top plate and terminating in the cavity of the shoe, and with a recess in the under side of said plate, and a bolt passing through the aforesaid hole and frame and having its head seated in the recess of the shoe, and a nut on the opposite end of the bolt, substantially as described and shown.

6. In combination with the frame, a shoe secured to said frame and having a slot extending through it, and one side of said slot formed wedge-shaped, and the opposite side of the shoe formed with a laterally outward-projecting tubular boss screw-threaded internally, the tooth having its shank inserted into the slot of the shoe, and a set-screw in the tubular boss engaging the edge of the tooth-shank, substantially as described and shown.

7. In combination with the frame, a tooth-retaining shoe provided with a bolt-hole through its top plate, an aperture in its bottom plate for the passage of the head of the bolt, and a bolt passing through the top plate of the shoe and through the frame and having its head inside of the shoe, and a nut on the upper end of the bolt, substantially as described and shown.

8. In combination with the longitudinally-channeled bar A, the shoe B, having the slot *a*, extending through it and formed with the tenon *b*, and seated thereby in the channel of the bar A, and the bolt *c*, passing vertically through the tenon of the shoe and through the aforesaid bar and having its head inside of the shoe, as set forth and shown.

9. In combination with the longitudinally-channeled bar A, provided with bolt-holes, the shoe B, formed with the slot *a* for the reception of the tooth, and with the tenon *b*, recess *b''* in the under side of said tenon, a bolt-hole vertically through the tenon, the aperture *d* in the bottom plate of the shoe, and the bolt *c*, passing through the bolt-holes of the aforesaid tenon and channeled bar and having its head seated in the recess *b'*, substantially as described and shown.

10. The combination of the longitudinally-channeled draft-bar A, disposed with its channel downward, the saddle *e*, seated on top of the bar A and having downward flanges embracing the sides of said bar and upward flanges transverse of the bar, the cross-bar A', seated on the saddle between the upward flanges thereof, the shoe B, formed with the slot *a* and with the tenon *b*, seated in the channel of the bar A, and with the screw-threaded tubular boss *f* on its side, the tooth D, inserted into the slot *a*, the set-screw *g*, inserted into the boss *f*, and the bolt *c*, passing vertically through the top plate of the shoe and through the bar A, saddle *e*, and bar A', and having its head inside of the shoe, and a nut on its upper end, substantially as described and shown.

In testimony whereof I have hereunto signed my name this 14th day of May, 1889.

ANDREW DOWNWARD. [L. S.]

Witnesses:

M. W. ROSS,  
A. E. COLE.