

(No Model.)

W. S. LAWRENCE.  
Harrow.

No. 232,192.

Patented Sept. 14, 1880.

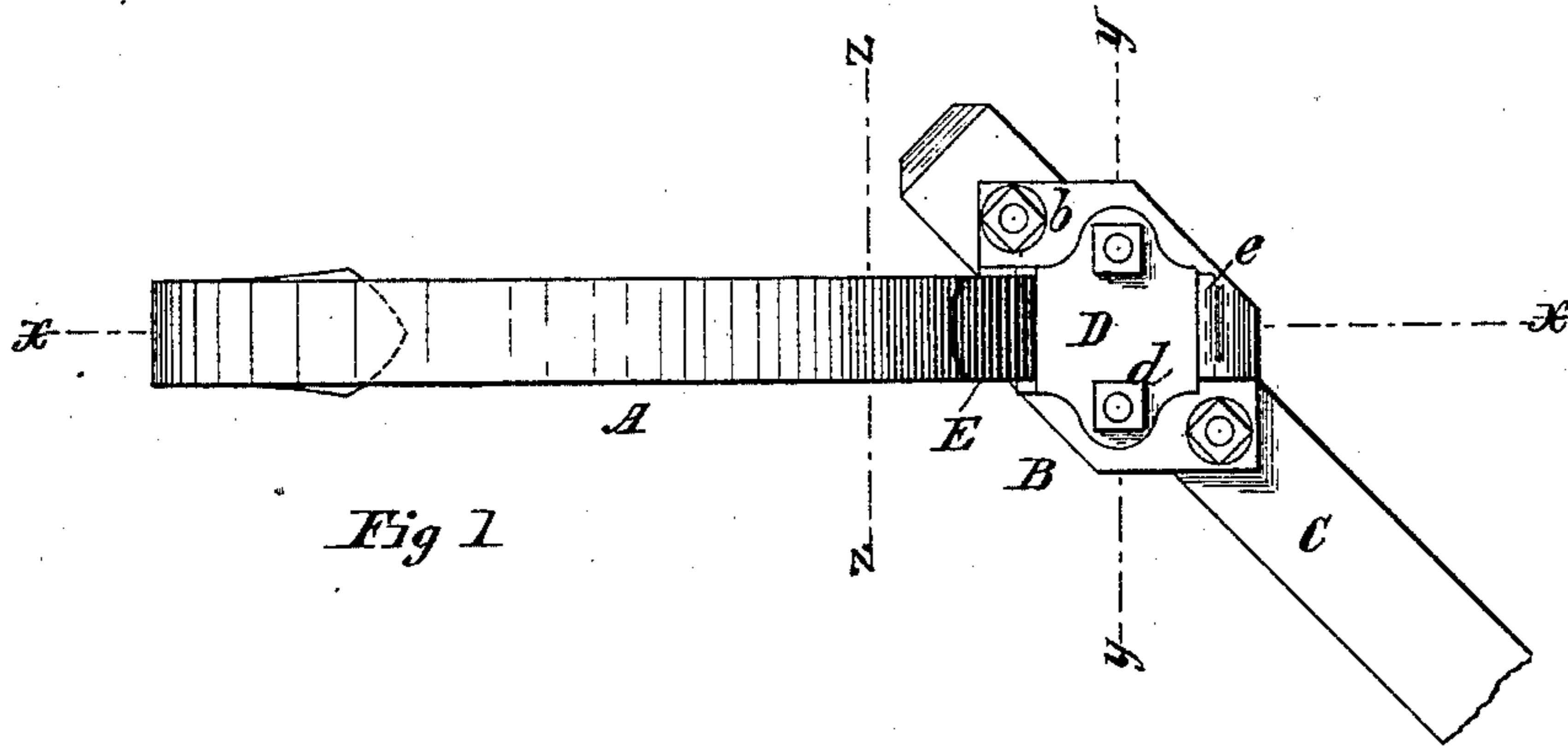


Fig 1

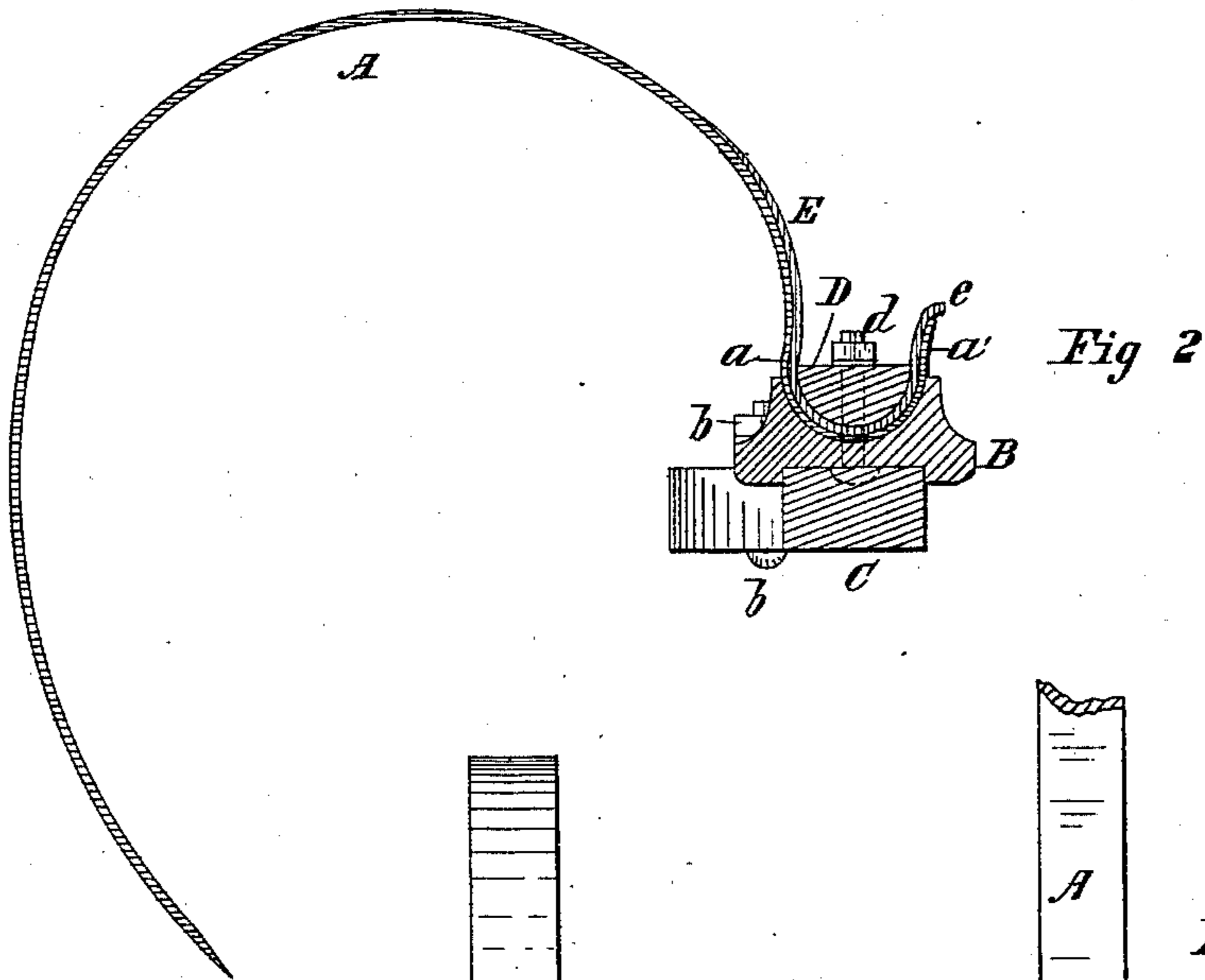


Fig 2

Fig 3

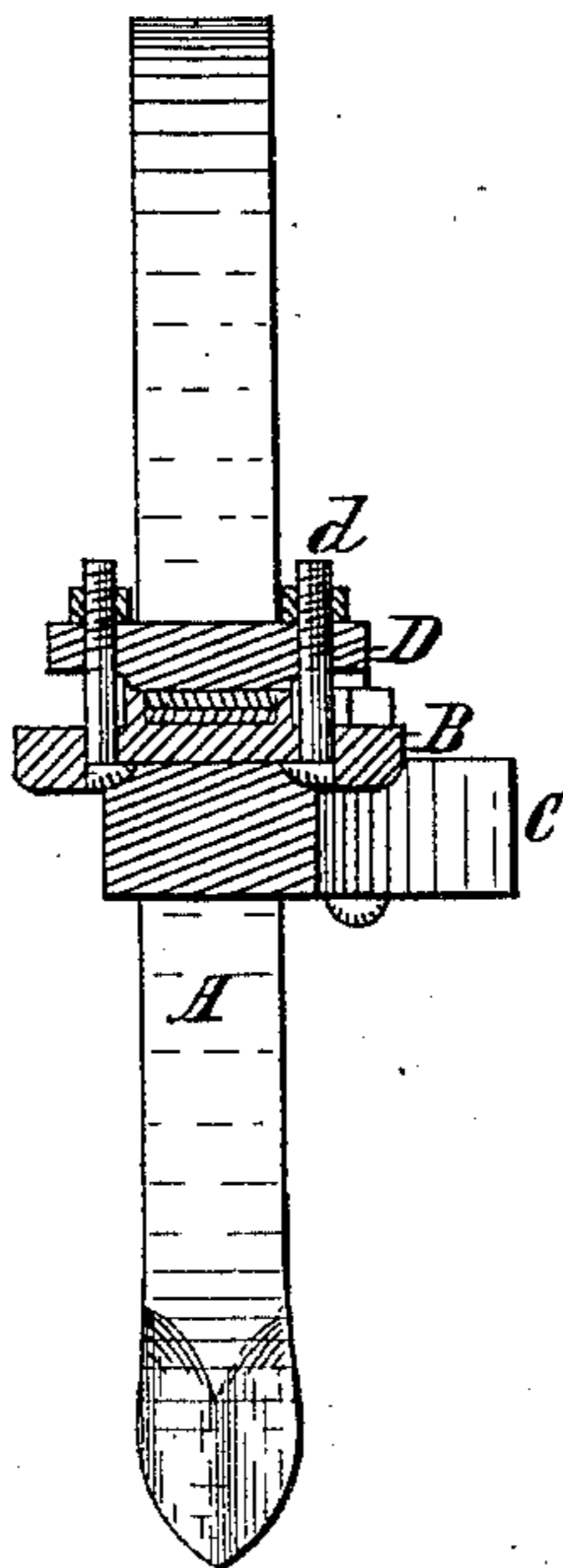
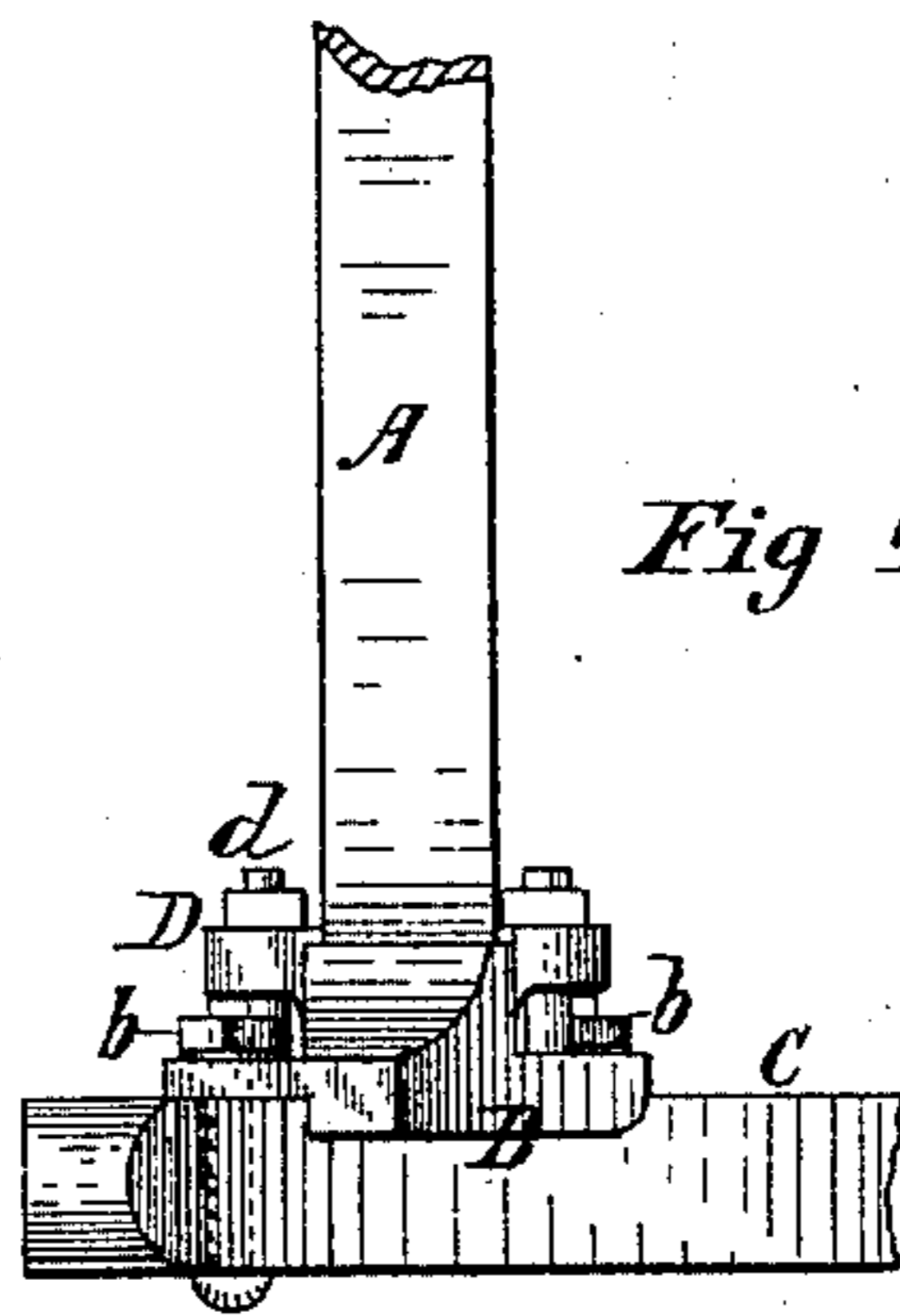


Fig 4



Witnesses

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# UNITED STATES PATENT OFFICE.

WILLIAM S. LAWRENCE, OF KALAMAZOO, MICHIGAN.

## HARROW.

SPECIFICATION forming part of Letters Patent No. 232,192, dated September 14, 1880.

Application filed March 22, 1880. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM S. LAWRENCE, of Kalamazoo, in the county of Kalamazoo and State of Michigan, have invented a new and useful Improvement in Harrows, which is fully described in the following specification, reference being had to the accompanying drawings, in which—

Figure 1 represents a plan view of my invention. Fig. 2 represents a section on the line *xx* in Fig. 1. Fig. 3 represents a section on the line *yy* in Fig. 1, including an end elevation of the tooth; and Fig. 4 represents a section on the line *zz* in Fig. 1.

The same letters denote the same parts in all the figures.

My invention relates to that class of harrows having spring-teeth; and the object of it is to make a tooth of such shape that it can be made shorter than the spring-teeth now in use and equally flexible, and to provide a convenient and economical mode of securing the tooth firmly to the bar, so that the point can be adjusted to any desired height with reference to the level of the tooth-bar, and also to provide a simple and convenient means of strengthening and stiffening the tooth at its shank or upright part near the point of attachment to the bar.

A represents a spring-tooth, having its inner portion, *a a'*, bent upward into a U-shaped curve to fit the concavity of the shoe B, which is secured to the tooth-bar C of the harrow at the desired angle by any approved means of fastening. The means represented in the drawing is by the nuts and screw-bolts *b*.

D is a cap, having a portion of its under surface convex to correspond to the U-shaped curvature of the tooth which fits into the latter, and when fastened to the shoe holds the tooth firmly in its place. The cap D is fastened to the shoe B by bolts *d*; but any other well-known equivalent fastening may be used.

By relaxing the fastenings, so that the cap D can be raised slightly, the inner end, *a'*, of the tooth can be adjusted in the shoe, thereby regulating the position of the point of the harrow-tooth. When the point of the tooth has been thus adjusted to the desired position the cap can be tightened again, and the tooth will be firmly held in its new place.

E is a spring brace or strip, corresponding in shape to the upwardly-curved end of the harrow-tooth, and serves to stiffen the shank of the tooth and prevent it from being bent or sprung out of its proper position by any obstacle, and at the same time, the strip being entirely separate from the tooth itself, neither interferes with the adaptation of the other to the concavity of the shoe when the cap D is loosened. There is a slight projection, *e*, at the inner end of this brace, which hooks on the inner end, *a'*, of the tooth, and thus holds the tooth and brace firmly together against any force tending to push the tooth backward.

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

1. The spring harrow-tooth, with its reversely-curved inner end, *a a'*, in combination with the shoe B, provided with a concavity adapted to form a seat for the curved end of the tooth. the cap D, convex on its under side, fastening bolt or pin *d*, and tooth-bar C, substantially as described.

2. The spring harrow-tooth having a reversely-curved inner end, *a a'*, in combination with the re-enforcing strip E, having the projection *e*, hooking over the inner end of the tooth at *a'*, substantially as and for the purpose described.

WILLIAM S. LAWRENCE.

Witnesses:

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