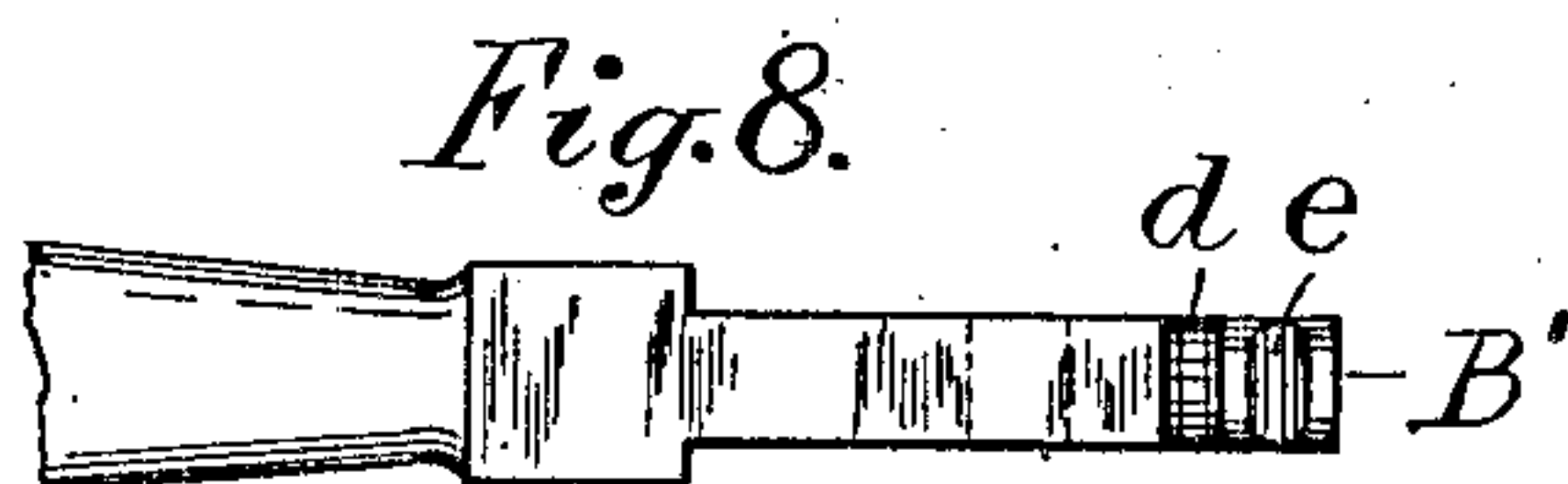
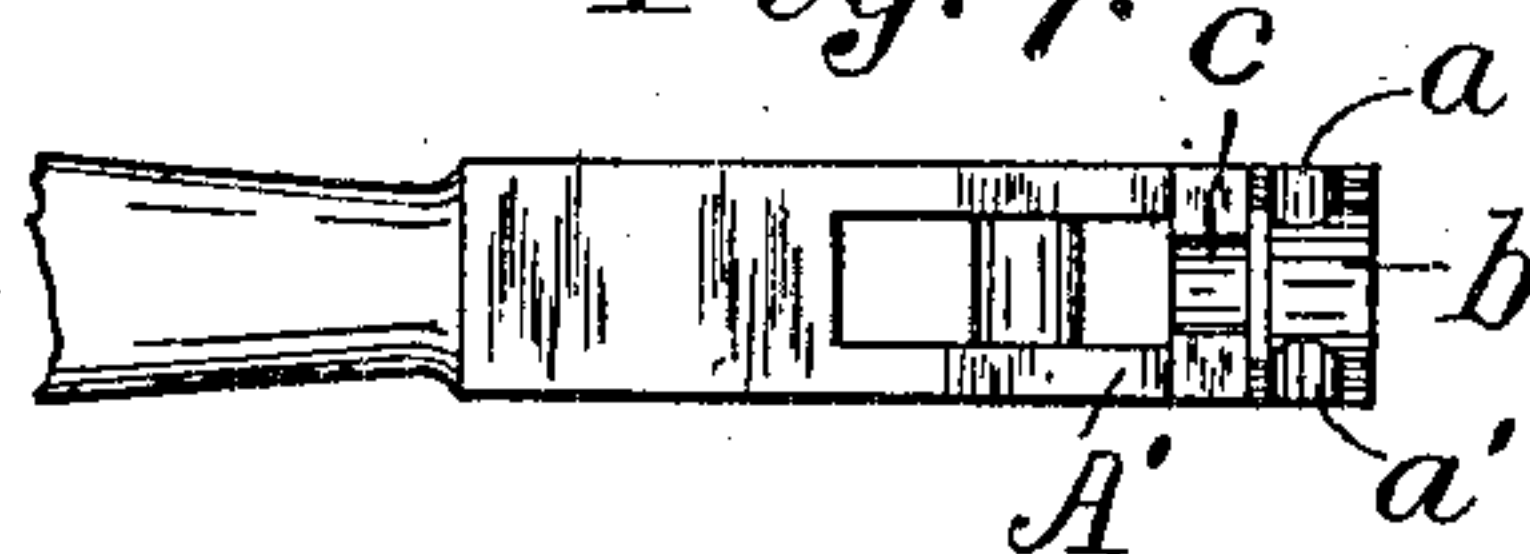
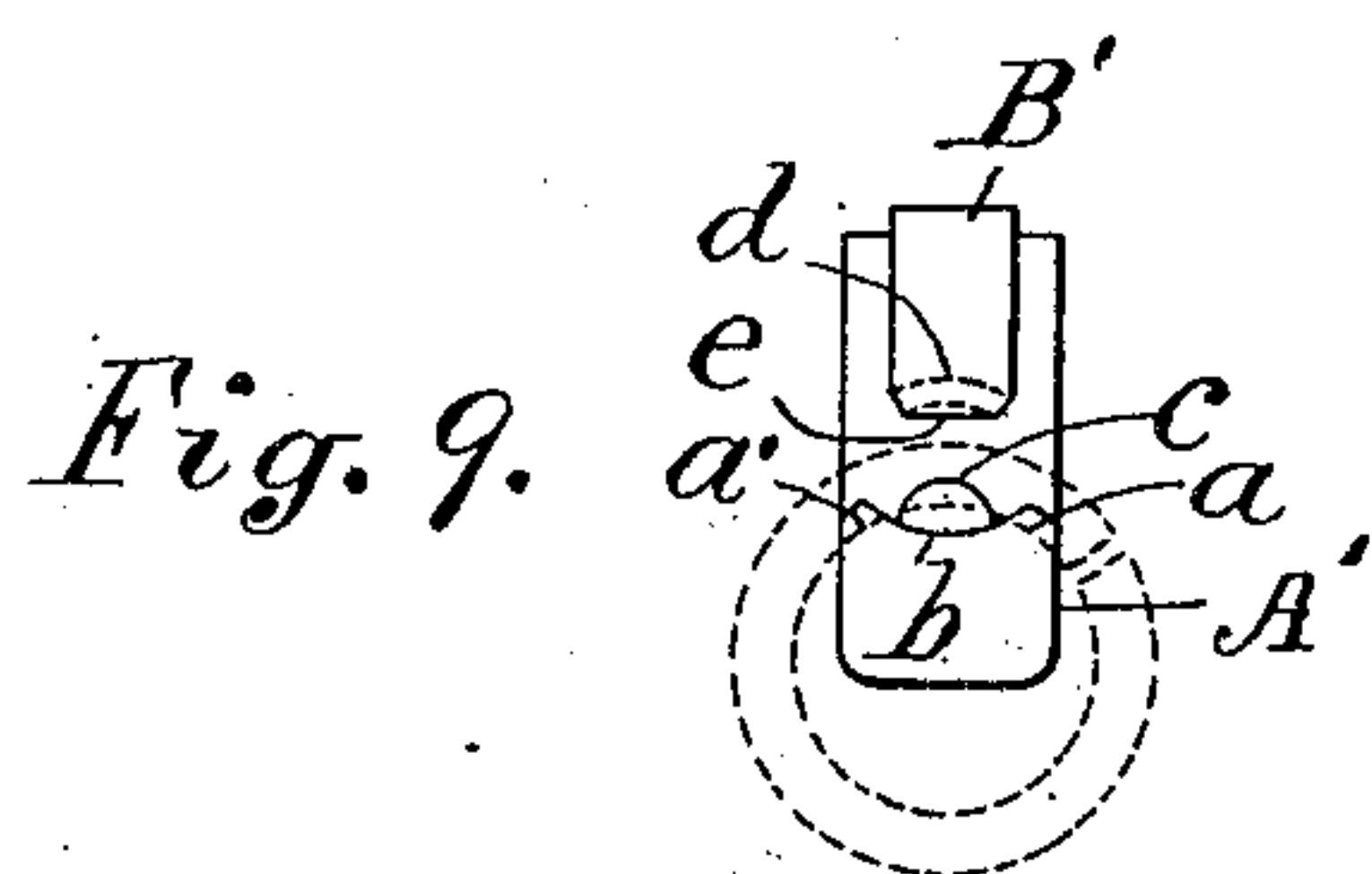
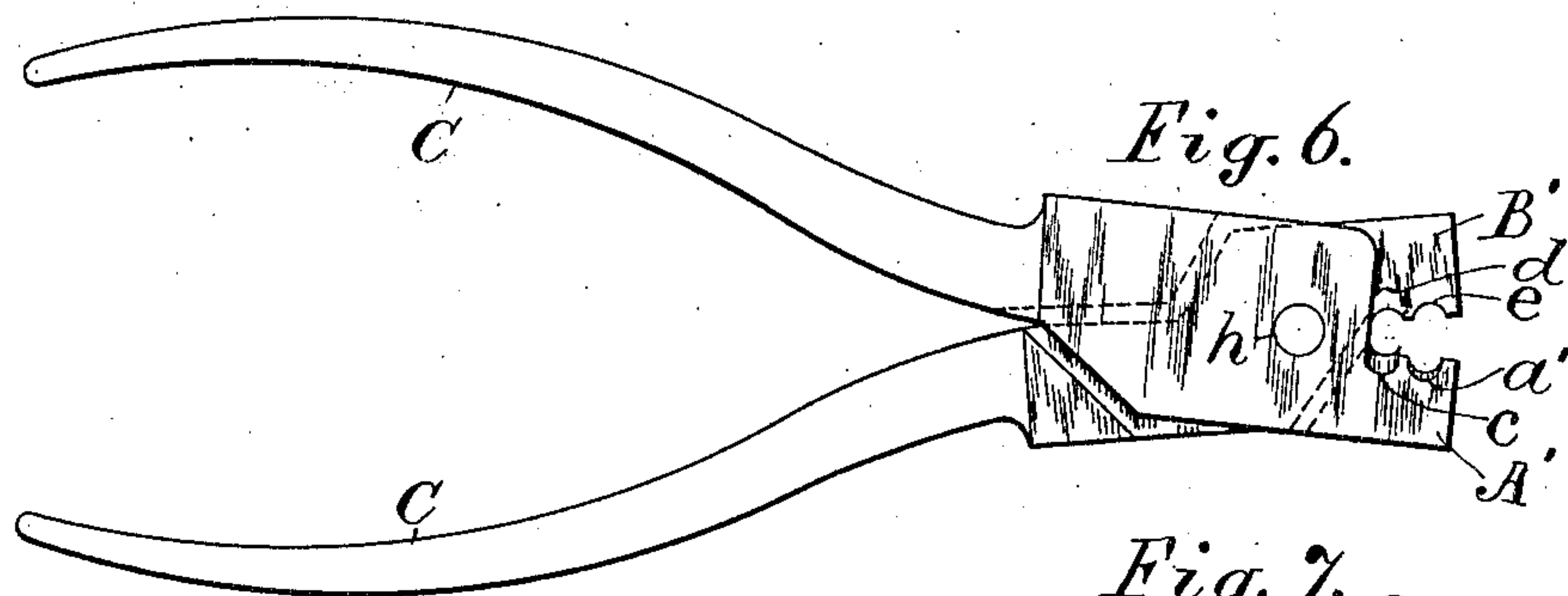
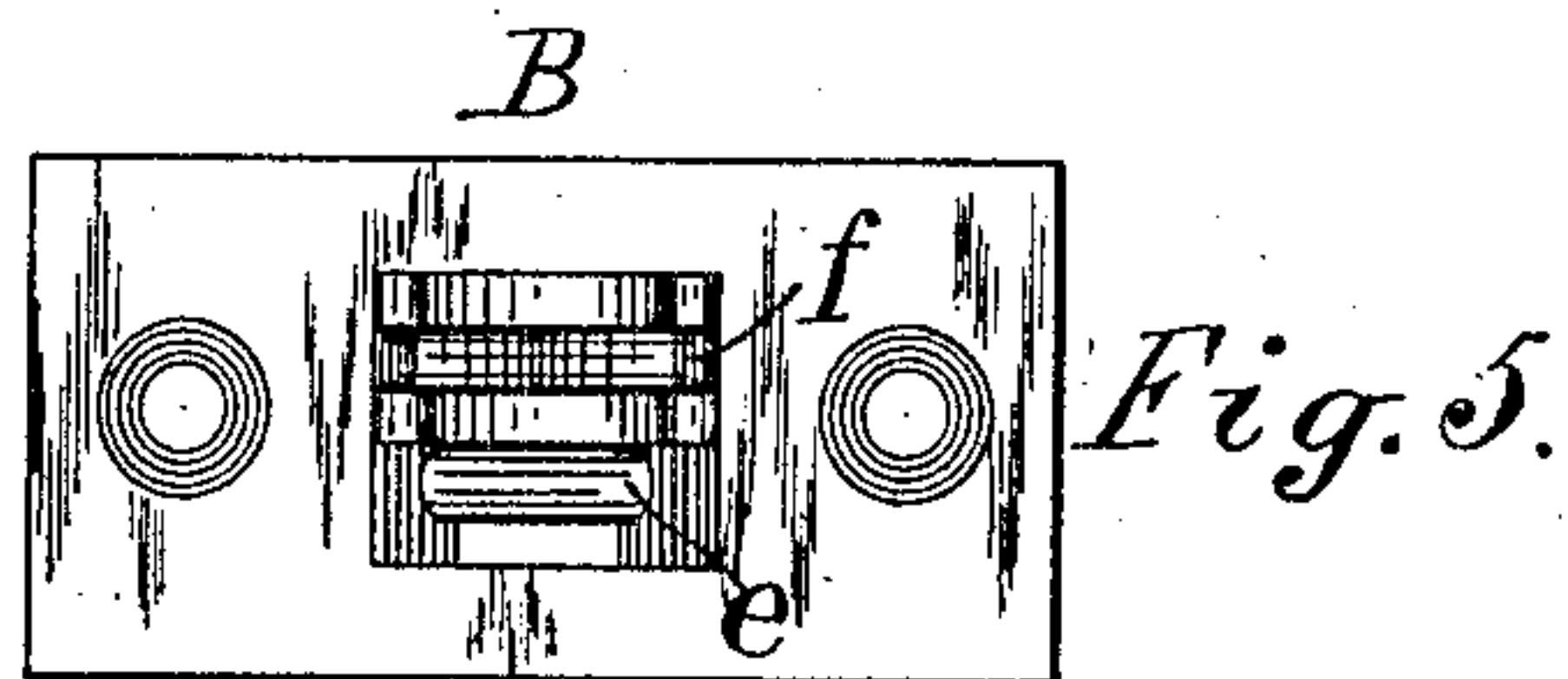
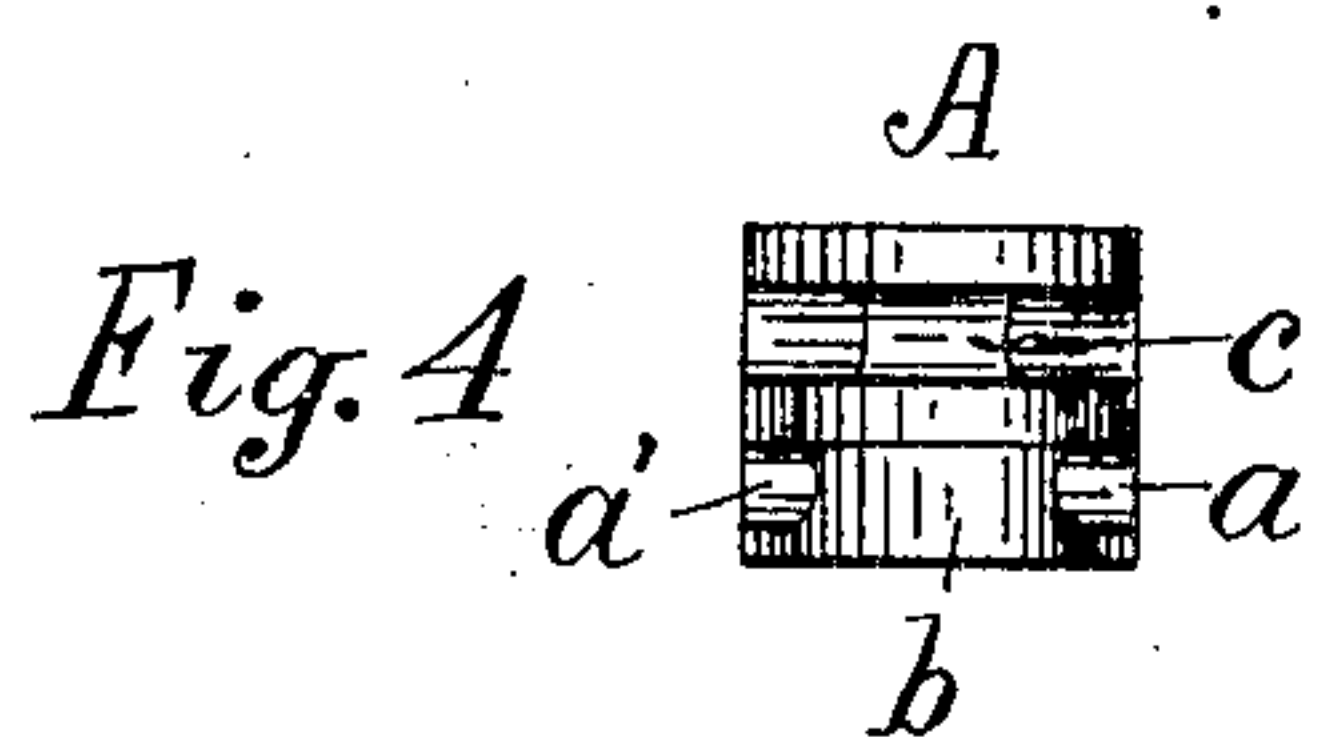
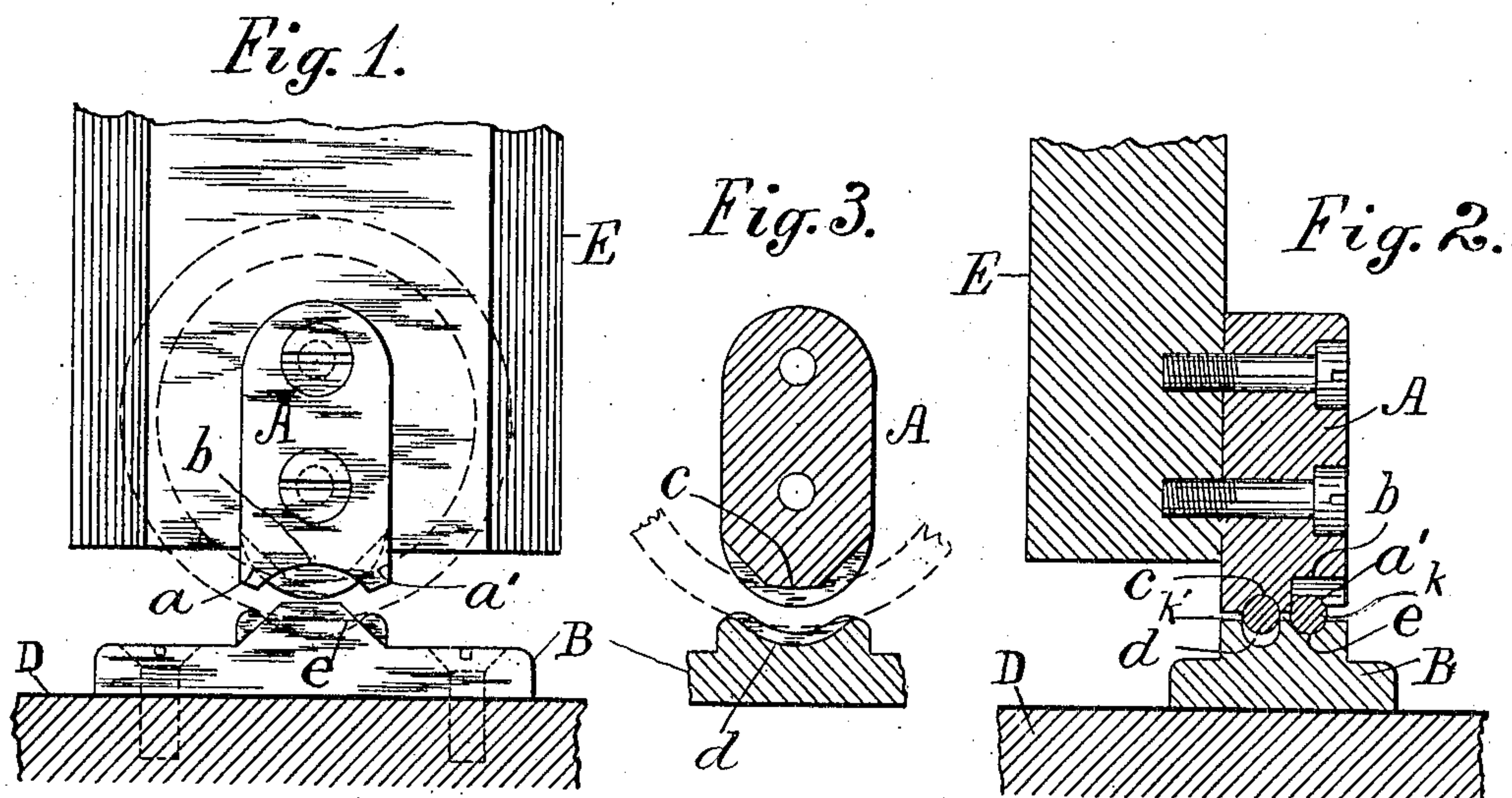


No. 844,885.

PATENTED FEB. 19, 1907.

L. M. MORDEN.
RING BENDING TOOL.
APPLICATION FILED MAY 5, 1904.



Attest:
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UNITED STATES PATENT OFFICE.

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RING-BENDING TOOL.

No. 844,885.

Specification of Letters Patent.

Patented Feb. 19, 1907.

Application filed May 5, 1904. Serial No. 206,488.

To all whom it may concern:

Be it known that I, LUCENA M. MORDEN, a citizen of the United States, of 59 Grand street, Waterbury, county of New Haven, State of Connecticut, (whose post-office address is also the same,) have invented certain new and useful Improvements in Ring-Bending Tools, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

The object of the present invention is to facilitate the manufacture of divided rings, such as are used in loose-leaf books to hold perforated sheets of paper.

In making such rings it is found difficult to roll the wire into a perfect circle, so that the ends will fit one another in the desired manner, and it is especially difficult to make an opening-section upon a ring which will align precisely with the body of the ring, and it is therefore often necessary to slightly bend some portion of the ring, so as to open or close the same to bring the adjacent ends into alignment.

The present invention furnishes a tool which is adapted either to open or close a divided ring, and for this purpose the tool is formed with two opposite dies having specially-formed supporting and pressing faces adapted, respectively, to open and close the ring.

The means for opening the ring includes a convex seat adapted to support the inside of the ring at two points and a pressing-face operating upon the exterior of the ring between its two points of support to flatten the curve and thus open the ring. The means for closing the ring includes a concave seat adapted to support the outside of the ring at two points and an opposed pressing-face operating upon the interior of the ring between the two supporting-points.

The opposed die-faces may be constructed upon a hand-pliers to bend rings of various sizes within the scope of such a tool, and they may also be applied to the bed and moving slide of a foot or power press to operate upon heavier rings. The seats which support the ring, especially upon its inner side, are grooved to steady the ring and hold it in a fixed position, and this is especially necessary where the dies are formed upon the faces of a hand-pliers.

In adjusting the divided ends of a ring to one another to bring them into alignment it is difficult to open or close the ring precisely

the right amount by a single pressure of the bending-dies, and it is therefore necessary in practice to alternately open and close the ring until the proper adjustment has been effected.

To facilitate the opening and closing of the ring without the necessity of inverting or turning over the ring, the dies are formed so that one of the supporting-seats and one of the pressing-faces are arranged upon one of the dies and the other seat and pressing-face are arranged upon the opposite die. By this arrangement the ring can be moved instantly from one seat to another and opened or closed with the utmost facility.

The seats upon the dies are adapted to support rings within a certain variation of size, as between an inch and an inch and a half diameter, and the seats are grooved to receive the wire of the maximum size in such rings, and are then adapted to receive and bend rings made of smaller wire.

In manufacturing divided rings upon a large scale a set of dies for each size of ring is necessary.

In the drawings, Figure 1 shows the dies applied to the bed D and ram or slide E of a foot-press. Fig. 2 is a side elevation of the same parts in section, where hatched, at the center line of Fig. 1. Fig. 3 is a section of the upper die through the punch *c* and seat *d* of Fig. 2. Fig. 4 shows the under side or operative face of the upper die, and Fig. 5 shows the operative face of the lower die. Fig. 6 is a side view of the hand-pliers provided with the dies. Fig. 7 shows the lower jaw attached to part of the upper handle. Fig. 8 shows the upper jaw attached to part of the lower handle, the jaw being turned over to expose the operative face. Fig. 9 is an end view of the jaws, showing in front the dies for opening the ring, and the dies for closing the ring being represented in the rear.

One of the dies in all the views is designed to receive the inner or concave side of the ring, as shown in Figs. 4 and 9, and the opposite die is provided with the convex seat *a a'* for opening the ring and also with the punch *c* for closing the ring. The opposed die is formed with the concave seat *d*, to operate with the punch *c*, and also with the punch *e*, to operate with the convex seat *a a'*.

To open the ring, it requires support at two points, for which reason the convex seat is formed in the middle with a recess *b*, leaving short segments of curve at its opposite ends,

which are adapted to fit approximately the interior of the ring, and the seats are grooved transversely, as shown in Fig. 2, which serves to steady the ring and hold it exactly transverse to the seat and in a line to receive the pressure of the opposed punch *e*.

The curvature of the supports *a a'* and their transverse grooves serve to sustain the ring under pressure without bruising the same, and the ends of such grooves are rounded to permit their operation upon rings of various diameters without bruising or marking the same.

As the punch *e* operates upon the convex side of the ring, it may consist of a flat surface, as shown, or any suitable projection adapted to press upon the ring intermediate of the supports *a a'*. The punch is also grooved, as shown in Figs. 2 and 3, to approximately fit the ring, and thus prevent bruising the same.

The drawings show the opening-dies upon the front of the operative faces and the closing-dies in the rear of the same. In Figs. 1 and 2 the upper die carries in front the convex seat *a a'* and the lower die the pressing-face *e*, while in the rear the upper die carries the convex transversely-grooved pressing-face *c* and the lower die the concave transversely-grooved seat *d*.

The concave seat is made with a smaller curvature or radius than any ring to be supported thereon, and thus furnishes two supports, one at each end of the groove, with an intermediate recess into which the ring can be bent by the pressing-face. The face *c* is made convex to touch the interior of the ring opposite the center of the recess in the seat *d* in the die B, and such die and face are adapted to bend rings of materially different diameters. This arrangement of the seats and faces upon the two dies permits the ring to be opened or closed by merely shifting it from one groove to the other, as shown at *k* and *k'* in Fig. 2, and without turning or reversing the ring at all.

If the two seats were made on the same die and the two pressing-faces upon the opposite die, the ring would have to be reversed in position for the operation of the dies, which would involve unnecessary labor.

The transverse grooving of the seats and faces is clearly shown in Figs. 4 and 5, thus affording surfaces adapted to fit approxi-

mately the wire of the rings and press upon the same without bruising.

Figs. 6 to 9 show the same arrangement of dies upon the upper jaw B' and the lower jaw A' of a pliers having handle *c*. In this construction the seat and face for opening the ring are arranged at the outer ends of the jaws in their opposed faces, and the seat and face for closing the ring are arranged closer to the pivot *h* of the jaws. Such arrangement is preferable, as more force is required to close the ring than to open it, and the closing dies are therefore set closest in the pivot.

The conjunction of the opening and closing dies in a single tool affords very great convenience and economy in manipulating such divided rings.

Having thus set forth the nature of the invention, what is claimed herein is—

1. A ring-bending tool having two dies each provided with a pair of reversely-shaped bending-faces, the concave face upon one being opposed to the convex face upon the other, and such reversely-shaped faces being adapted respectively to open and close a ring when the ring is applied in the same position thereto.

2. The ring-bending dies having two pairs of bending-faces adjacent to one another, one pair comprising a concave seat grooved to steady the ring and a pressing-face opposite thereto, and the other pair comprising a convex seat formed with two end supports grooved to steady the ring, and a recess between such supports, and a pressing-face opposite to the recess, whereby rings of various sizes may be opened or closed, substantially as herein set forth.

3. The ring-bending dies for opening divided rings, one die having a convex seat formed with two end supports grooved to steady the ring, and having a recess between such supports, and the other die having a pressing-face opposite to the recess, whereby rings of various sizes may be opened or closed, substantially as herein set forth.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

LUCENA M. MORDEN.

Witnesses:

THOMAS S. CRANE,
L. LEE.