

J. A. SMART.
TUBULAR CUTTING PUNCHES.

No. 174,386.

Patented March 7, 1876.

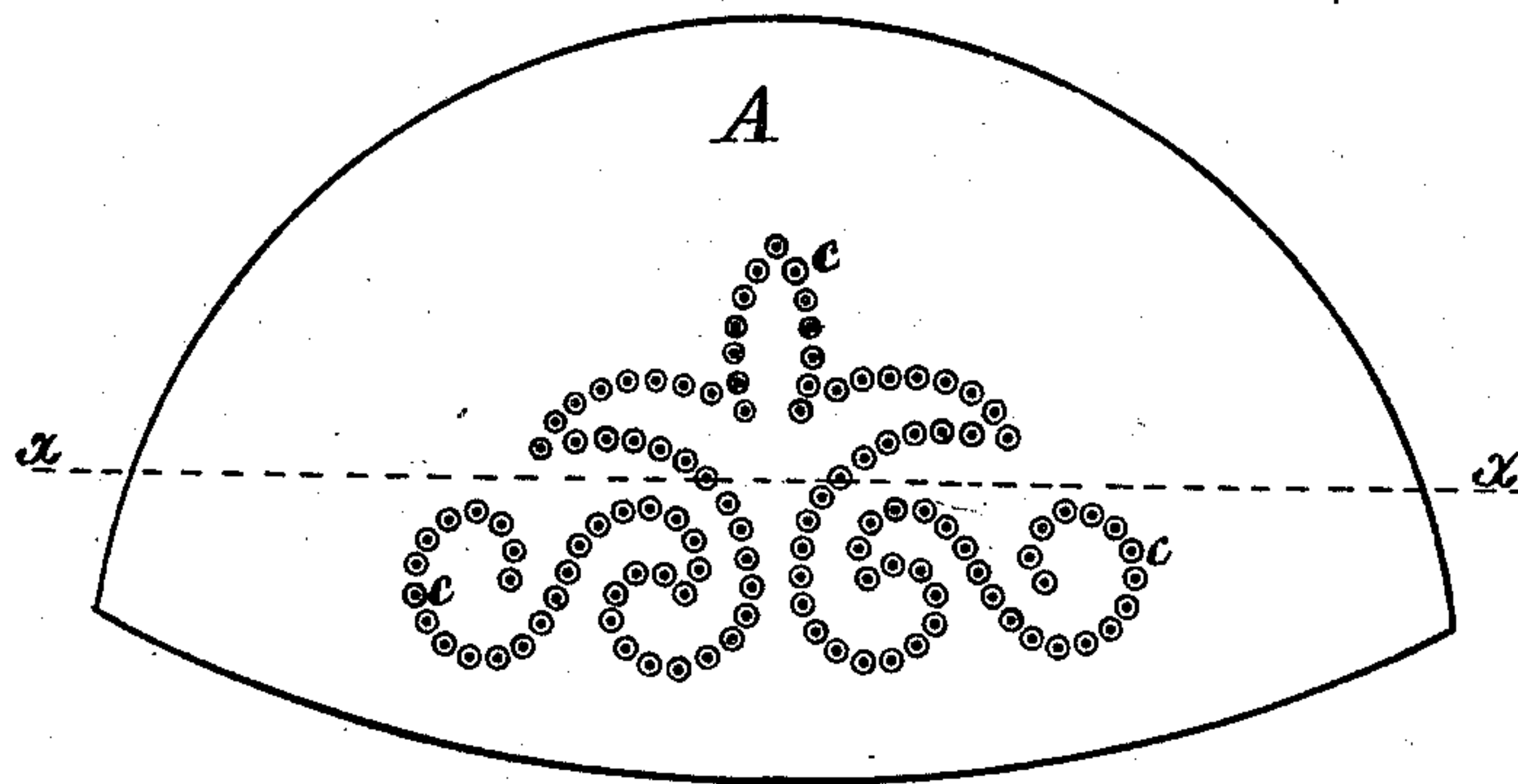


FIG. 1.

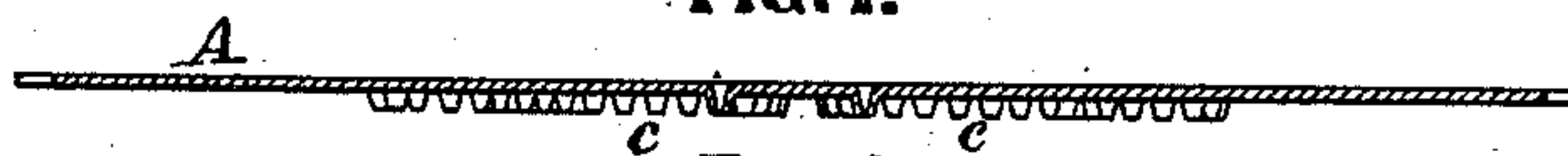


FIG. 2.



FIG. 5.

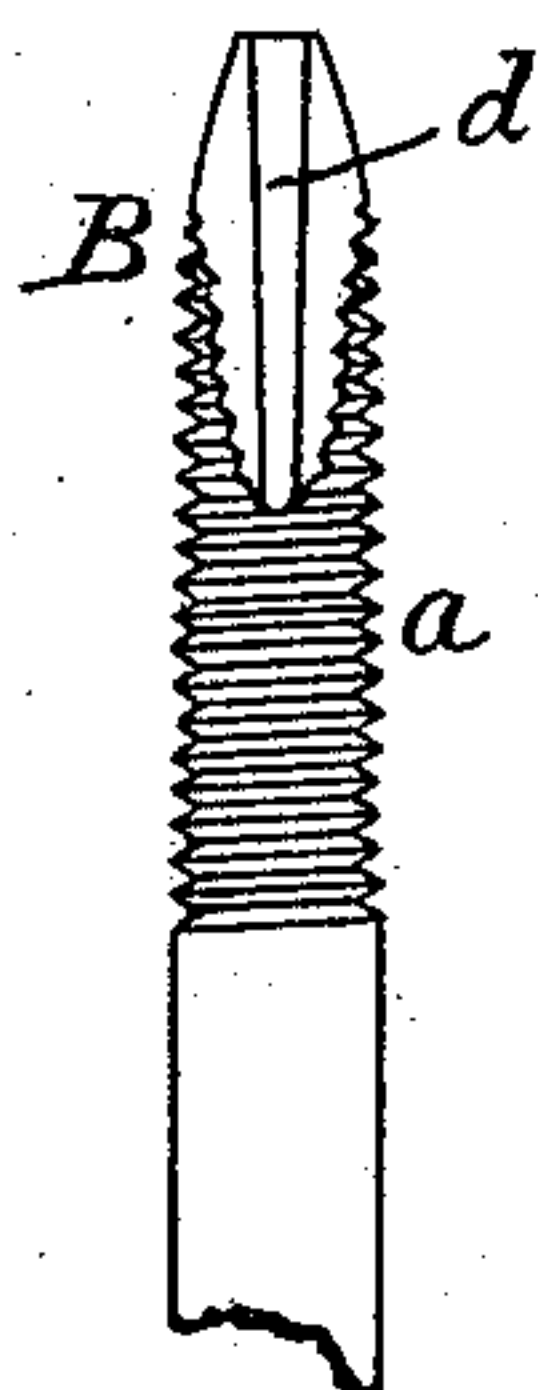


FIG. 3.

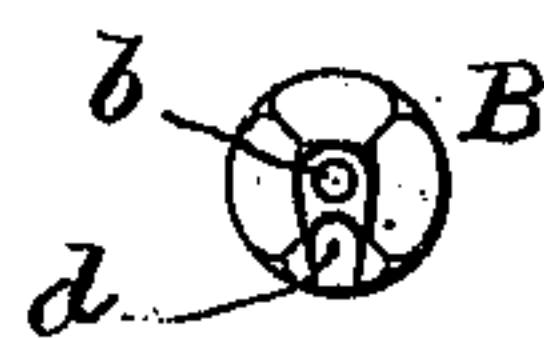


FIG. 4.

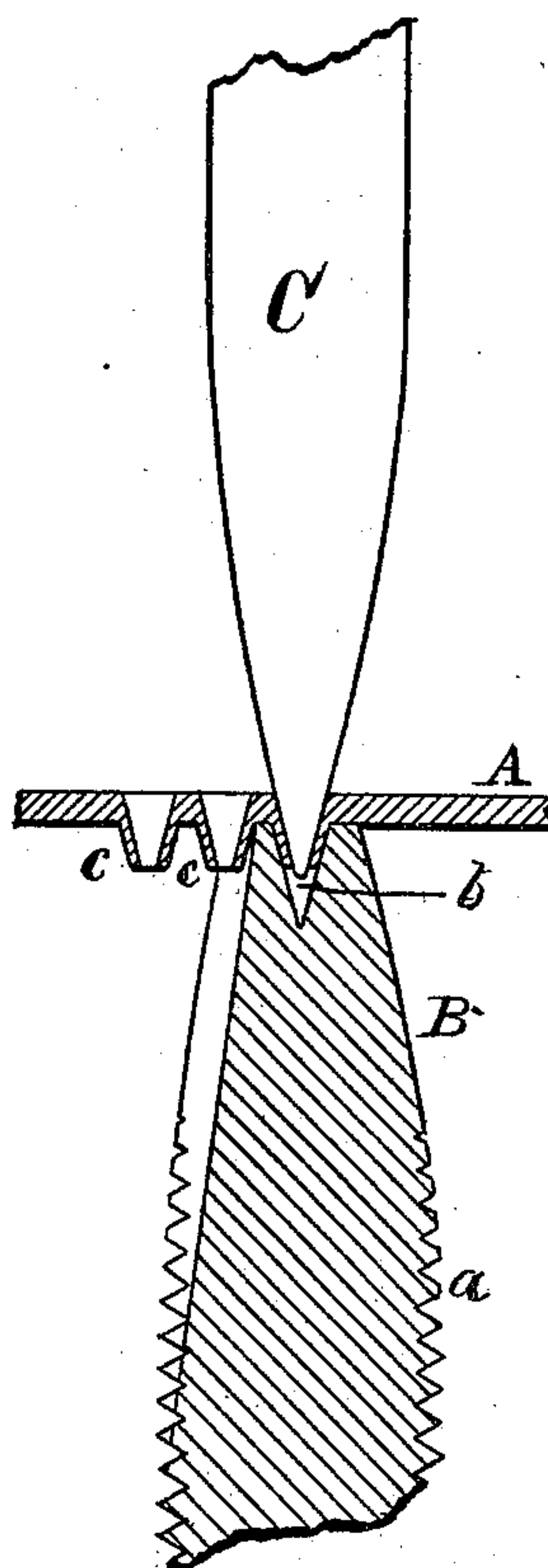


FIG. 6.

WITNESSES.

Wm. P. Edwards

E. A. Hemmenway

INVENTOR.

Jasper A. Smart

2 Sheets—Sheet 2.

J. A. SMART.

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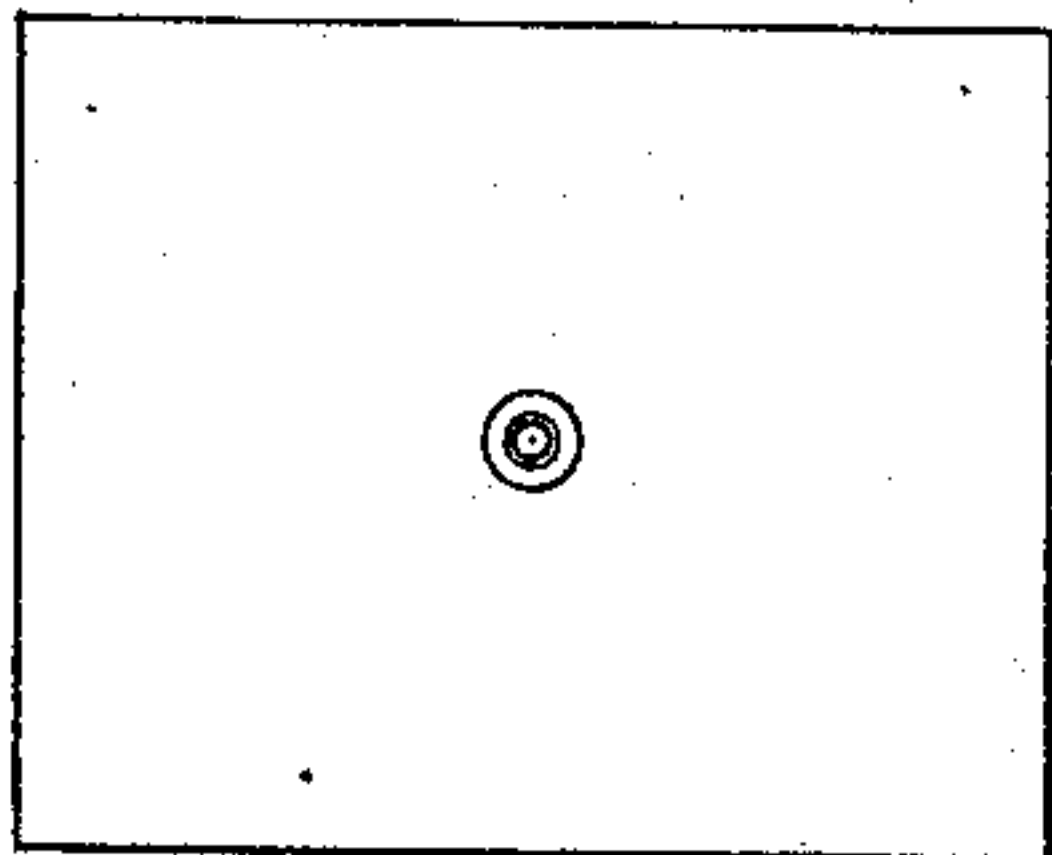


Fig. 7.



Fig. 8.

WITNESSES.

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UNITED STATES PATENT OFFICE.

JASPER A. SMART, OF EAST MEDFORD, MASSACHUSETTS.

IMPROVEMENT IN TUBULAR CUTTING-PUNCHES.

Specification forming part of Letters Patent No. **174,386**, dated March 7, 1876; application filed January 3, 1876.

To all whom it may concern :

Be it known that I, JASPER A. SMART, of East Medford, in the county of Middlesex and State of Massachusetts, have invented a new and useful Tubular Cutting-Punch and a method of producing the same, of which the following, taken in connection with the accompanying drawings, is a specification :

The object of my invention is the production, at a comparatively small cost, of small tubular punches to be used in gangs or clusters, arranged according to some regular geometrical design, for the purpose of perforating leather, cloth, paper, or other like material.

My invention relates, first, to the construction of the tubular punch; and it consists in striking up the tubular punch from a plate of iron or steel by displacing the metal to form a taper hole through the plate, and forcing the metal so displaced outward from the side of the plate in the form of an annular projection, every part of the outer edge of which is equidistant from the surface of the plate from which it is formed. It further consists in forming a series of tubular punches, arranged to represent any desired design, in one piece, with a connecting-plate of which each of said punches forms an integral part.

My invention relates, in the second place, to the tools or dies by which said tubular punches are formed, and the method of applying them to form a tubular cutting-punch projecting from the side of a plate of metal, of which it forms an integral part, by displacing a portion of the metal of said plate, and forcing it outward from the side of said plate in the form of an annular projection; and it consists in the use, for the purpose, of a female die, having a conical cavity formed therein of the desired diameter and taper to give the proper form and size to the punch, and a male die or punch having its working end made to fit the interior of the cavity in the female die, with its point slightly rounded, said dies being firmly secured in proper position, with their axes in line, in a suitable press in such a manner that a suitable reciprocating motion may be imparted to the male die. It further consists in forming upon one side of the female die a longitudinal groove or channel, to serve,

in conjunction with the first annular projection or tubular punch formed, as a register or gage, by which the position of the next tubular punch is determined.

In the drawings, Figure 1 is a plan of a punch-plate, having a series of tubular punches projecting therefrom arranged to form a suitable design for perforating a toe-cap for a boot or shoe. Fig. 2 is a section of the same on line *x x* on Fig. 1. Fig. 3 is a side elevation, and Fig. 4 a plan, of the female die for forming the tubular punch. Fig. 5 is an elevation of the male die or solid punch, and Fig. 6 is a section, illustrating the method of applying the dies to form the tubular punch. Figs. 7 and 8 are plan and sectional views of a single tubular punch.

A is a plate of metal, which may be soft annealed steel, or best charcoal-iron, upon the upper side of which is marked, in any suitable manner, the design which it is desirable to reproduce, by means of the gang-punch, in leather, cloth, or other flexible material. The plate A is placed upon the end of the female die B, with one of the points in the design directly beneath the point of the male punch C, when, by a suitable operation of the press in which the dies are mounted, the male punch is forced into the metal, perforating it, and, by virtue of its conical form, forcing the metal displaced downward into the female die, as shown in Fig. 6. The metal thus displaced and thrown downward forms an unbroken annular projection, *c*, from the under side of the plate, somewhat smaller at its end than at its junction with the body of the plate, and having a tapering hole through its center, extending to the upper side of the plate, through which the core or piece of material cut out by the punch is delivered in a well-known manner. The female die B is formed on the end of a steel rod, provided with screw-threads *a*, by means of which (and suitable nuts not shown) it is held in position in the press, though it may be made of different form and be secured in various ways to the bed of the press. This die B has formed in its end a simple tapering hole or recess, *b*, of suitable form, and having straight sides, as clearly shown in Fig. 6, and has also formed upon one side of its exterior

a groove, *d*, extending longitudinally of the die-rod B, as shown in Figs. 3 and 4.

The groove *d* is made for the twofold object of serving as a means of registering the plate after the first tubular punch has been formed, for the purpose of producing other like tubular punches at equal distances from each other, and to reduce the thickness of the die upon one side to enable the die to be placed nearer to a tubular punch previously made, without materially weakening the die, the loss of metal, by cutting the groove being compensated for by an excess of metal upon each side of the groove, which serves as a brace to support the walls of the die against separation.

The male die or punch C is made from a rod of steel, having its working end tapered to a nearly sharp point to correspond to the form of the recess *b* in the female die. The plates A—after the tubular projections *c* are all formed, and their ends brought to an even height from the surface of the plate by a file, or rubbing upon a flat level surface supplied with a suitable abrading material, and the burr removed from the outer corner of each punch by means of a hollow or outside reamer—are tempered, if made of steel, or case-hardened, if made of iron.

What I claim as new, and desire to secure by Letters Patent of the United States, is—

1. As a new article of manufacture, a tubular cutting-punch formed by perforating a plate of metal and forcing the metal displaced in the act of perforation outward in the form of an annular ring, having an unbroken cutting-edge equidistant from the plate to which

it is attached, and of which it forms an integral part, substantially as described.

2. A series or gang of tubular cutting-punches struck up from and forming an integral part of a single plate of sheet metal, and arranged to represent any desired symmetrical or ornamental design, and adapted to transfer said design to leather, cloth, or other like material by perforating the same, substantially as described.

3. The method of forming tubular cutting punches from a plate of metal to which they are attached, and of which they form an integral part, after being formed, by subjecting said plate of metal to the action of a conical-pointed punch or male die, and a female die provided with a corresponding conical recess, substantially as described.

4. The female die B, provided with the conical recess or mold *b* and exterior longitudinal groove *d*, adapted for use as and for the purpose described.

5. The combination of the conical-pointed punch C and the female die B, provided with the corresponding conical recess *b*, as a means of forming conical annular projections from the side of a thin plate of metal, as and for the purposes described.

Executed at Boston, Massachusetts, this 31st day of December, 1875.

JASPER A. SMART.

Witnesses:

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E. A. HEMMENWAY.