

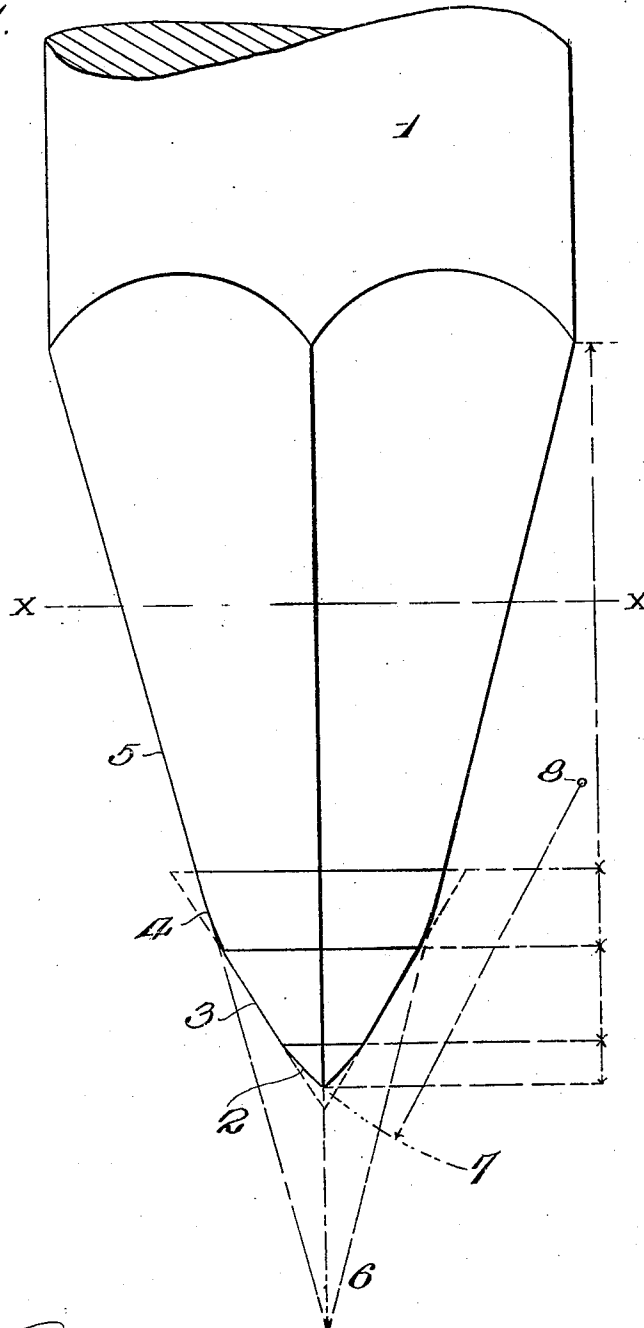
F. H. PIERPONT.
CUTTER FOR PUNCH CUTTING MACHINES.
APPLICATION FILED JUNE 16, 1908.

938,434.

Patented Oct. 26, 1909.

2 SHEETS—SHEET 1.

Fig. 1.



Inventor

Witnesses

Thomas Durant
Thomas Durant

Frank H. Pierpont

By

Church V. Church

Attorneys

F. H. PIERPONT.
CUTTER FOR PUNCH CUTTING MACHINES.
APPLICATION FILED JUNE 16, 1908.

938,434.

Patented Oct. 26, 1909.

2 SHEETS—SHEET 2.

Fig. 2.

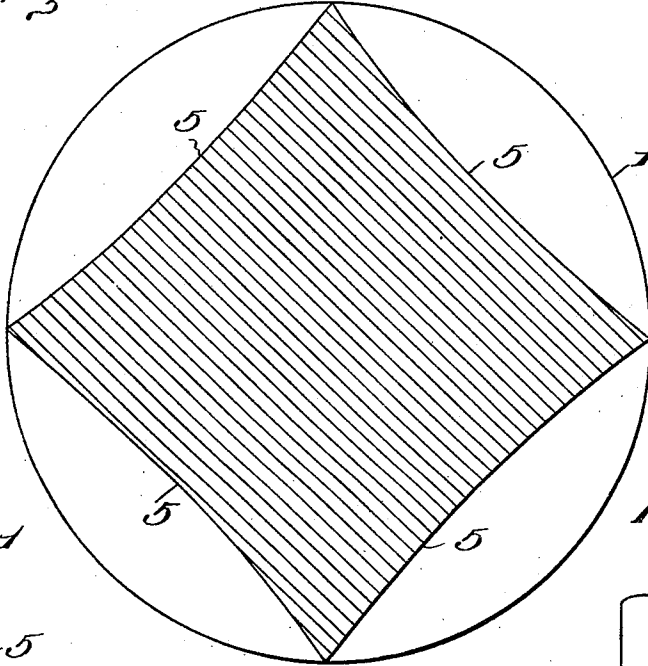


Fig. 5.

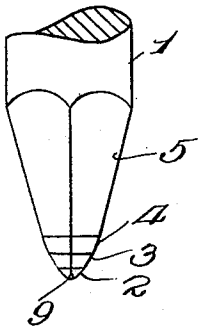
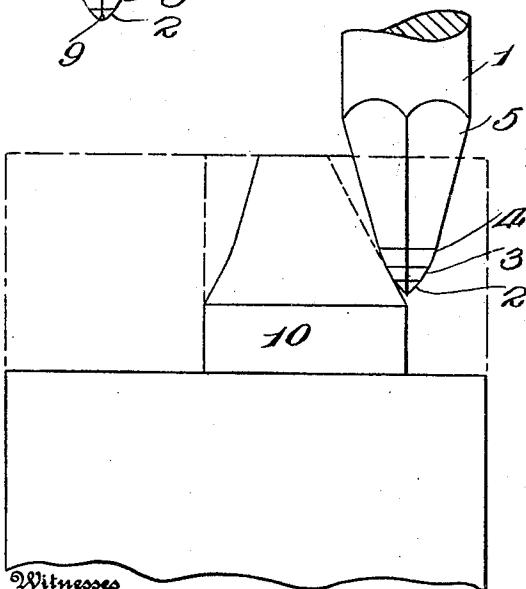


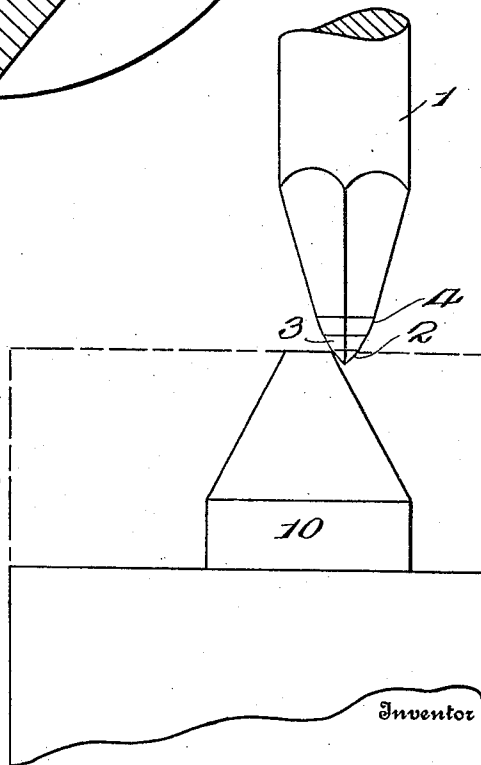
Fig. 3.



Witnesses

For Inve
Thomas Durant

Fig. 4.



Inventor

Frank H. Pierpont

By

Church & Church

Attorneys

UNITED STATES PATENT OFFICE.

FRANK HINMAN PIERPONT, OF HORLEY, ENGLAND, ASSIGNOR TO LANSTON MONOTYPE MACHINE COMPANY, OF PHILADELPHIA, PENNSYLVANIA, A CORPORATION OF VIRGINIA.

CUTTER FOR PUNCH-CUTTING MACHINES.

938,434.

Specification of Letters Patent.

Patented Oct. 26, 1909.

Original application filed July 17, 1906, Serial No. 326,571. Divided and this application filed June 16, 1908. Serial No. 438,834.

To all whom it may concern:

Be it known that I, FRANK HINMAN PIERPONT, a citizen of the United States, temporarily residing at Horley, county of Surrey, England, have invented certain new and useful Improvements in Cutters for Punch-Cutting Machines; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification, and to the figures of reference marked thereon.

This invention relates to a new and improved form or construction of cutters for engraving and die cutting machines and is especially adapted for use in connection with the punch cutting machine of my application Serial No. 326,571, filed July 17, 1906, of which this is a division.

The cutting of type punches is performed by a special engraving or punch-cutting machine provided with a blank holder and a rotating cutting tool which are relatively movable in two directions, the one parallel with the axis of the cutter and the other transverse thereto. The transverse movements are effected and controlled through the medium of a pantographic system equipped with a tracer which is caused to follow at graduated distances the outline of a pattern, the latter a copy on an enlarged scale of the type face to be cut. For practical reasons the side walls of the character produced on the end of the blank and constituting the type punch are formed at an incline, the sides converging toward and intersecting the face, which latter is a reproduction, on a reduced scale, of the master pattern. The angles occurring in the face are not all reproduced in the body, but are merged gradually into the curved or inclined side walls, which result is obtained through the relative adjustment of the blank and cutter longitudinally of the axis of the cutter, and by causing the tracer in its movement about the pattern to more or less approximate without exactly following the outline of the pattern, as illustrated and described in the aforesaid application. Obviously in such a system the form of the punch is dependent partly upon the form of the cutter and partly upon the relative motions of the latter and the blank, and to

secure the best results it is not alone necessary that the cutting edges should be of known or standard form and dimensions, each part bearing a known relation to the controlling or adjusting agents, in order that the effect of the latter may be precalculated, but that they should be of a character or form to produce relatively smooth and even surfaces, notwithstanding the fact that the reduction is effected in successive parallel planes intersecting the punch. Much depends upon the adjusting devices, but unless the cutter is properly shaped and of known and exact dimensions, it is impossible to determine in advance the exact form of the punch, and to prevent the formation of ridges and angles calculated to interfere with the action of the punch in effecting the drive, hence it results that frequent observations of the work, followed by readjustments of the control devices, to compensate for irregularities or departures from the standard due to the defective form of the cutter, become necessary, involving the exercise of the highest degree of skill and the consumption of much time.

The present invention has for its object the production of a cutter fulfilling in a large degree the conditions mentioned, and the same consists in the novel form and arrangement of its cutting edges, as hereinafter fully described, the novel features being specified in the claims.

In the accompanying drawings: Figure 1 is a side elevation of the improved cutter shown upon a greatly enlarged scale. Fig. 2 is a transverse section on line $x-x$, Fig. 1. Figs. 3 and 4 are enlarged side elevation of a punch blank with the cutter applied thereto. Fig. 5 is a modification of the cutter adapted for interior of counter work.

Like characters designate corresponding parts in the several figures.

The cutting tools employed in the formation of type punches are extremely minute, so much so that the details of form are not readily visible to the naked eye and the aid of a magnifying glass is necessary to measure and determine their dimensions and forms, hence, in order to illustrate the invention, it has been necessary to greatly exaggerate the size of the cutter which latter in practice is usually approximately .075 inch

in length and .055 inch in diameter, and is rotated at a speed of from 5,000 to 6,000 revolutions per minute.

The improved cutter consists of a shank or stem (1) terminating in a pyramidal point, (preferably four sides), whereof the line of intersection of adjacent faces affords an edge that, beginning at the point, is first a curve (2); then a straight incline (3) at a given angle to the axis of the cutter corresponding with the angle of the surface to be produced; next a second curve (4) that is the produced first curve; and finally, a straight incline (5) which is a chord of the curve (2—4) and slanting outward to the base at an angle less than that of the first mentioned incline (3). In forming the tool an extreme degree of accuracy is demanded, more especially with respect to the sections containing inclines 3 and curves 2, the former serving to give the finishing cuts and establish the dimensions and angle of the side walls of the punch, and the latter entering the angles and tracing the outline of the face of the punch, and that this work may be executed with accuracy and despatch a special machine has been devised for the purpose and is disclosed in application Serial No. 336,989, filed October 1, 1906. The preferred method of construction is one in which the end of a round wire is reduced, as by grinding, on three or more (preferably four) sides to produce a pyramidal point, as indicated by dotted lines 6, Fig. 1, the angular relation of the several faces to the axis of the cutter being identical and the faces slightly concaved transversely to produce at the intersection of adjacent faces the cutting edges represented by straight inclines 5. The apex or point of the pyramid is next reduced or cut away to produce the curved edges 2—4, which is accomplished by dressing the faces on identical curves 7, the latter struck from a center 8 so located that the arc formed by a radius perpendicular to and touching the face operated upon will bisect the axis of the pyramid within the latter, as indicated in Fig. 1. Finally a section of each of the curved faces thus produced is removed, to form the straight cutting inclines 3, by dressing it off at an angle more obtuse than that of the face nearer the base of the pyramid, the angular relation of said faces to the axis being identical and such as is adapted to produce a straight cutting edge 3 coinciding with that of the side wall of the punch to be produced.

The cutter thus far described is especially adapted for shaping the exterior surface of the punch and is denominated a point tool. Owing to the form of the point it is not well adapted to penetrate the surface, as in the formation of the counters or excavated portions in the face of the punch, and when used for this purpose the two opposite curves 9 are ground away at an obtuse

angle to form a flattened axial drill point as represented in Fig. 5.

The method of operating and the action of the cutter upon the punch blank are illustrated, diagrammatically in Figs. 3 and 4. The end of the blank having been preliminarily shaped by a milling tool to the dimension represented by section 10, the cutter is moved laterally of its axis into contact with and is carried around the projecting end of the blank in a path approximating the form of the face to be produced. The cutter is then shifted longitudinally toward the face of the punch and again applied to the side thereof, but this time its lateral motion is slightly increased, sufficient in extent to cause the straight incline 3 (the latter corresponding in inclination to the surface to be produced) to remove the surface produced by the curve 4 and reduce it to the plane of that resulting from the previous application of the straight incline. These operations are repeated until by successive longitudinal adjustments the inclines 3 of the cutter pass beyond the face of the blank when the finishing cut is made by the extreme end or point of the cutter.

By reference to Figs. 3 and 4 wherein the prepared end of the blank is shown in full lines, the completed punch in dotted lines, and the cutter in two successive stages of longitudinal adjustment and maximum side displacement corresponding with the section to which applied, it will be seen that the major portion of the work is performed by the cutting edges at the base of the pyramidal cutter where it is strongest, the point being protected and reserved for the final or finishing cut at the faces of the punch, and, further, that the straight section 3 intersecting the surface in the plane of the last preceding cut produces a smooth, tapering surface at the precalculated angle, whereas if said straight incline 3 were omitted and the original curvature on the line 2—4 were retained, a circumferential groove would result from each application of the cutter, and instead of a smooth taper the surface would be composed of a series of concaves and intermediate ridges, the latter formed at the intersection of adjacent curves.

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

1. As a new article of manufacture a punch cutting tool such as described comprising a shank or stem terminating in a tapering cutting end or point composed of a plurality of longitudinally converging straight cutting edges merging into curved cutting edges on lines intersecting the axis.

2. A punch cutting tool provided with a shank or stem and a tapering cutter, the latter comprising a plurality of longitudinal cutting edges terminating in converging

curves with intermediate straight sections disposed at an angle to the axis corresponding to the inclination of the finished surface to be produced.

5 3. A revoluble tool for punch cutting machines comprising a shank or stem and a tapering cutting end or point provided with a plurality of longitudinal converging cutting edges, each of the latter consisting of a straight section disposed at an angle to the axis, a curved section, a second straight section disposed at an angle to the axis greater than that of the first named section, and a second curved section.

15 4. A revoluble tool for punch cutting machines the same comprising a shank or stem and a tapering cutting end or point provided with a plurality of longitudinally disposed converging cutting edges each of the latter containing a straight section inclined to the axis of the tool and terminating at the end nearer the axis in an arc shaped curved section of which the said straight section is a tangent, a second straight section joining said curved section and disposed at a greater angle to the axis than the first mentioned straight section, and a second curved section connected to the second straight section.

25 5. A revoluble tool for punch cutting machines the same comprising a shank or stem and a pyramidal cutting end or point the faces whereof are each rounded off on an

are intersecting the axis within the apex and to which the face is tangent.

6. A punch cutting tool provided with a frusto-pyramidal base section with laterally concave faces and a pointed extremity formed by a prolongation of the faces in curves intersecting the axis within the apex of the pyramid.

7. A punch cutting tool provided with a frusto-pyramidal base section, the faces whereof are concaved transversely and a pointed extremity formed by a prolongation of each face first in a curve, next in a straight line, the latter inclined to the axis at a greater angle than the sides of the base section, and finally a curve which is a prolongation of the first named curve and terminates at the axis.

8. A punch cutting tool comprising a pointed angular pyramid whereon the intersection of adjacent faces affords an edge which is first a curve from the point along a convex tip, then a straight incline at a given angle with the axis, next a second curve that is the produced first curve, and finally a tangent to the second curve slanting outward to the base at an angle to the axis less than said given angle.

FRANK HINMAN PIERPONT.

Witnesses:

H. D. JAMESON,
F. L. RAND.