

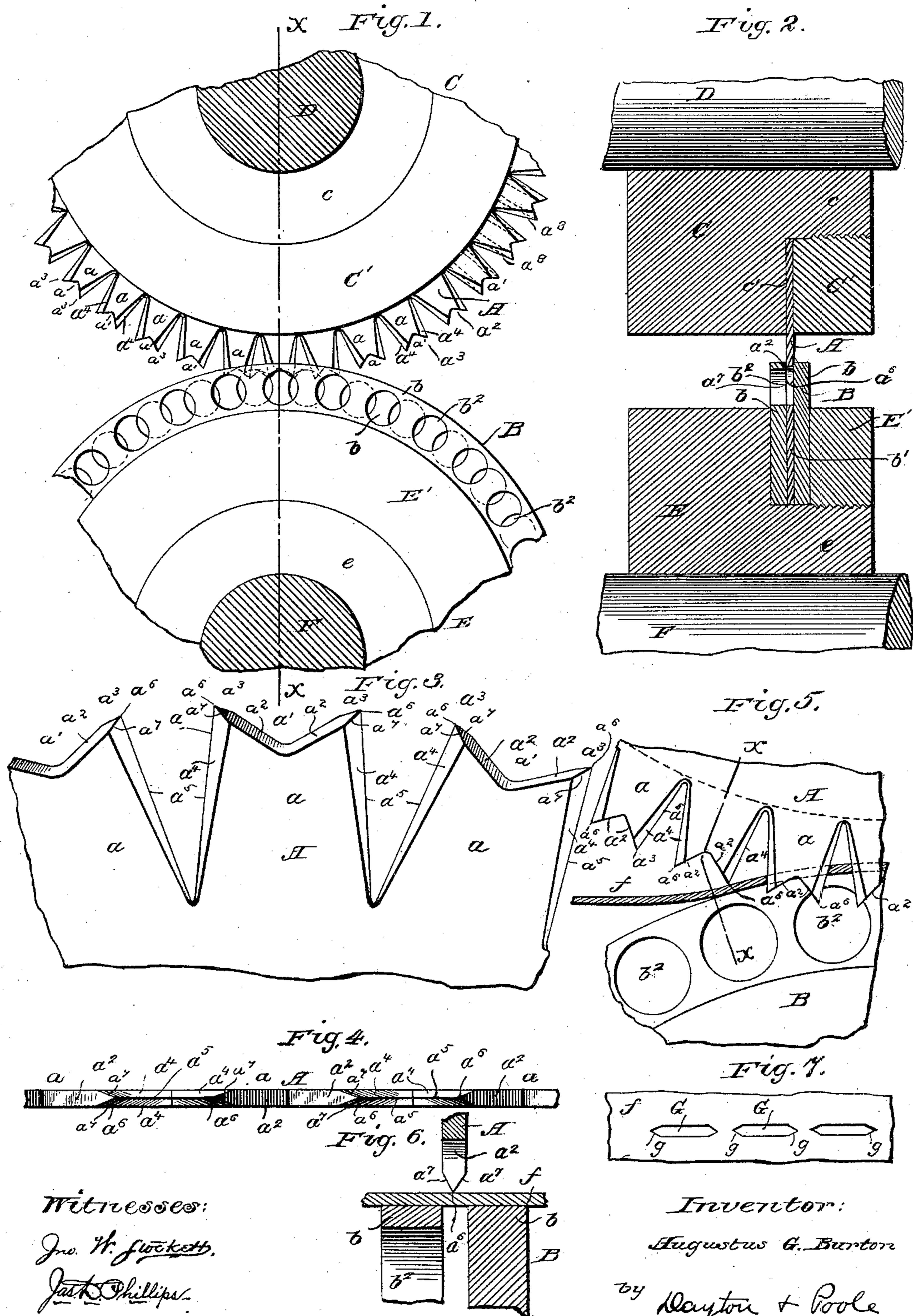
(No Model.)

A. G. BURTON.

CUTTER FOR PERFORATING MACHINES.

No. 371,736.

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Witnesses:
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UNITED STATES PATENT OFFICE.

AUGUSTUS G. BURTON, OF CHICAGO, ILLINOIS.

CUTTER FOR PERFORATING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 371,736, dated October 18, 1887.

Application filed January 29, 1887. Serial No. 225,925. (No model.)

To all whom it may concern:

Be it known that I, AUGUSTUS G. BURTON, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful
5 Improvements in Cutters for Perforating-Machines; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked
10 thereon, which form a part of this specification.

This invention relates to cutters for that class of machines for perforating or partially severing sheets of paper, to facilitate the separation of such sheets in the line of the perforations,
15 having notched or toothed cutters or perforators which operate in connection with opposing matrices.

The object of this invention is to provide an improved construction in the notched cutters
20 adapted for use in machines of the character above mentioned; and it consists in the matters hereinafter described, and pointed out in the claims.

The notched cutter herein illustrated as embodying my invention is of that class which operates by cutting or punching small strips or fragments from the sheet being operated upon, so as to form a series of narrow apertures on the line of perforation. The said cutter
30 is preferably constructed of thin sheet metal, and is arranged to operate in connection with a circular matrix having a continuous annular groove to receive the teeth of the cutter, the said groove being approximately
35 of the same width as the thickness of the cutting-edge of the disk, so that teeth or projections upon the cutter operate in connection with the sides of the groove to cut or shear the paper at the lateral margins of the apertures.

40 Notched cutters, generally similar to those above described, have heretofore been used, in which transverse cutting-edges have been formed at the ends of the cutting-face of each tooth by making a V-shaped notch in the teeth,
45 the object of such transverse cutting-edges being to sever the paper at the ends of the rectangular apertures before the sides thereof are cut by the action of the lateral edges of the teeth and the sides of the groove.

50 As an improved construction in the cutters of the character above described, I bevel the

opposite sides of the end portions of each tooth at either side of the notches between the teeth, so that the beveled faces so formed at their intersection with the inclined faces of the
55 notches in the cutting-faces of the teeth will form a projecting point at either end of said cutting-faces located midway of the thickness of the cutter. By this construction the points at the ends of each tooth in entering the
60 paper will operate first to punch through the paper resting over the groove in its unsupported central portion and will cut or sever the paper diagonally from such central unsupported point to the sides of the groove, after
65 which the lateral margins of the paper will be cut or sheared out by the operation of the lateral margins of the end or cutting faces of the teeth upon the adjacent edges of the groove of the matrix, as hereinafter more particularly
70 described.

In the accompanying drawings, Figure 1 is a fragmentary side view of a circular cutter constructed in accordance with my invention and a grooved matrix, showing part of the
75 supporting rings or collars for the said cutter and matrix and of the shafts upon which the parts are mounted. Fig. 2 is a sectional view taken upon line *xx* of Fig. 1. Fig. 3 is a fragmentary perspective view, much enlarged, of
80 the portion of the notched periphery of the cutter shown in Fig. 1. Fig. 4 is an edge view, much enlarged, of a portion of the periphery of the cutter. Fig. 5 is a fragmentary sectional view taken through the grooved matrix transverse to the shaft, with the cutter in
85 side view, illustrating the operation of the cutter upon the paper in the act of perforating. Fig. 6 is a sectional view illustrating the operation of one of the teeth of the cutter upon
90 the paper, taken upon the indirect line *xx* of Fig. 5. Fig. 7 is a view showing the form of perforations made.

As shown in the drawings, A is a circular cutter, and B is an opposing grooved matrix.
95 The cutter A is, as herein shown, supported upon a ring-sleeve, C, secured to the rotating shaft D of the perforating-machine, the cutter being provided with a central circular aperture considerably larger than the shaft, which
100 is placed over a cylindric projection, *e*, upon the collar C, the cutter being held in place

upon the collar by being clamped between an annular plane, c' , of the collar adjacent to the part C' , preferably provided with an interior screw-thread constructed to engage the exterior threaded portion of the projection c .

The matrix B is, as herein shown, formed by two annular plates, b , supported by suitable clamping nuts or collars concentrically with the matrix-shaft of the perforator and having between them an annular plate or layer, b' , of less diameter than said rings, and constructed to hold them apart, so as to form a groove of the requisite width for the entrance of the cutter, this means of forming the matrix being substantially similar to that shown in Reissued Letters Patent No. 10,652, granted to me October 20, 1885. The said plates b , as shown in the drawings, are provided with central apertures and are fitted upon a cylindrical projection, e , upon a collar, E , secured upon the shaft and held upon said collar by means of a clamping-ring, E' , in the same manner before described in the means for supporting the cutter A upon the shaft D . The plates b are, as shown, constructed to project beyond the exterior surface of the collar E and are provided with a series of lateral apertures, b^2 , for the escape of the particles of paper removed by the cutters from the groove of the matrix, this construction in the matrix also being shown in the patent above referred to.

The periphery of the cutter A is provided with a series of projections or teeth, a , which are made the full thickness of the plate composing the cutter at their cutting-faces, and are constructed to operate in connection with the lateral margins of the groove of the matrix to cut or shear the paper at either side of the apertures formed by the said teeth. The cutting faces or ends of the said teeth are preferably notched, as indicated at a' , so as to form oppositely-inclined faces a^2 and projections a^3 at the ends of the said cutting-faces, so that in forming the perforations the paper at the ends of the apertures will first be punctured by the said projections a^3 , and the fragment of paper to be removed from the aperture afterward severed at its lateral margins from the adjacent parts of the sheet by the action of the inclined cutting-faces a^2 of the teeth upon the edges of the grooved matrix.

As an improved construction in teeth constructed generally in the manner above described, the edges of the said teeth adjacent to the notches between the teeth are provided, as shown more clearly in Fig. 3, with oppositely-beveled faces a^4 , which meet at an edge, a^5 , midway of the thickness of the cutter, and thereby form at the intersection of said beveled faces and the oppositely-inclined faces, a^2 of the notched ends of the teeth sharp projecting points a^6 and oblique cutting-edges a^7 , extending from said points a^6 to the lateral faces of the teeth at the points at which the beveled faces a^4 join said lateral faces.

The sides of the spaces or notches between the teeth may be parallel with each other, as

indicated by the dotted lines a^8 in Fig. 1; but as a preferred construction said notches are V-shaped, so that the teeth are broader at their bases than at their cutting-faces, the object of this construction being to prevent the paper at the ends of the perforations from being broken or torn by the back edges of the teeth as the latter are withdrawn therefrom.

The operation of the teeth constructed as above described is more clearly shown in Figs. 5 and 6, in which a portion of a sheet of paper (indicated by f) is shown as passing between the cutter and matrix. As illustrated in Fig. 5, two of the teeth therein shown are represented as having passed entirely through the paper, and another tooth is represented with its point a^6 resting upon the surface of the paper and about to puncture it. The enlarged sectional Fig. 6 illustrates the position of the point of the tooth when in the position last mentioned with reference to the sides of the groove and the cutters, the point, a^6 , as therein shown, being in contact with the paper midway of the sides of the groove over which the paper rests.

In the inward movement of the teeth toward the groove from the position shown in Fig. 6, it is obvious that the point a^6 will first puncture the paper, and the cutting-edges a^7 , adjacent thereto, will then operate to sever the paper in an oblique line until the latter has been cut the full width of the groove, after which the sides will be cut by a shearing action between the sides of the said groove and the cutting-faces of the tooth.

An advantage is found in making the teeth of a circular cutter with V-shaped notches between them, or broader at their bases than at their cutting-edges, as herein shown, for the reason that when the sides or lateral edges of the teeth are parallel, as shown in dotted lines in Fig. 1, the rear edges are liable, on account of the circular form of the cutter and the consequent angular position of the said rear edges of the teeth to the paper at the moment of withdrawal, to tear or break the paper at the ends of the apertures, and thereby give a rough appearance to the work. In the form of tooth shown, however, the lateral margin of the teeth, being divergent toward the body of the cutter, will obviously tend to slightly elongate the apertures formed by their cutting-faces in entering to their full depth in the groove of the matrix, and in order to prevent the paper at the ends of the apertures from being irregularly torn or broken in this operation the edges a^5 , formed by the oblique faces a^4 , are preferably sharpened, so that in the farther entrance of the teeth after their cutting-edges have formed the apertures said edges a^5 will operate to slightly cut or slit the ends of said apertures at the median line thereof. The paper, when cut or slit in this manner, will return itself to its normal position, so as to present a flat and smooth appearance at the ends of the apertures, or may be readily flattened by passing between the

feed-rollers of the perforating-machine or through flattening-rollers thereon especially adapted for the purpose. The slits or cuts formed at the ends of the apertures, as described, possess the advantage of causing the paper to tear in the proper direction between the apertures when the perforated sheet is torn apart, and thereby give a clean edge to the several portions thereof.

10 A notched cutter having teeth made in the manner herein shown and described may obviously be applied to machines employing straight reciprocating cutters, as well as to machines in which circular revolving cutters are used.

15 I claim as my invention—

1. The combination, with a grooved matrix, of a cutter having a series of teeth upon its periphery, which are notched upon their cutting-faces and oppositely beveled at their lateral

edges to form points a^6 , substantially as and for the purpose set forth.

2. The combination, with a grooved matrix, of a cutter having a series of notched teeth upon its periphery, provided with oblique lateral faces a^4 , forming sharp lateral edges a^5 , substantially as described. 25

3. The combination, with a grooved matrix, of a cutter having a series of teeth, a , provided with oppositely-inclined end faces, a^2 , and beveled lateral edges constructed to form, with the faces a^2 , points a^6 and oblique cutting-edges a^7 , substantially as and for the purpose set forth. 30

In testimony that I claim the foregoing as my invention I affix my signature in presence of two witnesses. 35

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