

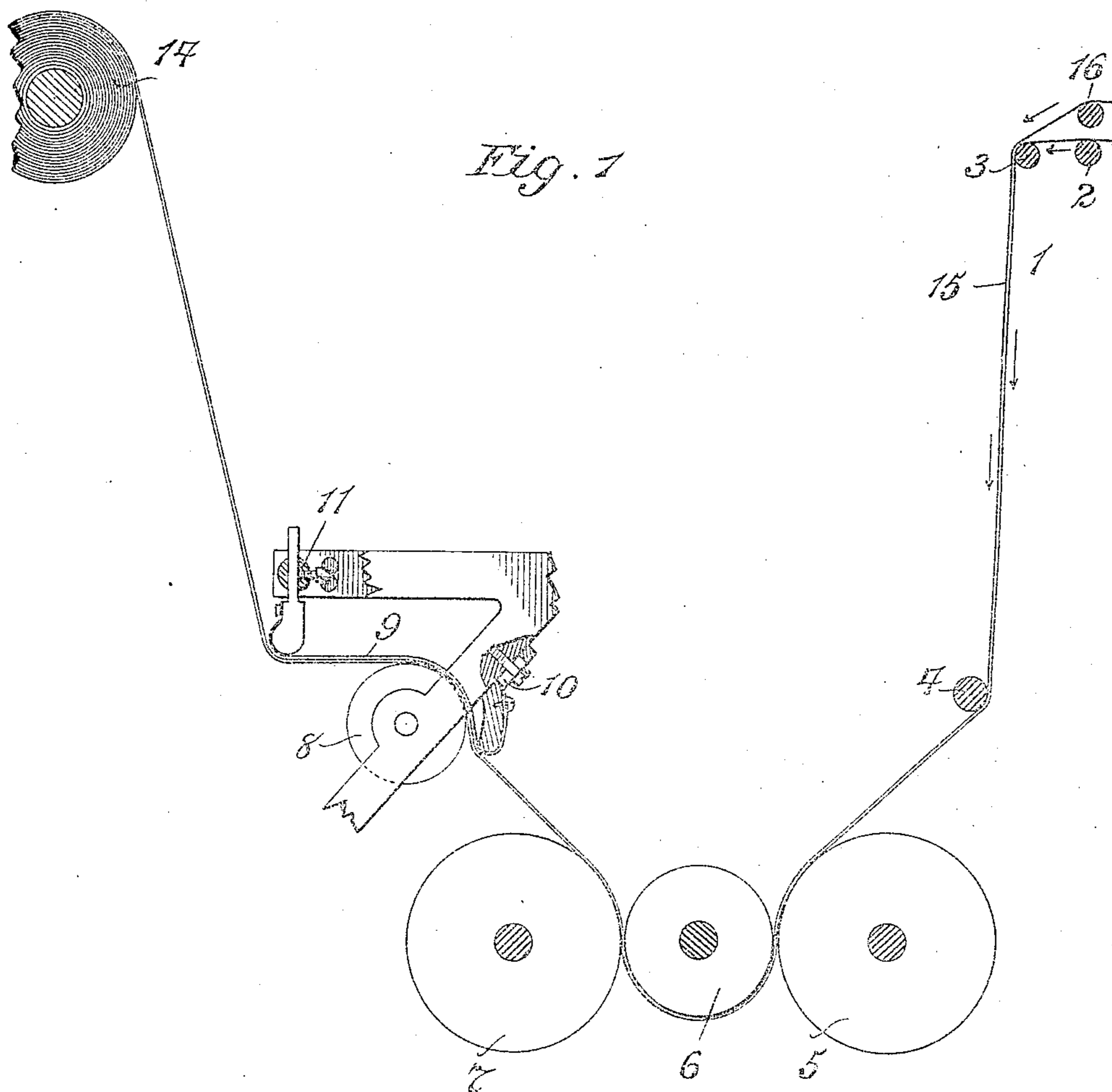
No. 835,189.

PATENTED NOV. 6, 1906.

B. KARFIOL.
METHOD OF PERFORATING OR DIVIDING PAPER.

APPLICATION FILED JULY 5, 1906.

2 SHEETS—SHEET 1.



Witnesses
Edward C. Bouchard
Wm L. Morris

Benzion Karfiol Inventor

By His Attorneys
Hewitt & Hewitt

No. 835,189.

PATENTED NOV. 6, 1906.

B. KARFIOL.
METHOD OF PERFORATING OR DIVIDING PAPER.
APPLICATION FILED JULY 5, 1906.

2 SHEETS—SHEET 2.

Fig. 2.

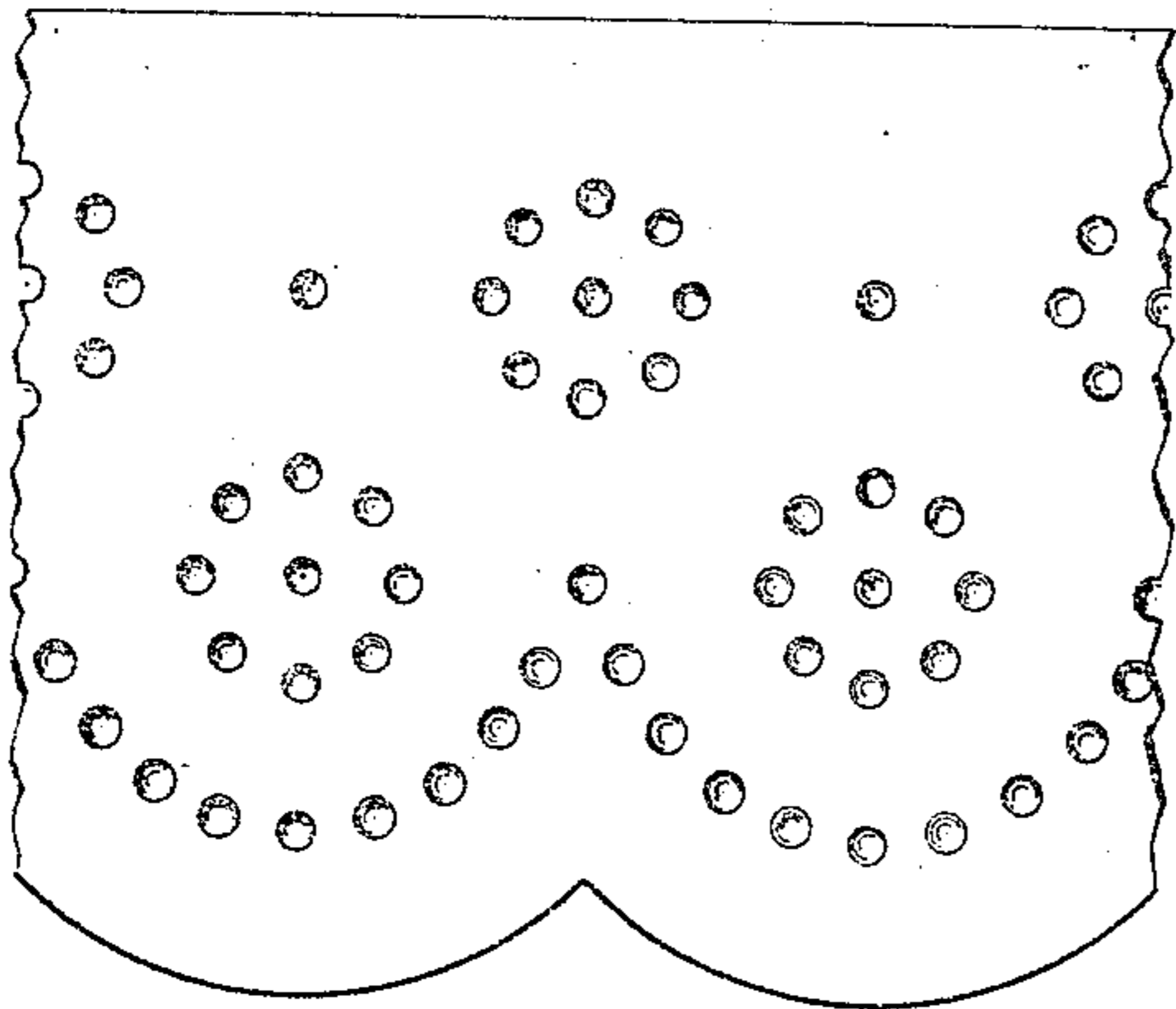


Fig. 3.

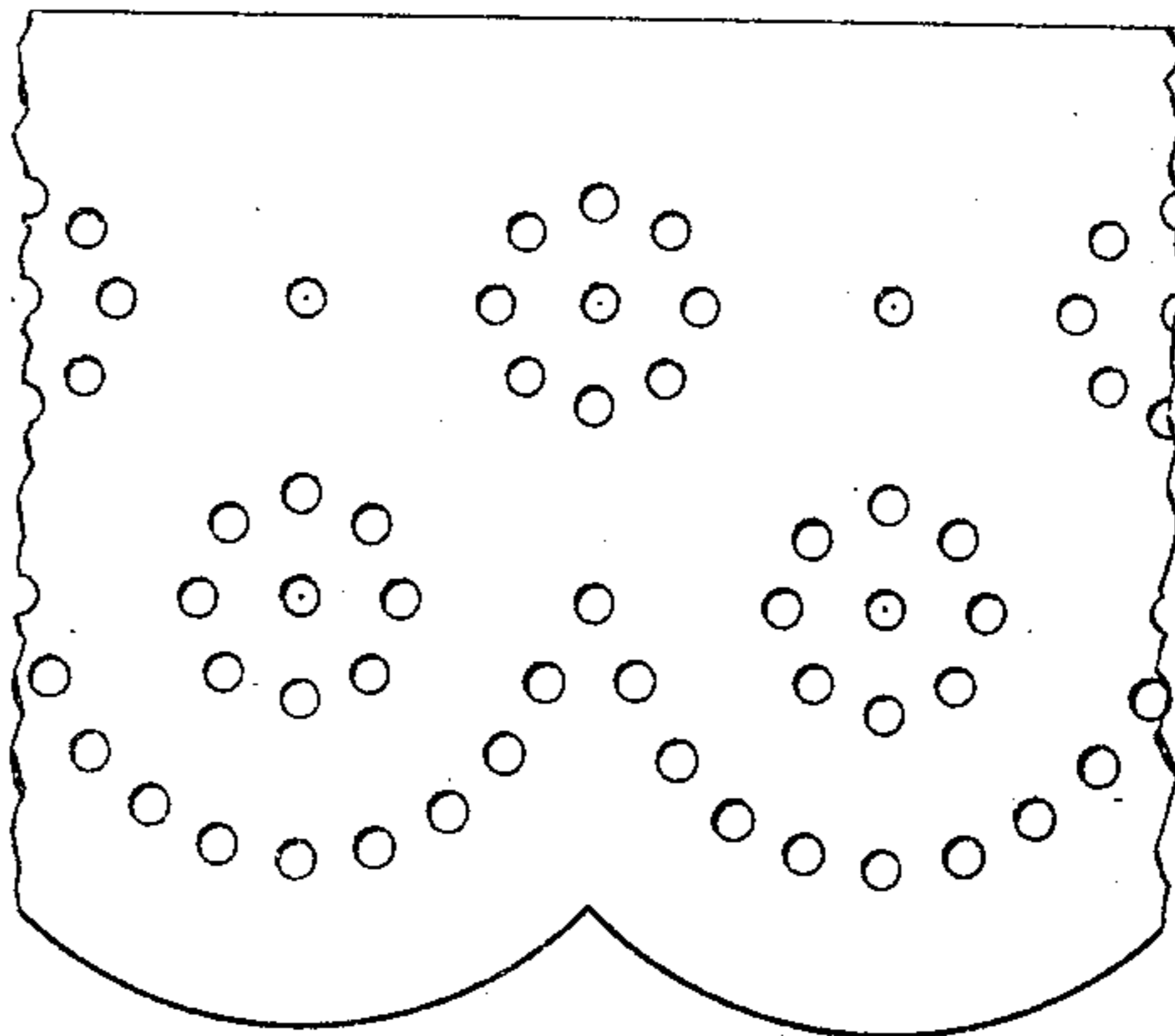


Fig. 4.



Fig. 5.

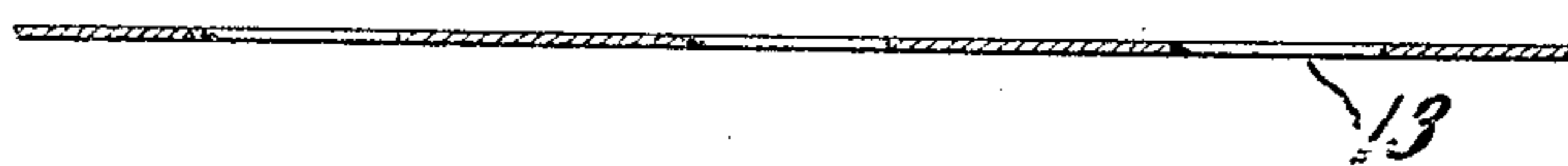
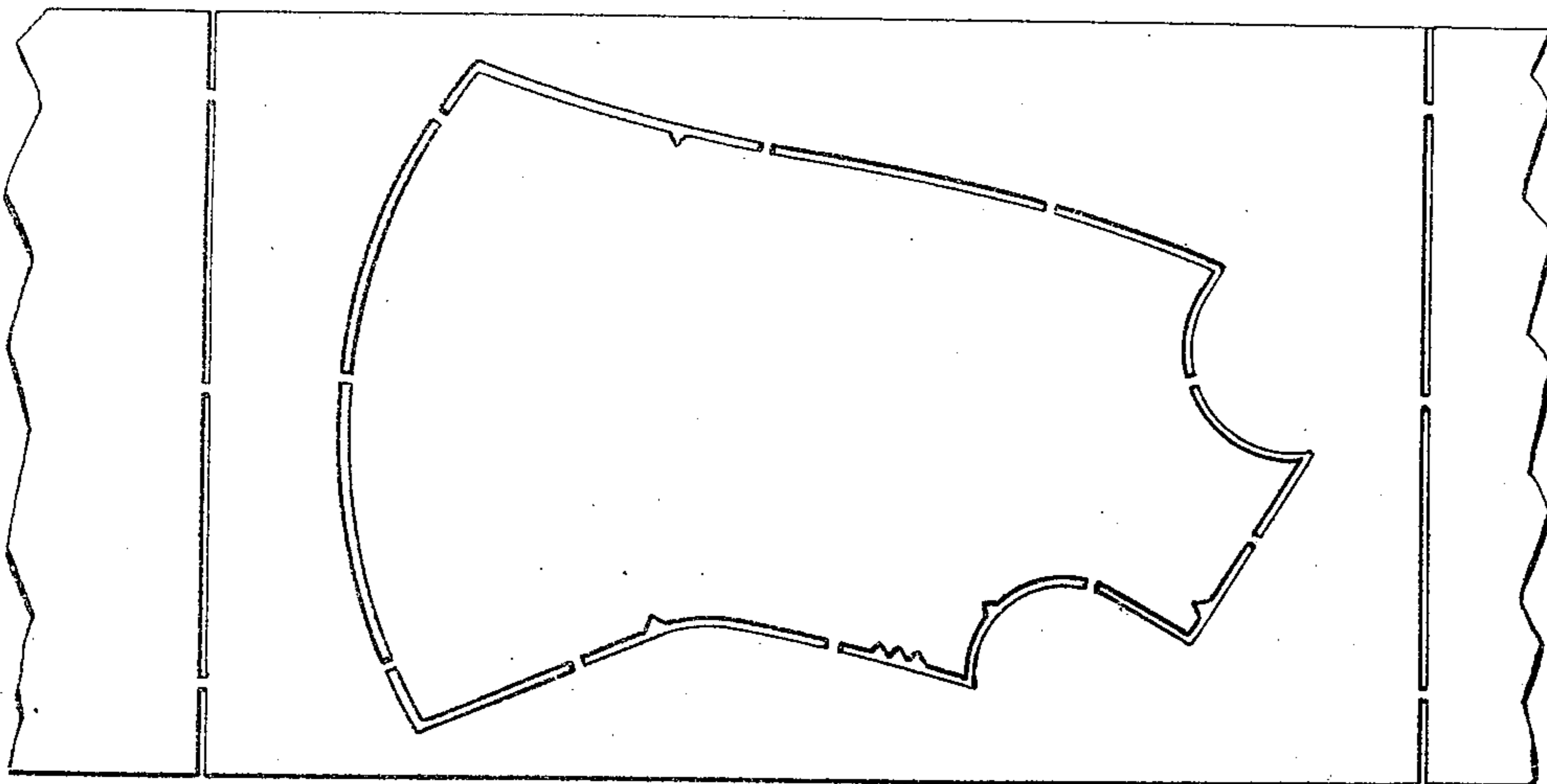


Fig. 6.



Witnesses
Edward L. Rowland
Wm. L. Morris

Benjamin Karfiol Inventor

By his Attorneys
Stewart & Stewart

UNITED STATES PATENT OFFICE.

BENZION KARFIOL, OF NEW YORK, N. Y.

METHOD OF PERFORATING OR DIVIDING PAPER.

No. 835,189.

Specification of Letters Patent.

Patented Nov. 8, 1906.

Application filed July 5, 1906. Serial No. 324,884.

To all whom it may concern:

Be it known that I, BENZION KARFIOL, a citizen of the United States of America, and a resident of the borough of Brooklyn, county of Kings, city and State of New York, have invented certain new and useful Improvements in the Method of Perforating or Dividing Paper or other Sheet Material, of which the following is a specification.

My invention relates to a novel method of perforating paper or other sheet material, having perhaps particular reference to what is known as "lace paper," or paper which is perforated for ornamental purposes. Instead of perforating the material by forcing a cutting-tool directly through the sheet, and thus at once effecting the perforation or division, in my invention I first indent the sheet so as to produce on one side thereof certain elevations or protuberances along the lines on which it is finally to be divided or perforated. This indented but unfinished product I then treat in such a way as to cause the elevations thereon to be removed, whereby the material is divided, and holes or perforations are made to appear therein along the desired lines.

The advantages of my invention are various. In the first place, I need no high pressure at the dies, as would be the case were the cutting done directly through the sheet. Again, I avoid the necessity of troublesome and special provision for the removal from the machinery of the paper or other cuttings or particles, due to the division of the material. As is well known, where in the manufacture of lace paper perforating-dies are used high pressure must be maintained between the dies, and there results, even when the machinery is operating most efficiently, injury to the fabric of the paper, often a tearing of it, and also injury to the machinery. Moreover, there presently results yet more serious injury by reason of the clogging of the dies by paper-cuttings. Such cloggings at once impair the efficiency of the cutting operation and by their presence in the dies injure the paper. Furthermore, by accumulation and by being forced into the dies at high pressure the cuttings or clogged particles soon injure and render worthless the dies.

Having briefly set forth the nature and objects of my invention, I will now describe the same in detail in connection with the accompanying drawings, in which---

Figure 1 is a diagrammatic view of one form of apparatus by which my process may be performed. Fig. 2 is a view showing a piece of the paper which has been indented, but not yet cut or divided. Fig. 3 is a view showing the paper of Fig. 2 after the indentations thereon have been cut or divided off. Fig. 4 is an enlarged detail view disclosing the manner in which the paper is indented. Fig. 5 is a view similar to Fig. 4, showing the appearance of the paper after the indent of Fig. 4 has been removed. Fig. 6 is a view showing my invention as applied to pattern-making, the pattern-sheet being divided, as by my process, to show the pattern in outline and ready for detachment from the sheet.

A sheet of paper 1 is shown as fed from a roll 2 over idlers 3 and 4 and down between the rolls 5 and 6. Roll 6 is a steel roll having cut in its face the design to be impressed upon the paper. The roll 5 is a roll for holding the paper snugly to the roll 6. Also disposed against roll 6 is a matrix-roll 7. The matrix-roll 7 is a counterpart of the roll 6, having cut into its face the counterpart of the design borne by the latter roll. The matrix-roll 7 is usually of softer material than roll 6 and receives its design from the latter by rolling engagement therewith under pressure before the introduction of the paper.

Heretofore, in apparatus where roll 6 is a cutting-roll and punches through the paper, the rolls 5, 6, and 7 have been maintained against each other under great pressure, and the sheet has been perforated between rolls 6 and 7 by the coacting edges of the dies thereon. In my process, however, the pressure between rolls 6 and 7 is only sufficient to indent the paper. From roll 7 the paper passes up to an abrading or cutting roller 8, being held resiliently against the face thereof by any suitable pressure device, such as a bent spring-piece 9, the tension of which may be varied, as by adjustments 10 and 11. It will be noticed that the abrading-roller 8 is on the same side of the paper as the roll 7, whereby the protuberances or indentations 12, (see Fig. 4,) projected on that side of the paper by the roll 6, may come into contact with the roller 8. The roller 8 has a surface of emery, ground glass, or other suitable abrading material and is driven in any suitable manner. This revolving surface removes the elevations from the surface of the paper, and naturally the desired perforations 13 (see Fig. 5) appear in their places. From

the roll 8 the finished paper passes to a take-up roll 14.

In the drawings I have shown a second strip of paper 15, being fed from a second supply-roll 16 to the idler 3, where it is superimposed upon the strip 1, and thus positioned passes through the steps described in connection with the latter. This second strip of paper may or may not be employed. Preferably, however, I use two strips, for the one tends to support the other, and thus make the indentations produced at the rolls 6 and 7 more rigid or stable, whereby they may stand up better to the action of the cutter 8.

In the application of my invention to the manufacture of lace paper the roll 7 would ordinarily be the usual embossing-roll. In passing between the rolls 6 and 7 the paper would therefore receive the usual embossings on its upper or face side, while the indentations made by the roll 6 would appear on the reverse or under side. My invention is thus seen to comprise two distinct and important steps. In the first step of my process it will be noted that I produce an unfinished article—namely, a paper or other material indented on one side, but as yet uncut. This article is novel with me and is characteristic of my invention. The second step of the process consists in a treatment of the indented material to cut or divide from its body the indentation or elevation produced in the first step.

Since in my invention the cutting is done by removing the elevations on the surface of indented sheet material, the necessity of punching through the sheets is obviated, and consequently my process admits of considerable selection of cutting means or methods, thus making possible more efficient cutting and a better finished article. For instance, a knife-edge by its nature is likely to injure a fabric, such as paper, and yet heretofore it has been the most practicable means for cutting. In my invention, however, as I simply have protuberances or indentations to remove, I prefer to grind off the same. The advantages of grinding are several. Grinding involves no dies to become clogged, and it is an easy matter to take care of the particles removed from the sheet. The perforations or divisions may by grinding be made practically perfect, in that the elevations or protuberances may be removed flush with the surface of the sheet without any chance of injury to the latter. A grinding-tool, even if in contact with the face of the sheet, will not catch or injure the same, providing the engagement of the tool with the paper is to some extent yielding.

In the removal of the indentation by the grinder I rely on the natural stability of the paper or other fabric to enable the elevations or protuberances to stand up against the action of the grinding-tool. The fabric being

more or less delicate, however, it should not be held in absolutely unyielding engagement with the tool. Unless free to have some slight movement relative to the face of the grinder the material would be cut by the latter and torn. Therefore, where the material passing in a sheet over the grinder from the indenting to the take-up rolls would not by virtue of its character and the length of the sheet have sufficient resiliency of movement at the grinder, a further means for providing resilient engagement of the sheet and grinder is introduced. In the present case I have shown the paper as bearing lightly on the grinding-roll by reason of the action of the spring 9. Other means for obtaining a resilient engagement of the grinder with the indented material may of course be substituted for that shown.

Where in some instances the fabric may be particularly delicate or flimsy, I superimpose a plurality of sheets of the same before the indenting step. The sheets then indented, the pyramids or indents thereon being presented to the grinder in multiplex will stand up to the latter, so as to be cut cleanly and effectively, no matter how delicate the texture may be. Additional advantages of my method are, then, that a number of sheets may be prepared simultaneously and that, regardless of the nature of the fabric, the paper can be divided without injury thereto.

Whereas I have stated my invention as particularly adaptable to the manufacture of lace paper, it is obvious that it may be equally adaptable and useful in almost any instance where paper is to be divided or perforated. My invention may, for instance, be employed to great advantage in the manufacture of dress-patterns. In such use it is merely necessary to indent the pattern-paper along the line of the pattern to be cut, leaving an occasional break in the indent in order to provide means for maintaining the pattern in the sheet until it is desirable to detach the same. Then, upon the division of the pattern-paper along the line of the indentation, the pattern will be severed, except for the retaining-pieces left at the points where the indent was broken. The pattern may thus be made in a simple and expeditious manner by merely passing the paper through the steps of my invention hereinbefore described, and the pattern-sheets emerging from the machine are at once ready for shipment and use. Obviously, moreover, my invention is not confined to the division or perforation of paper alone. The invention is applicable wherever any sheet material of a nature to be indented in the manner described is to be cut or divided for almost any purpose. For instance, by my process the ornamental trimmings of brass or other metal used on picture-frames, furniture, and elsewhere are readily and effectively made.

The variety of the material and the purpose for which such may be used when cut in accordance with the present invention, are innumerable.

5 What I claim is—

1. The method of cutting or dividing paper or other sheet material which consists in first indenting the paper or other sheet material along the lines where it is desired to divide the same, and then cutting the indentations from the material while maintaining the latter in resilient engagement with the cutting-tool.

2. The method of cutting or dividing paper or other sheet material, which consists in first indenting the paper or other sheet material along the lines where it is desired to divide the same and then grinding or abrading the indentations from the material while maintaining the latter in resilient engagement with the grinding-tool.

3. The method of cutting or dividing paper or other sheet material which consists in first indenting the paper or other sheet material along the lines where it is desired to divide the same, and then grinding or abrading the indentations until the same are reduced to a plane flush with the surface of the sheet while maintaining the latter in resilient engagement with the grinding-tool.

4. The method of making lace paper which consists in indenting the paper where it is desired to cut out portions of the paper and then cutting the indentations from the material while maintaining the latter in resilient engagement with the cutting-tool.

5. The method of making lace paper which consists in indenting the paper where it is desired to cut out portions of the paper, and then grinding or abrading the indentations from the material while maintaining the latter in resilient engagement with the cutting-tool.

6. The method of making lace paper which consists in indenting the paper where it is desired to cut out portions of the paper

and then grinding or abrading the indentations, until the same are reduced to a plane flush with the surface of the paper while maintaining the latter in resilient engagement with the grinding-tool.

7. The method of making lace paper which consists in first embossing the paper so that the embossed portion appears on one side of the paper and then indenting the paper along lines where it is desired to cut the same, said indentations appearing on the opposite side of the paper from the embossed surface, and then cutting said indentations from the material while maintaining the latter in resilient engagement with the cutting-tool.

8. The method of making lace paper which consists in first embossing the paper so that the embossed portion appears on one side of the paper and then indenting the paper along lines where it is desired to cut the same, said indentations appearing on the opposite side of the paper from the embossed surface, and then grinding or abrading the indentations from the material while maintaining the latter in resilient engagement with the grinding-tool.

9. The method of making lace paper which consists in first embossing the paper so that the embossed portion appears on one side of the paper and then indenting the paper along lines where it is desired to cut the same, said indentations appearing on the opposite side of the paper from the embossed surface, and then grinding or abrading the indentations until the same are reduced to a plane flush with the surface of the paper while maintaining the latter in resilient engagement with the grinding-tool.

Signed by me in the city, county, and State of New York this 27th day of June, 1906.

BENZION KARFIOL.

Witnesses

PAUL BONYNGE,
WM. L. MORRIS.