

No. 835,283.

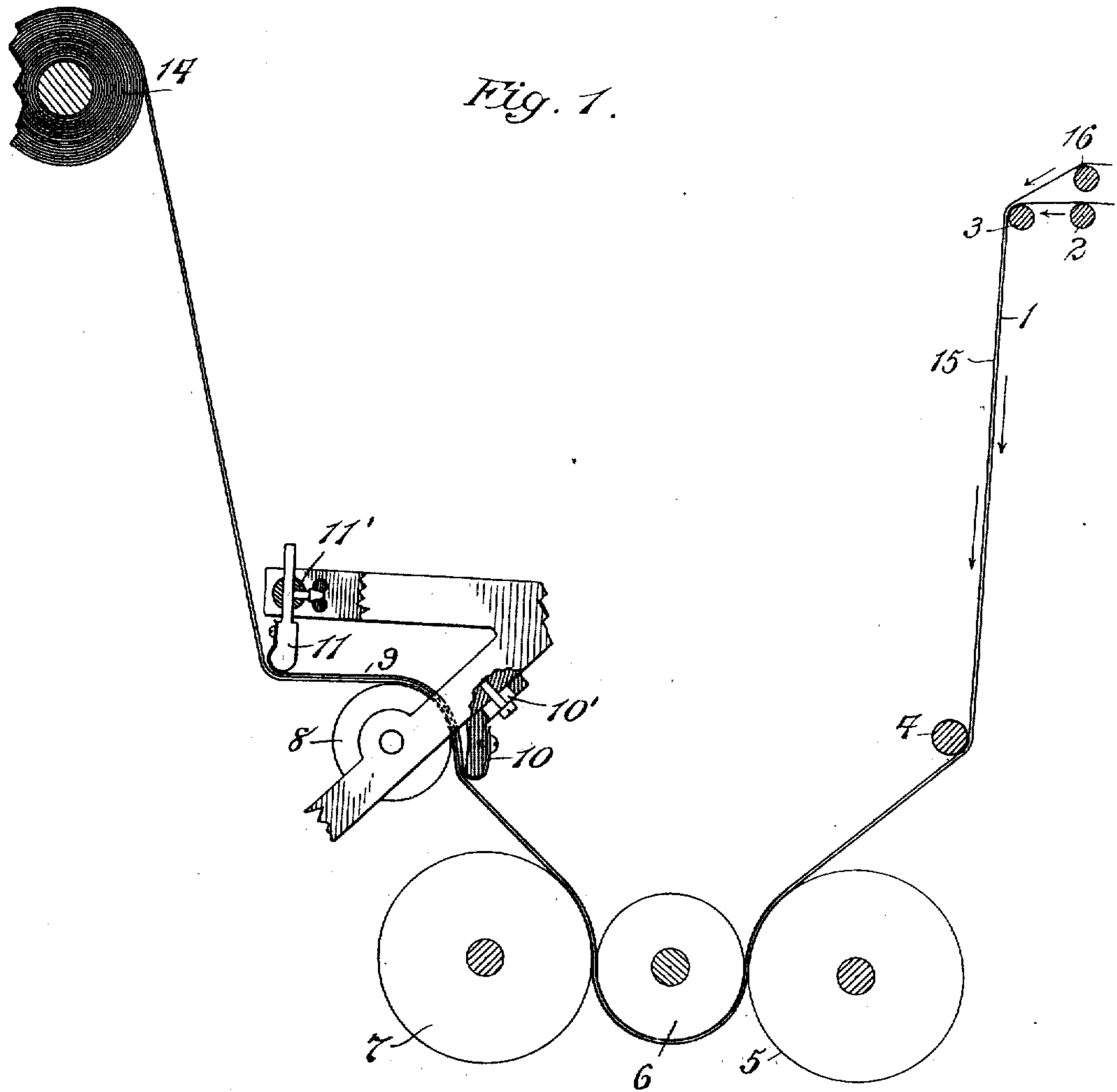
B. KARFIOL.

PATENTED NOV. 6, 1906.

APPARATUS FOR PERFORATING OR DIVIDING PAPER OR OTHER SHEET MATERIAL.

APPLICATION FILED JULY 5, 1906.

2 SHEETS—SHEET 1.



Witnesses
Edward J. Dowling,
Wm. L. Morris

Benjamin Karfiol Inventor

By his Attorneys
Stewart & Stewart

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2 SHEETS—SHEET 2.

Fig. 2.

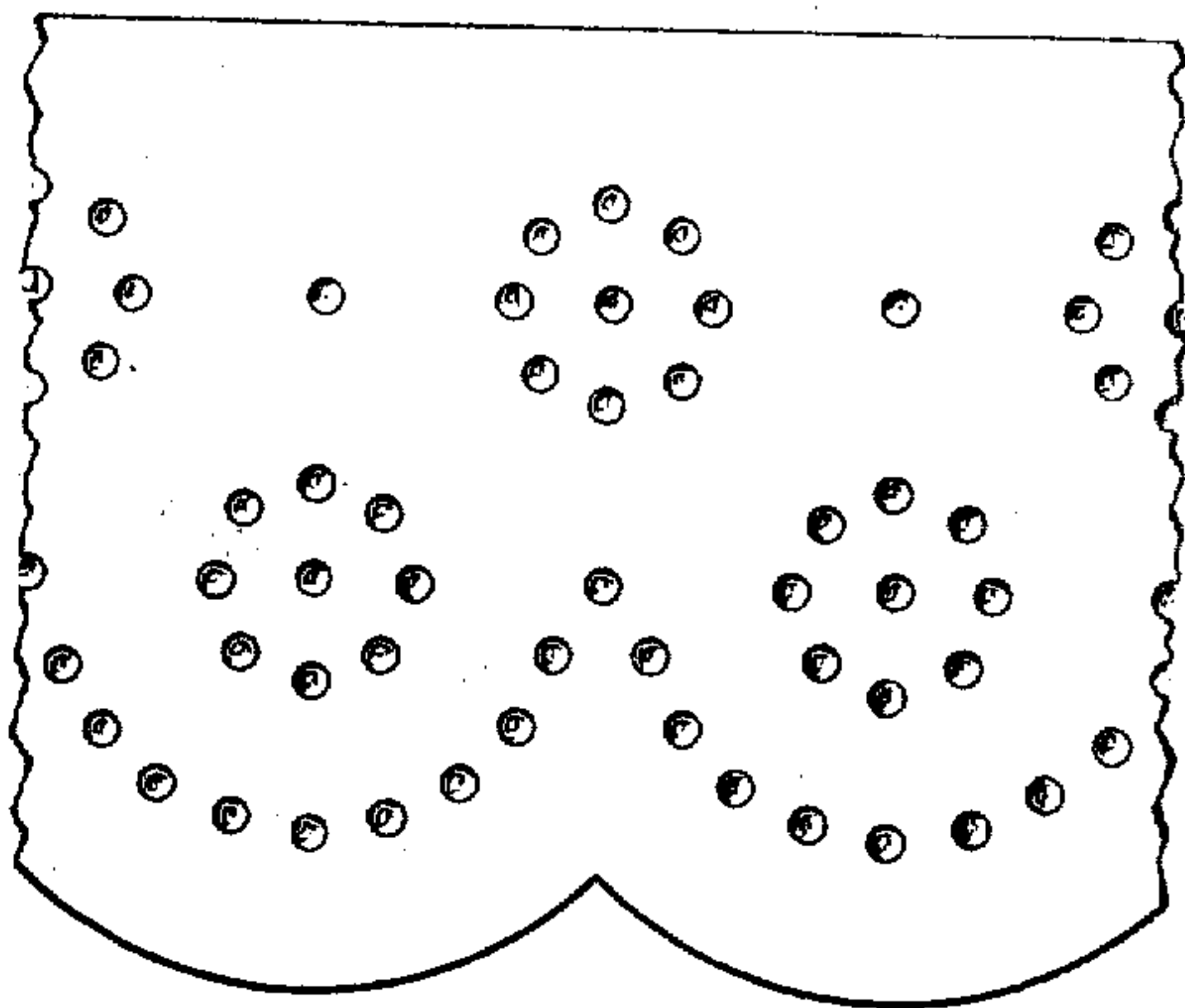


Fig. 3.

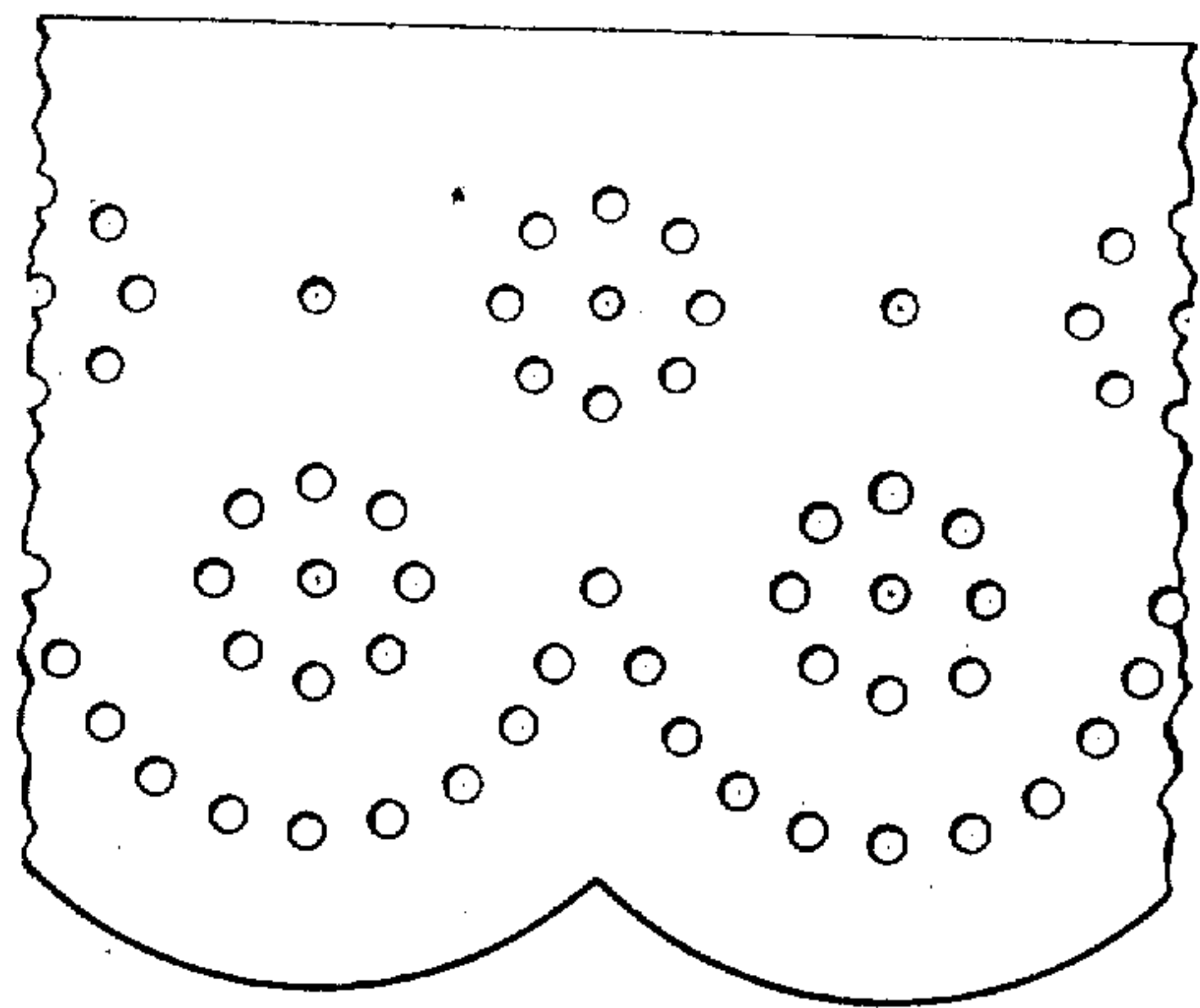


Fig. 4.



Fig. 5.

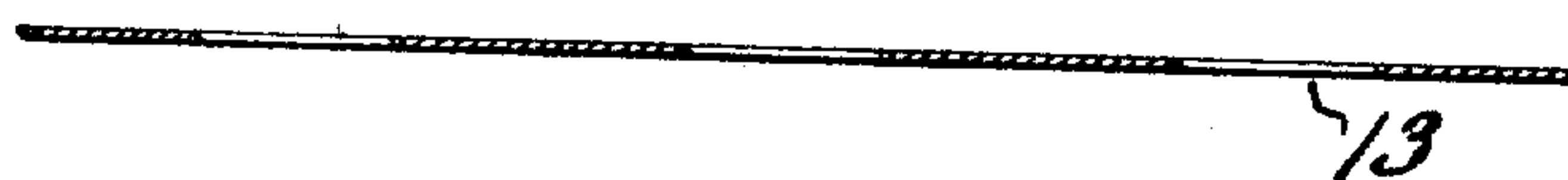
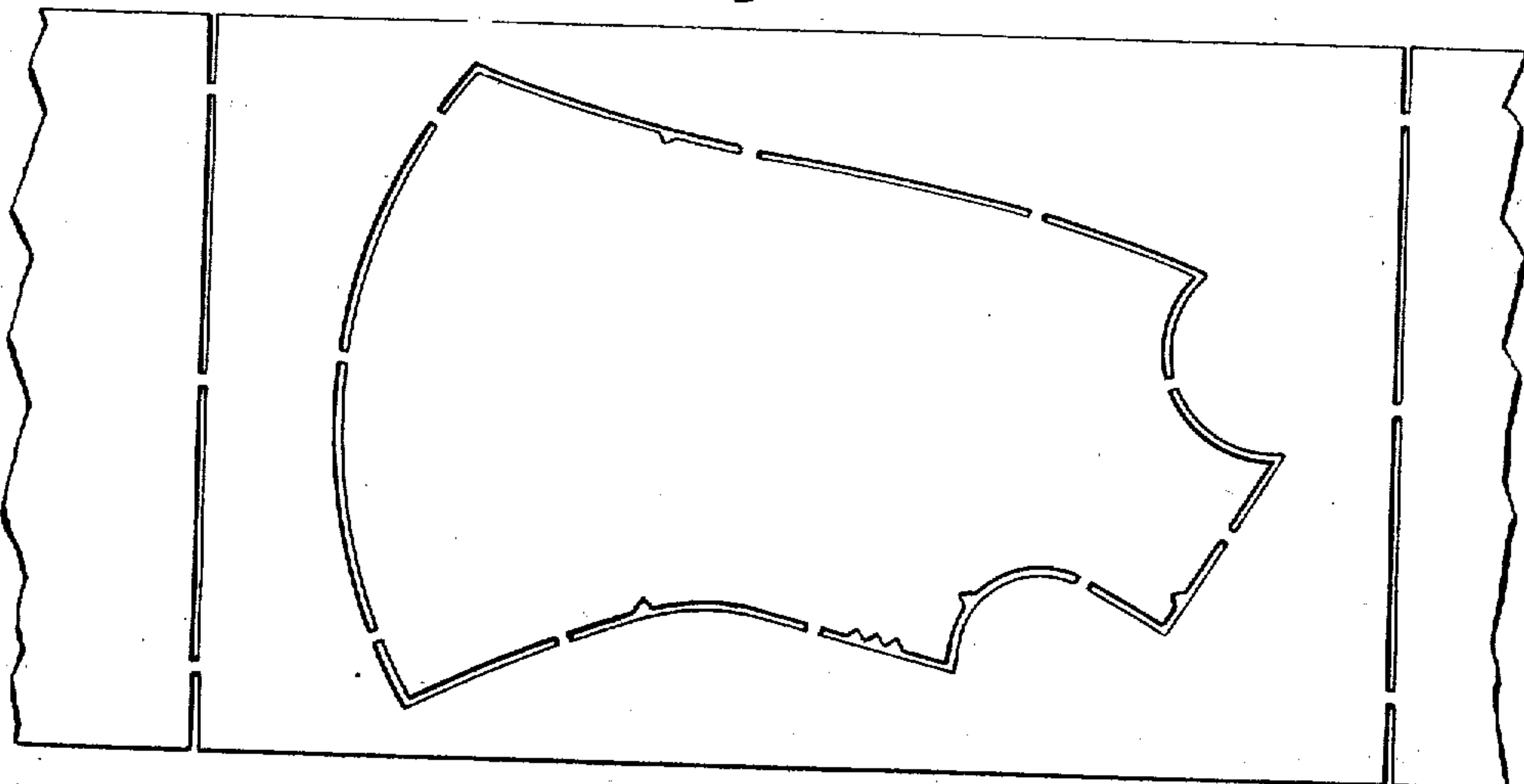


Fig. 6.



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UNITED STATES PATENT OFFICE

BENZION KARFIOL, OF NEW YORK, N. Y.

APPARATUS FOR PERFORATING OR DIVIDING PAPER OR OTHER SHEET MATERIAL.

No. 835,283.

Specification of Letters Patent.

Patented Nov. 6, 1906.

Application filed July 6, 1906. Serial No. 324,835.

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 Apparatus for Perforating or Dividing Paper or other Sheet Material, of which the following is a specification.

My invention relates to a novel means for 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.

In my apparatus instead of perforating the paper or other material by forcing a cutting-tool directly through the sheets, and thus at once effecting the perforation or division, I have provided means for first indenting the sheet material 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, and, further, means for then treating this indented but unfinished product 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 at 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 the clogging of the dies by paper-cuttings. Such cloggings at once impair the efficiency of the cutting apparatus 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 embodying my invention. 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-sheets being divided as by my invention 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 apparatus, 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, mounted on supports 10 and 11, having adjustments 10' and 11' for varying the pressure of the paper on the roll.

It will be noted 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 re-
 5 moves 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.

10 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
 15 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
 20 more rigid or stable, whereby they may stand up better to 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
 25 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.

30 My invention is thus seen to comprise two distinct and important features. In the first operation of my apparatus it will be noted that I produce an unfinished article—namely, a paper or other sheet material on
 35 one side indented, but as yet uncut. This article is novel with me and is characteristic of my invention. The second operation of the apparatus consists in a treatment of the indented paper to cut or divide from the body
 40 its indentations or elevations produced in the first operation.

Since in my invention the cutting is done by removing the elevations on the surface of indented sheet material, the necessity for
 45 means for punching through the sheets is obviated, and consequently my invention in its broadest application admits of a selection of cutting means or methods, thus making possible more efficient cutting and a better
 50 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 protu-
 55 berances or indentations to remove I prefer to grind off the same. Grinding involves no dies to become clogged and makes it an easy matter to take care of the paper particles re-
 60 moved 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 in-
 65 jury to the latter. A grinding-tool, even if in contact with the face of the paper, 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 elevations by the grinder I rely on the natural stability of the
 70 paper 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
 75 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
 80 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
 85 grinder a further means for providing resilient engagement of the sheet and grinder is introduced. In the present case I have
 90 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
 95 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
 95 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
 100 cleanly and effectively, no matter how delicate the texture may be. Additional advantages of my invention are then that a number of sheets may be prepared simultaneously and that regardless of the nature of the
 105 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
 110 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 nec-
 115 essary 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
 120 same. Then upon 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
 125 made in a simple and expeditious manner by merely passing the paper through the steps of my invention heretofore described, and the pattern-sheets emerging from the machine are at once ready for shipment and use.

Obviously my invention is not confined to 130

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 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 purposes for which such may be used when cut in accordance with my invention are innumerable.

What I claim is—

1. An apparatus for perforating or dividing paper, or other sheet material, comprising in combination, means for indenting the paper at predetermined points thereof, means for cutting the elevations so formed from the surface of the paper, and means for providing resilient engagement of the paper with the cutting means during the cutting operation.
2. An apparatus for perforating or dividing paper, or other sheet material, comprising in combination, means for indenting the paper at predetermined points, means for cutting the elevations so formed from the face of the paper, means for conveying the paper from the indenting to the cutting means, and means for providing resilient engagement of the paper with the cutting means during the cutting operation.
3. An apparatus for perforating or dividing paper, or other sheet material, comprising in combination, means for indenting the paper at predetermined points thereof, means for grinding the elevations so formed from the face of the paper, and means for maintaining resilient engagement of the paper with the grinding means during the grinding operation.
4. An apparatus for perforating or dividing paper, or other sheet material, comprising in combination, means for indenting the paper at predetermined points, a grinding-roll for removing the elevations from the face of the paper, and means for providing resilient engagement of the paper with the grinding-roll during the grinding operation.
5. An apparatus for perforating or dividing paper, or other sheet material, comprising in combination, means for indenting the paper at predetermined points thereof, means for grinding the elevations from the face of the paper, means for conveying the paper from the indenting to the grinding means and means for maintaining the paper in proper contact with the grinding means.
6. An apparatus for perforating or dividing paper, or other sheet material, compris-

ing in combination, means for indenting the paper at predetermined points, a grinding-roll for removing the elevations from the face of the paper, means for conveying the paper from the indenting to the grinding means and a bent strip of resilient material, conforming to the shape of the grinding-roll for maintaining the paper in proper contact therewith.

7. An apparatus for perforating or dividing paper, or other sheet material, comprising in combination, means for indenting the paper at predetermined points thereof, means for grinding the elevations from the face of the paper, means for conveying the paper from the indenting to the grinding means and a spring-strip for maintaining the paper in proper contact with the grinding means.

8. An apparatus for perforating or dividing paper, or other sheet material, comprising in combination, means for indenting the paper at predetermined points, means for grinding the elevations from the face of the paper, means for conveying the paper from the indenting to the grinding means, resilient means for retaining the paper in contact with the grinding means, and means for adjusting the tension of said resilient contact-maintaining means.

9. An apparatus for perforating or dividing paper, or other sheet material, comprising in combination, coacting dies designed to indent paper at predetermined points, means for cutting the elevations from the face of the paper, means for conveying the paper between the coacting dies and therefrom to the cutting means, and means for providing resilient engagement between the paper and the cutting means during the cutting operation.

10. An apparatus for perforating or dividing paper, or other sheet material, comprising in combination, coacting dies, one of said dies being an embossing-die and the other an indenting-die, means for conveying the paper between said dies, whereby the same are indented on one side and embossed upon the other, means for removing the elevations from the face of the paper, and means for maintaining resilient engagement of the paper with the elevation-removing means during the operation of the latter.

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

BENZION KARFIOL.

Witnesses:

PAUL GREGORY,
WM. L. MORRIS.