(No Model.) 4 Sheets—Sheet 1.

S. WHEELER.

MACHINE FOR CUTTING PAPER INTO GEOMETRICAL FORMS.

No. 420,524. Patented Feb. 4, 1890.

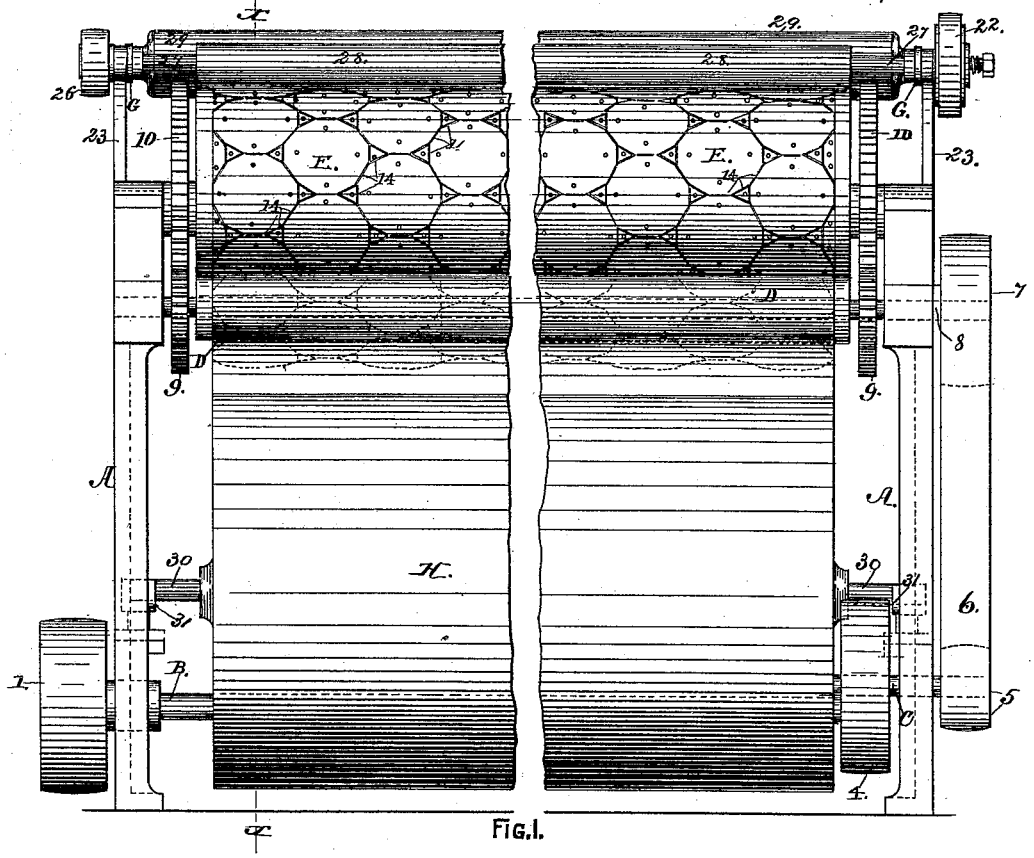

Fig. 1.

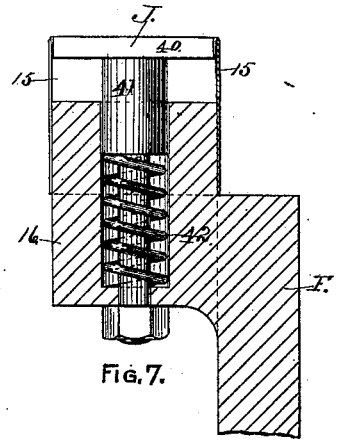

Fig. 7.

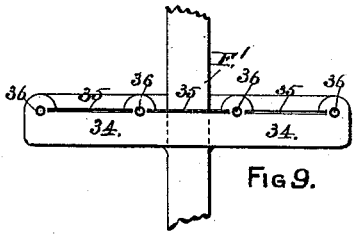

Fig. 9.

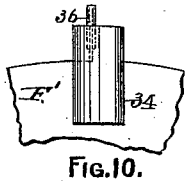

Fig. 10.

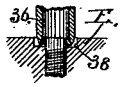

Fig. 11.

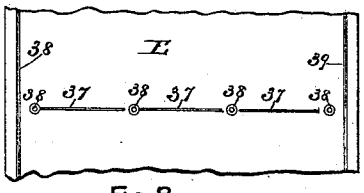

Fig. 8.

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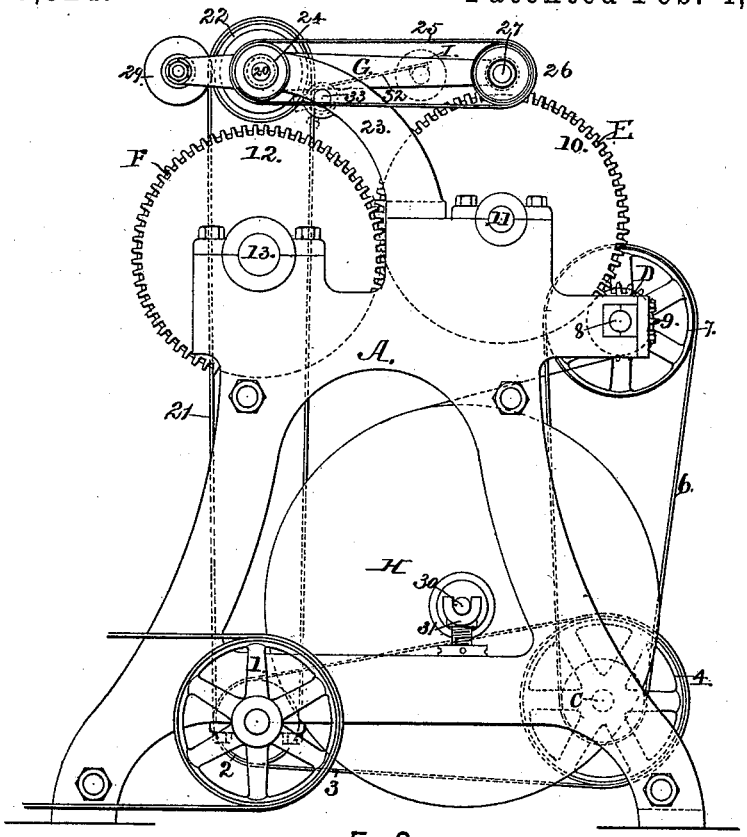

FIG. 2.

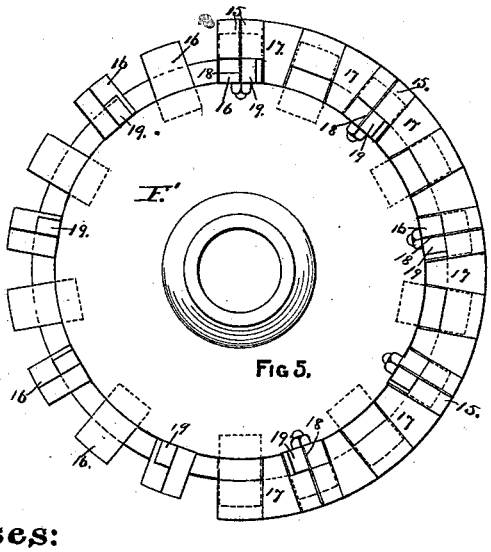

FIG. 5.

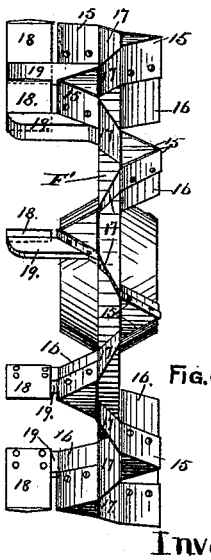

FIG. 6.

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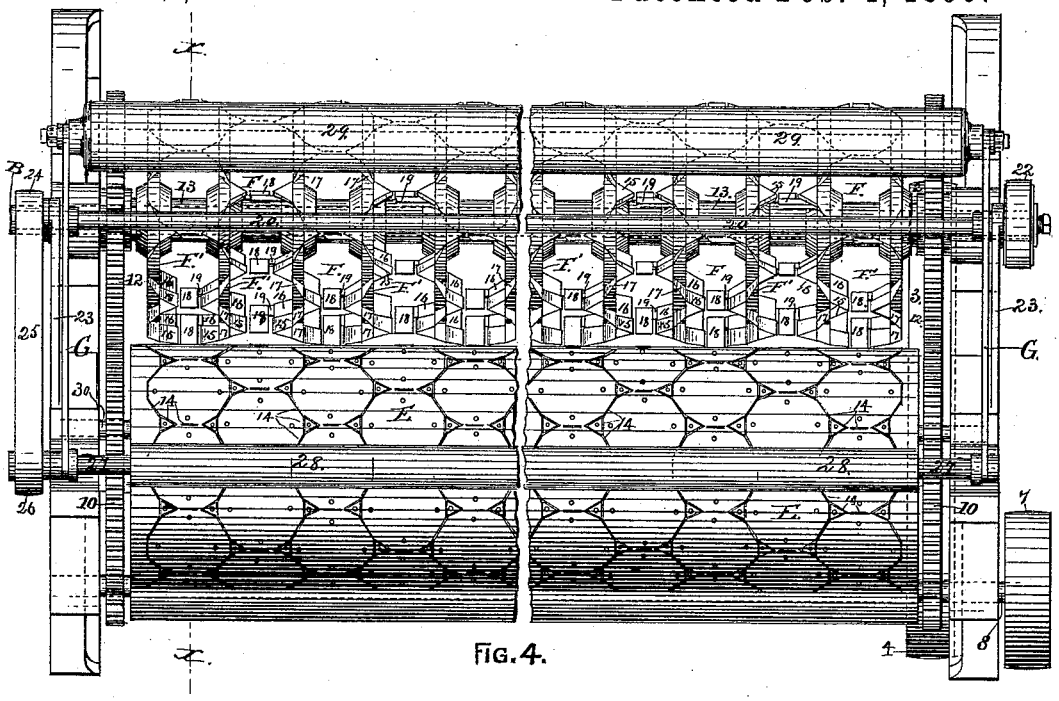

FIG. 4.

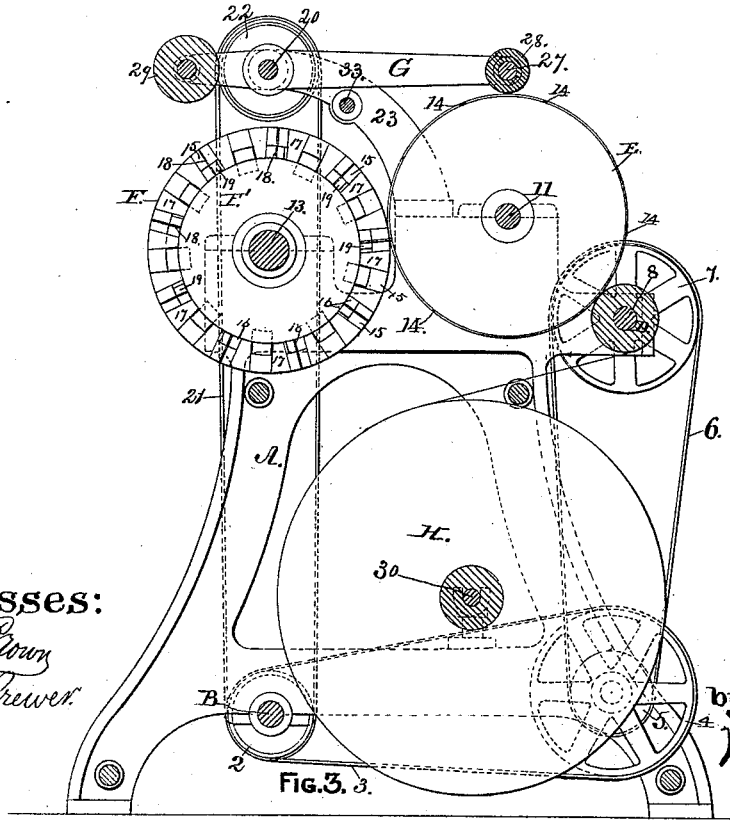

FIG. 3.

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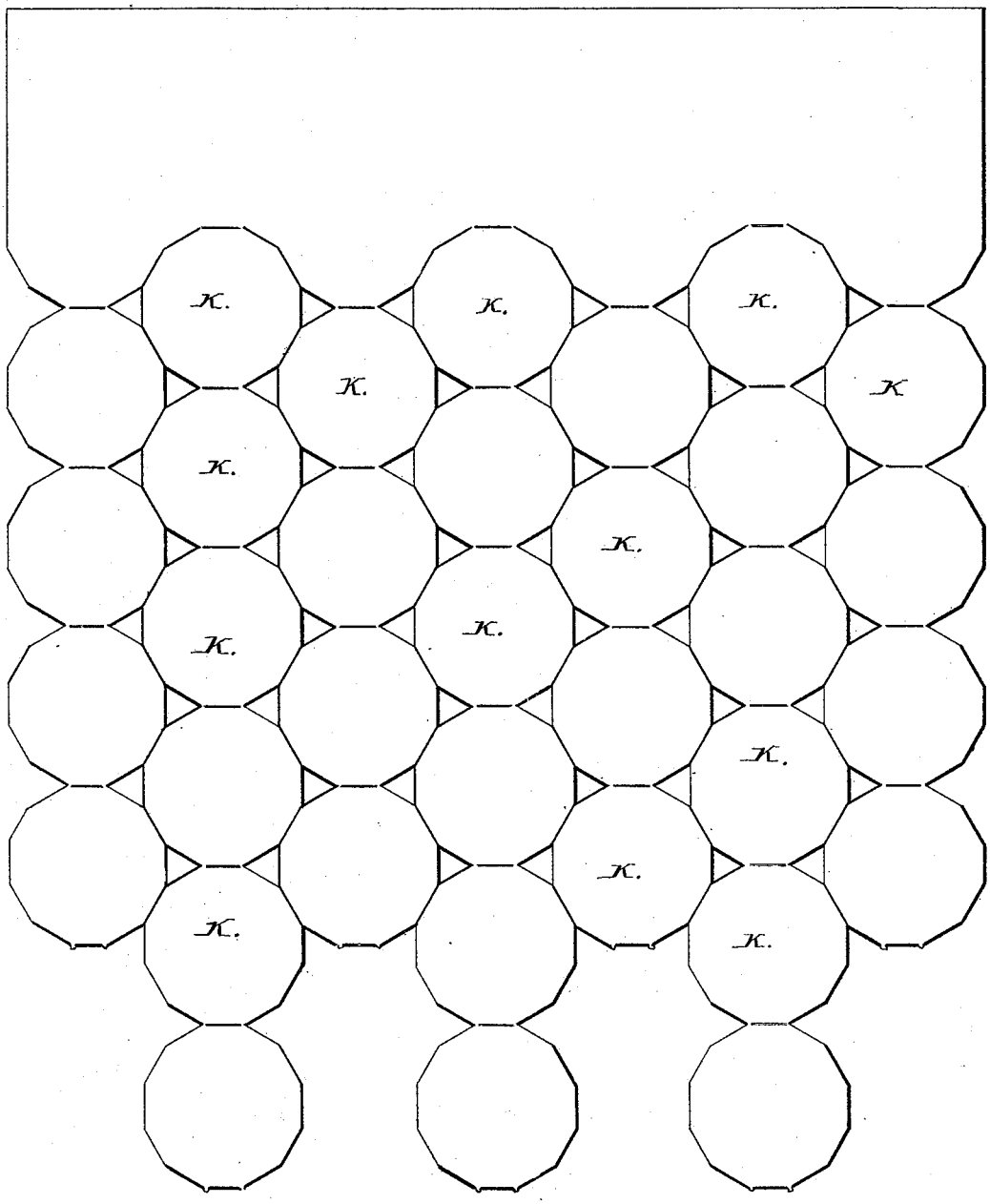

Fig. 12.

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UNITED STATES PATENT OFFICE.

SETH WHEELER, OF ALBANY, NEW YORK.

MACHINE FOR CUTTING PAPER INTO GEOMETRICAL FORMS.

SPECIFICATION forming part of Letters Patent No. 420,524, dated February 4, 1890.

Application filed October 15, 1887. Serial No. 252,332. (No model.) Patented in England November 1, 1887, No. 14,886.

To all whom it may concern:

Be it known that I, SETH WHEELER, of the city and county of Albany, in the State of New York, have invented new and useful Improvements in Machines for Cutting Paper into Geometrical Forms, (for which I have received a patent in Great Britain November 1, 1887, No. 14,886,) of which the following is a specification.

My invention relates to improvements in machines for cutting paper into geometrical forms, but more especially into blanks for toilet use; and the object of my invention is to provide suitable facilities for separating webs of paper into continuous strips of partially-separated geometrical figures with great rapidity and precision. This object I attain by the mechanism illustrated in the accompanying drawings, which are herein referred to and form part of this specification, and in which—

Figure 1 is a front elevation, transversely broken at its central portion, of a machine embodying my invention; Fig. 2, an end elevation of the same; Fig. 3, a transverse section at the line X X on Fig. 1; Fig. 4, a plan view. Figs. 5 and 6 are respectively a side elevation and a front elevation of one of the disks of cutters arranged for cutting strips of partially-separated blanks of dodecagonal form. Fig. 7 is an enlarged vertical section of one of the triangular lugs and cutters, showing its ejector in elevation. Figs. 8, 9, 10, and 11 are details of cutters and dies for producing a partial separation of the continuous strips of paper into rectangular figures or blanks; and Fig. 12 is a plan view of a sheet of paper having cuts therein to form dodecagonal blanks.

As represented in the drawings, A indicates the frame of my machine, which is preferably made entirely of metal.

B is the driving-shaft, which is journaled in the frame A, and is provided with pulleys 1 and 2, which are secured thereon, the first being fitted to receive motion from any suitable motive power and the other being for transmitting the motion through the belt 3 to a pulley 4, which is secured to an intermediate shaft C. The latter is also provided with a pulley 5, which transmits motion through a belt 6 to a pulley 7, secured to a drum-shaft 8, on which the drum D and a pinion 9 are also secured. Said pinion gears into a spur-wheel 10, secured to the die-cylinder shaft 11. The spur-wheel 10 gears into a like spur-wheel 12 of the same size, which is secured to the cutter-cylinder shaft 13, thereby giving to the cylinders secured to the shafts 11 and 13 a perfect uniformity in their rotations.

E is the die-cylinder, which is secured to the shaft 11 and has on its circumferential face a series of grooves or indentations 14, which conform to the arrangement of cuts or separations to be made in the web of paper. As shown in the first six figures of the drawings, the said grooves are arranged for cutting a series of separated strips of partially-separated dodecagonal forms from a web of paper, the said strips being so indented into each other (as shown in Fig. 12) that but little wastage of the paper will be produced. When required, said grooves may be arranged for cutting separate strips of partially-separated blanks of paper having any other preferred geometrical form.

F is the cutter-cylinder, which has on its circumference a series of cutters that conform to the arrangement of grooves 14 in the cylinder E. Said cutters are preferably beveled at both sides to produce a knife-edge thereon, so that the cut will be effected without the cutters coacting with the edges of the grooves 14—that is to say, the cut is not a shearing one. The same result may be attained if the cutters are beveled on one side only; but it is found in practice that the double bevel is preferable, and that it is not essential that the cutting-edge of the cutter should be in contact with the edge of the grooves, for the double-beveled cutters will effect the separations of the paper satisfactorily with less liability of injury to the cutting-edges.

The cutter-cylinder F is preferably composed of a series of disks F′, which have the cutters arranged around their peripheries, and which, as shown in the drawings, are secured to the shaft 13 in such manner that the required figures will be produced by the combination of the cutters attached to the several disks. The triangularly-arranged cutters 15, which cut out the small equilateral triangular wastage pieces from between the adjoining edges of the strips of partially-

separated dodecagonal blanks, are secured to radially-arranged triangular arms or lugs 16, which are formed alternately at opposite sides of the disks F′. The diagonally-arranged cutters 17, which run at an angle from the base-line of one triangle to the base-line of the next triangle, are secured to the angular sides of the depressions in the edge of the disks F′, as shown in Figs. 5 and 6. Longitudinal cutters 18, which produce the partial separations of the dodecagons of a continuous strip, are secured to lugs 19, which project from one side of each disk F′, (except one of the end disks,) so that said longitudinal cutters will project from the apex of the triangular cutters 15. A belt 21, which runs from the pulley 2 to a pulley 22, secured to the shaft 20, transmits motion to the latter. Said shaft is journaled in the end of the arms 23, which are secured to the frame A in such manner as to locate the shaft 20 over the cutting-cylinder F. The shaft 20 forms a center on which the arms G are loosely fitted, so that said shaft will be left free to rotate therein without imparting motion to said arms and so that the latter will be free to vibrate on the shaft 20 when occasion requires. A pulley 24, secured to the shaft 20, imparts motion through the belt 25 to a pulley 26, secured to the shaft 27, which is journaled in the forward ends of the arms G, so that the shaft 27 will be located over the die-cylinder E. A reel 28 is secured to the shaft 27, for the purpose of winding up the strips of paper as they leave the die-cylinder E. The pulley 22 is an ordinary friction-pulley, which is adapted to slip when the peripheral speed of the paper wound on the reel 28 exceeds the speed of the belt 25, and thereby the increase of diameter of the roll of paper wound upon the reel 28 is compensated for. A counter-weight 29 is attached to the rearmost ends of the arms G, for the purpose of balancing the weight of the roll of paper wound on the reel 28.

H is a roll or web of paper carried on a spindle 30, that is journaled in adjustable bearings 31, so arranged that they can be raised or lowered, as occasion requires, to suit rolls of paper of different diameters.

I are revoluble slitting disks or cutters, which are used for cutting the web of paper into strips with straight parallel edges, when squares or other similar geometrical forms of paper are to be cut by the machine, the other separations, either complete or partial, being produced by the operations of the cutters and dies on the cylinders E and F. Said slitting-disks are journaled in the outer end of spring-arms 32, (shown in dotted lines in Fig. 1,) which arms are adjustably attached to a stationary bar 33 in such manner that all or any number of said slitting-disks can be thrown upward, as shown in Fig. 1, where they will not operate on the paper as it is carried over the upper side of the die-cylinder E.

As shown in Figs. 8 to 11, the disks F′ and the die-cylinder E are fitted for producing partial separations of the strips of paper in a direction corresponding to the axis of the die-cylinder E. Said disks are provided with transverse ribs 34, which carry straight cutters 35 and hollow circular cutters 36, all having knife-edges, as herein described, in respect to the cutters for producing the dodecagonal forms above referred to. The die-cylinder E, of which only a small portion is shown in the figures last referred to, is provided with a straight groove 37, in which the cutter 35 enters, and an annular groove 38, which corresponds to the cutter 36. Said die-cylinder is also provided with circumferential grooves 39, which correspond in position to the slitting-disks I, and which are of sufficient width and depth to enable said slitting-disks to perform their work without coming in contact with the metal, and are narrow enough to give proper support to the paper during the operation of slitting.

J is an ejector for discharging the pieces of waste paper produced in cutting out the geometrical forms. As shown in Fig. 7, said ejector is designed to fit in the inside of the triangle formed by the cutters 15, and it consists of a triangular head 40, which conforms to the interior of the triangular cutters 15, and is fixed on the upper end of a stem 41, that is fitted to freely slide endwise in suitable holes in the triangular lugs 16. Said ejector is forced inwardly against the resistance of a spring 42, by the contact of its head 40 with the surface of the die-cylinder E, and as soon as this contact is broken said spring forces the ejector J outwardly, thereby discharging the triangle of paper from the interior of the cutter.

Instead of the dodecagonal arrangement of grooves and cutters herein shown and described any other preferred arrangement of grooves and cutters for producing geometrical forms may be used on the respective cylinders of my machine.

In the sheet of paper represented in Fig. 12 the zigzag line of cuts by which the web of paper is separated into strips is indicated by a single heavy black line, and the transverse cuts, by which said strips are partially separated to form the dodecagons K, are indicated by double light lines. The dodecagon blanks are connected lengthwise of the strips by slender necks of paper which can be easily torn by a slight twitch of the hand to produce a separation of the blanks from each other.

I claim as my invention—

1. In a machine for cutting a web of paper into geometrical forms that are either completely or partially separated from each other, the combination of a die-cylinder having in its circumferential surface a series of grooves or indentations which conform to the cuts or punctures to be made in the paper, and a cutter-cylinder provided with a series of cutters which correspond to the grooves or in-

dentations in the die-cylinder, said cutters having cutting-edges which enter the grooves in the die-cylinder intermediately between the edges of said grooves, but which do not come in contact with said edges, the said die-cylinder and cutter-cylinder being rotated at the same rate of peripheral speed to produce the cuts in the paper by the incisive action of the cutting-edges of the knives between the edges of the grooves in the die-cylinder, as and for the purpose herein specified.

2. In a paper-cutting machine, a cutter-cylinder formed of a series of disks or spiders F′, secured to a central shaft 13, each of said spiders having secured to its sides a series of cutters which conform to the cut or puncture to be produced thereby, and which project beyond the perimeter of said spider, as and for the purpose herein specified.

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Witnesses.
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