

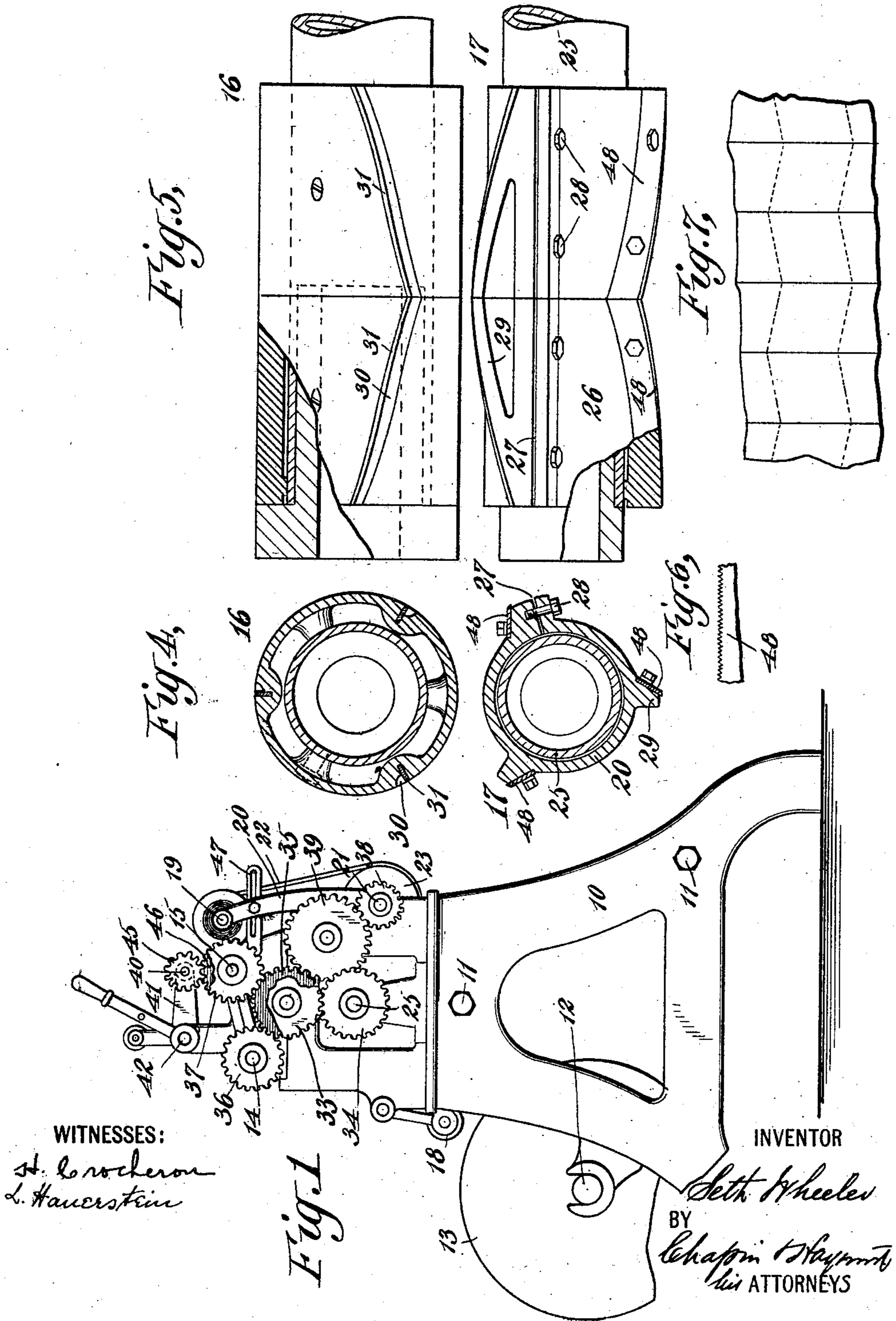
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PATENTED FEB. 5, 1907.

S. WHEELER.
PAPER CUTTING AND PERFORATING MACHINE.

APPLICATION FILED AUG. 1, 1906.

2 SHEETS—SHEET 1.



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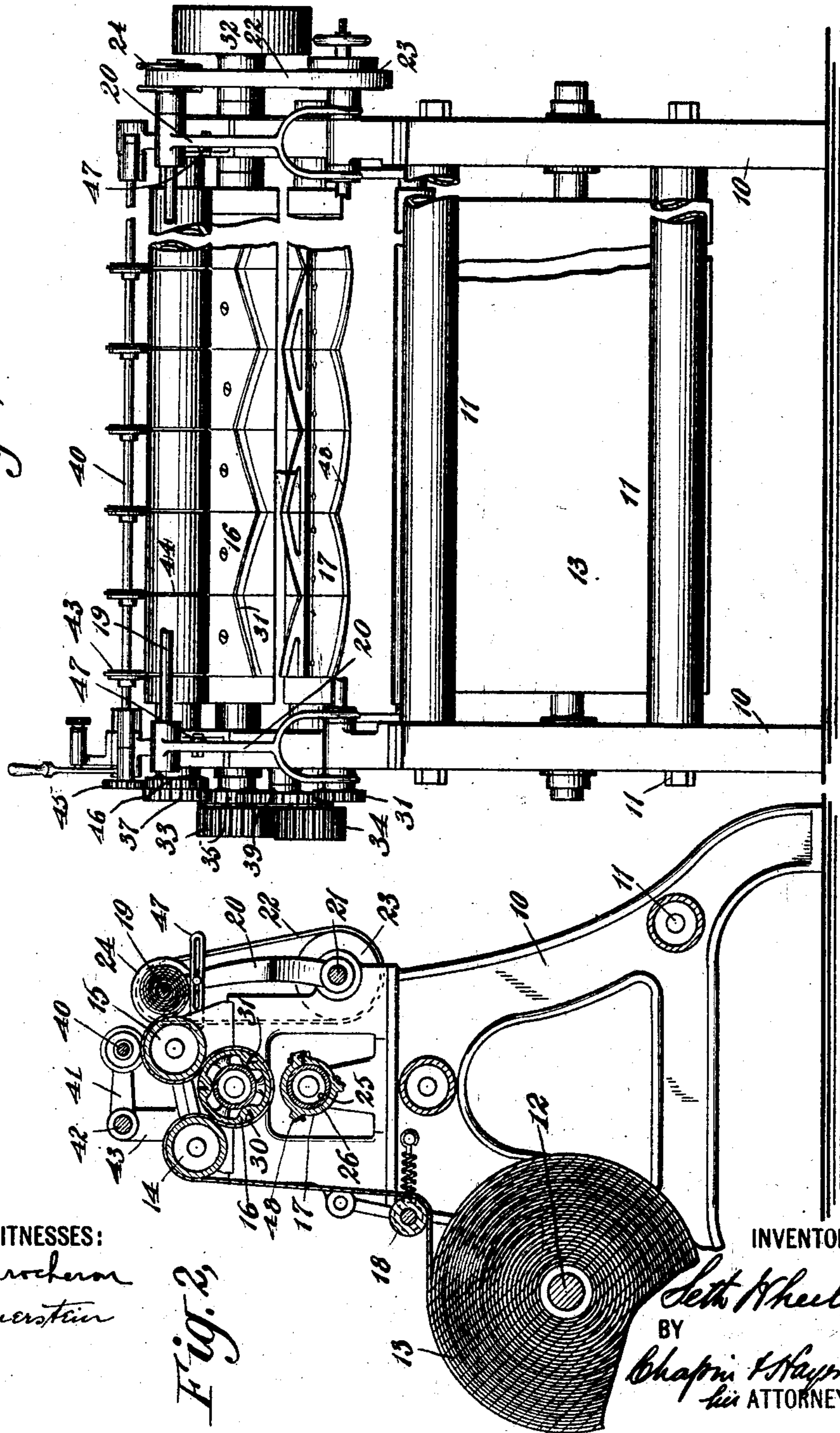
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2 SHEETS—SHEET 2.

Fig. 3,



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Fig. 2,

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PAPER CUTTING AND PERFORATING MACHINE.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, SETH WHEELER, a citizen of the United States of America, and a resident of Castleton, county of Rensselaer, State of New York, have invented certain new and useful Improvements in Paper Cutting and Perforating Machines, of which the following is a specification, reference being had to the accompanying drawings, forming a part thereof.

My invention relates to improvements in paper cutting and perforating machines, and particularly to means for simultaneously producing a number of rolls of transversely-perforated paper from a web.

The main object of the present invention is to economically produce rolls of this description with diagonal perforations, so that a sheet severed from the roll will be of substantially "diamond" form.

I will now describe a machine embodying this invention, having reference to the accompanying drawings, illustrating same, and will then point out the novel features in claims.

In the drawings, Figure 1 is a view in side elevation of the machine, certain parts being broken away. Fig. 2 is a view in central vertical transverse section therethrough. Fig. 3 is a front view of the machine with a part of the middle portion of the machine broken away and the ends brought nearer together in order to permit of illustration upon a reasonably large scale. Fig. 4 is a transverse sectional view, on an enlarged scale, through the perforating member and the die-cylinder employed complementarily thereto. Fig. 5 is a face view of the part shown in Fig. 4 with parts broken away and other parts shown in section. Fig. 6 is a detail face view of a portion of one of the perforating-knives. Fig. 7 is a view of a part of the web after it has been longitudinally slit and diagonally perforated.

Referring to the drawings by reference characters, 10 10 designate side or end frames of the machine, which are connected together by longitudinal bolts 11.

12 designates a shaft supported in brackets upon the frames 10, the said shaft 12 forming a support for a web of paper 13. The side frames 10 are also provided near their upper portions with suitable bearings for guide-rolls 14 15, a die-cylinder 16, and a perforator 17. The web from the roll 13 passes beneath a tension-roller 18, over the first guide-roller 14, around the die-cylinder 16, over the second

guide-roller 15, and is then "taken up" upon a frictionally-driven spindle 19. The spindle 19 is journaled in arms 20, which swing freely about an axle 21. The shaft 19 may thus move gradually outward as the diameter of the product increases, consequent upon the winding up of same thereon, and may similarly be moved as close to the direction-roller 15 as is required when new rolls are commenced. Slotted links 47, pivoted to the side frames, form convenient means for preventing the arms from swinging too far outward. The drive for the spindle 19 comprises a belt 22, which passes over a pulley 23 upon the spindle 19 and another pulley 24 upon the axle 21. The pulley 23 being upon the axle 21, which forms the swinging support for the arm, and the pulley 24 being journaled upon the arms, the driving relation of the axle 21 and spindle 19 will not be changed by the swinging movements of the said arms.

The perforating member 17, which is journaled in bearings immediately beneath the die-cylinder 16, comprises a shaft 25, preferably hollow, in order to save weight, a plurality of sleeves 26 strung upon the shaft 25, and perforating-blades 48, carried by the sleeves. The sleeves 26 are arranged close side by side, as shown in Figs. 3 and 5, and are preferably secured by being split, as at 27, and provided with clamping-bolts 28, by means of which they may be pinched to securely clamp them upon the shaft. The perforating-knives 26 are secured to lugs 29 upon the sleeves 25, said lugs, and hence said knives, being disposed diagonally with respect to the axis of the shaft 24. The knives of adjacent sleeves are preferably arranged oppositely diagonal to each other, as will be clear by examination of Figs. 3 and 5 of the drawings, and it will be seen that such oppositely-diagonal arrangement of the perforating-knives results in the production of zig-zag lines of perforations transversely of the web. Fig. 7 shows a part of a web so treated. The die-cylinder 16 is provided with recesses 30 and plates 31 for coacting with the perforating-knives 48, as will be well understood, and the parts which carry the blades 31 preferably comprise a plurality of sleeves corresponding to the sleeves 26 of the perforated member. The said perforating-blades are preferably arranged at an angle (as viewed in cross-section) to lines radial of the number 17, being disposed tangentially with respect

to an imaginary cylindrical surface having the axis of the member 17 as a center. This arrangement not only renders less delicacy of adjustment necessary as between the members 16 and 17, but also increases the efficiency of the perforating-blades.

The driving mechanism may conveniently comprise a belt-wheel 32, secured upon one end of the die-cylinder shaft, the opposite end of the die-cylinder shaft being provided with a gear-wheel 33, which meshes with a corresponding gear-wheel 34, secured fast to the perforator member 17. Fast with the gear-wheel 33 is another gear-wheel 35, which meshes with pinions 36 and 37 upon the shafts of the guide-rollers 14 and 15, respectively. The gear-wheel 35 also drives a pinion 38 upon the axle 21, said driving connection being through an idler gear-wheel 39. From the foregoing, then, it will be seen that the rollers 14 and 15, the die-cylinder 16, the perforator member 17, and the axle 21 are all positively driven and are in direct gear with each other, so that their relationships are always correctly maintained.

Arranged immediately above the direction-roller 15 is a shaft 40, said shaft being preferably journaled in an arm 41, itself swung upon an arbor 42, mounted in bearings 43, formed as a part of or secured to the side frames of the machine. The shaft 40 carries a plurality of slitting-disks 43, secured longitudinally along same, and the direction-roller 15 is preferably provided with circumferential grooves 44, with which the said slitters are arranged to register. The said slitting-disks are disposed along the shaft 40 in lines with the edges of the sleeves 25, so that they come opposite to the adjacent edges of each pair of said sleeves. The shaft 40 is driven by means of a pinion 45, which is arranged in mesh with a gear-wheel 46, fast to the pinion 37 upon the shaft of the direction-roller 15.

In operation the perforating-knives will first perforate the web widthwise in diagonal lines, and the slitters will immediately thereafter sever the web into strips, the diagonal lines of adjacent strips being in opposite directions. A part of a web thus treated is shown in Fig. 7.

From the foregoing it will be seen that I have provided a very simple means for producing simultaneously a number of rolls having diagonal perforations therein, so that the individual sheets severed therefrom will be in substantially diamond form. The number of rolls produced are only limited by the width of the machine and the width of the web, and the machine may be made of any suitable width as may be desired. The ar-

rangements of adjacent diagonal perforators in opposite directions prevents any tendency of the web to drift, and the arrangement of the perforators just in advance of the slitters prevents any tendency of the strips to creep with respect to each other while the perforating is taking place. In fact, it enables the take-up to be so close to the slitting-disks as to insure the roll being wound evenly, as is most desirable. The positive feeding of all the parts enables the machine to be run at a high speed, because there is substantially no tension upon the delicate web employed, such as would otherwise tend to rupture it.

It may be noted that for purposes of illustration the web in Fig. 2 is shown of considerable thickness; but it will be understood that actually the paper operated upon is very thin and extremely fragile.

What I claim is—

1. A paper cutting and perforating machine comprising means for feeding a web, a plurality of longitudinal slitters, a plurality of diagonally-arranged perforators, the length of each of which is substantially equal to the distance between adjacent slitters and the direction of adjacent perforators being opposite with respect to each other, and means for winding up the perforated strips.

2. A paper cutting and perforating machine comprising means for feeding a web, a plurality of perforators arranged side by side, adjacent perforators being arranged obliquely and in opposite directions with respect to each other whereby they will produce lines of zigzag perforations across the web, a plurality of slitters for slitting the web into strips, said slitters arranged in lines with the adjoining ends of the said perforators, and means for winding up the perforated strips.

3. A paper cutting and perforating machine comprising means for feeding a web, a plurality of longitudinal slitters, a rotary shaft, a plurality of sleeves thereon, perforating-knives upon said sleeves secured thereto diagonally with respect to the axis of rotation of the shaft and the perforating-knives of adjacent sleeves arranged oppositely divergent, and take-up means for the product.

4. A paper cutting and perforating machine comprising means for feeding a web, a longitudinal slitting means therefor, and diagonally-arranged tangential perforating knives.

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Witnesses:

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