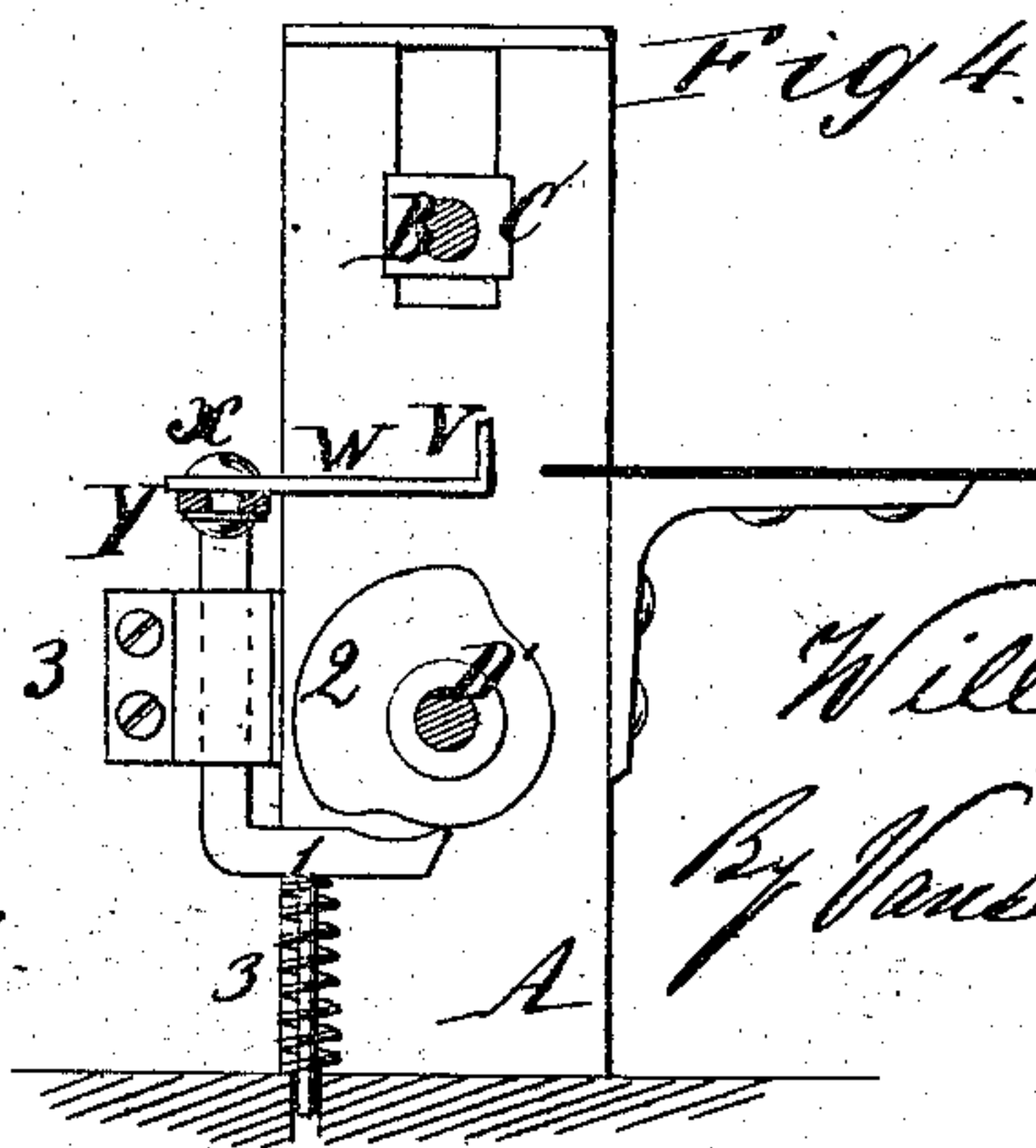
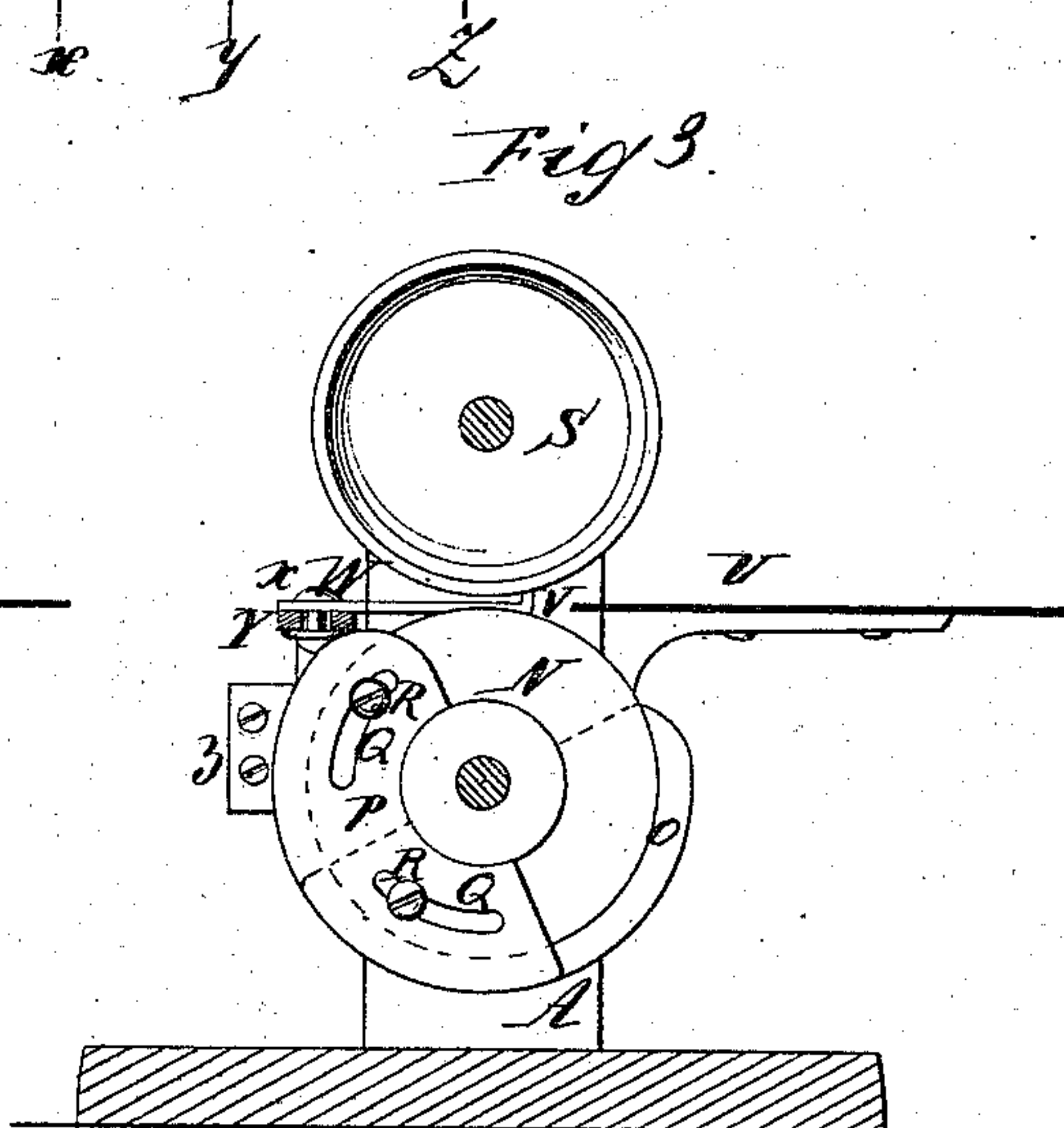
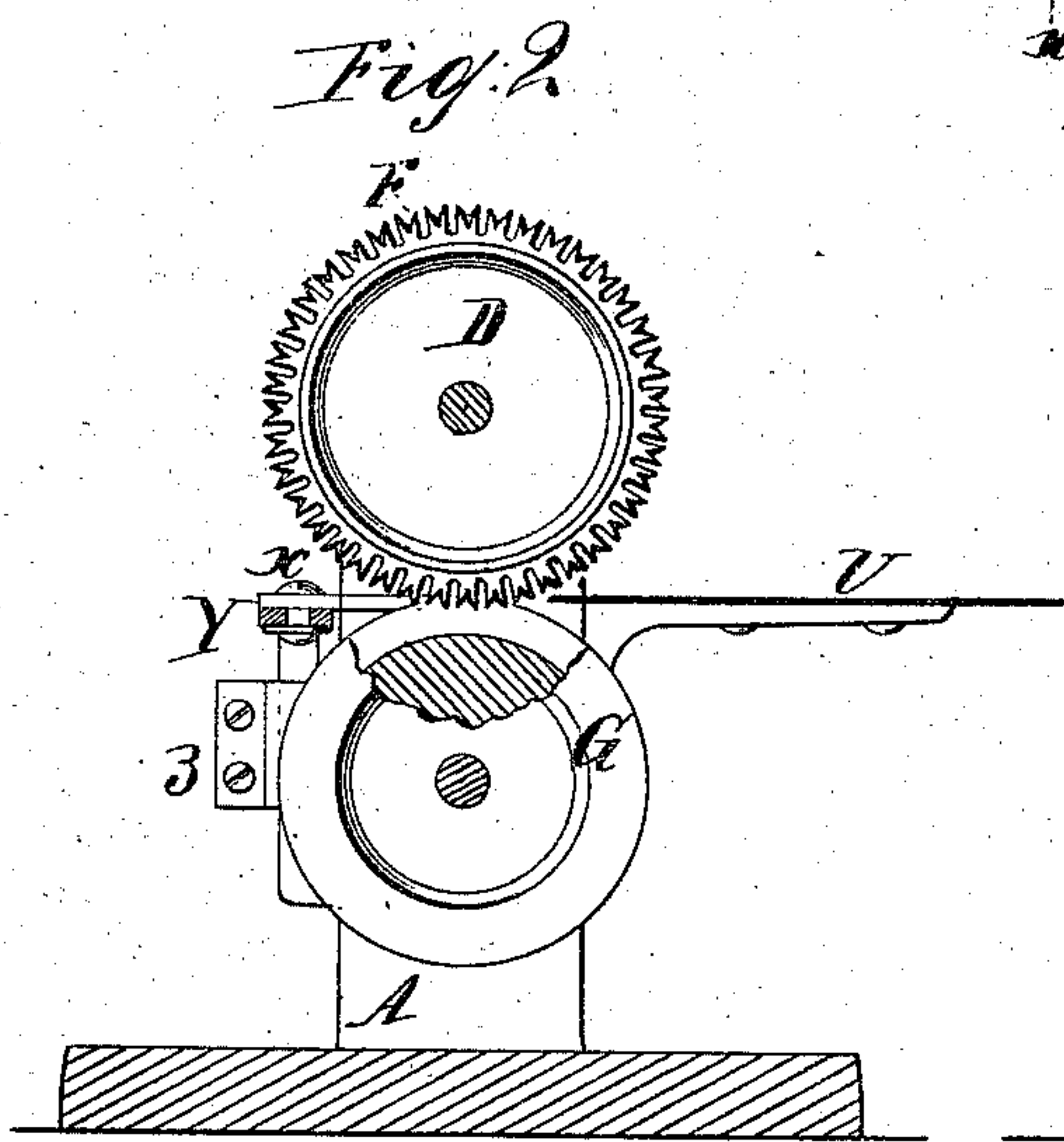
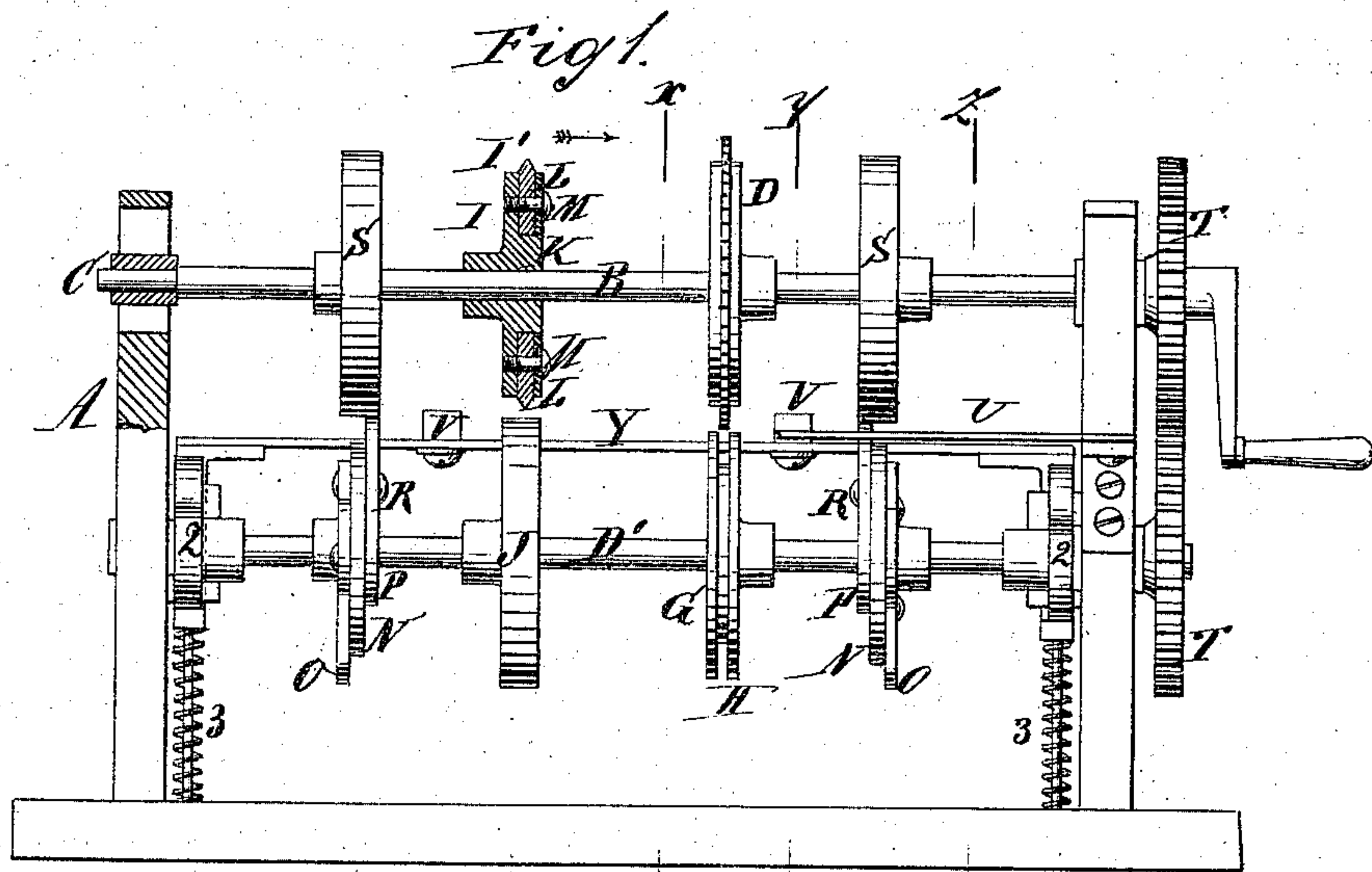


W. BRAIDWOOD.
Machines for Perforating Paper.

No. 154,450.

Patented Aug. 25, 1874.



Witnesses:
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UNITED STATES PATENT OFFICE.

WILLIAM BRAIDWOOD, OF MOUNT VERNON, NEW YORK, ASSIGNOR TO
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IMPROVEMENT IN MACHINES FOR PERFORATING PAPER.

Specification forming part of Letters Patent No. **154,450**, dated August 25, 1874; application filed
November 13, 1873.

To all whom it may concern:

Be it known that I, WILLIAM BRAIDWOOD, of Mount Vernon, in the county of Westchester and State of New York, have invented a new and useful Improvement in Machinery for Perforating Paper and other articles; and I do hereby declare the following to be a full, clear, and exact description thereof, which will enable those skilled in the art to make and use the same, reference being had to the accompanying drawing, forming part of this specification, in which drawing—

Figure 1 is a front elevation, partly in section, of a machine containing my improvements. Fig. 2 is a section taken in the line x of Fig. 1, looking in the direction of the arrow. Fig. 3 is a section taken in the line $y y$, Fig. 1, looking in the same direction. Fig. 4 is a section taken in the line $z z$, Fig. 1, looking in the same direction.

This invention relates to machinery for perforating paper—that is to say, for producing in paper or other articles lines of perforations, by means of which the paper can be readily severed along the perforated lines.

The invention consists, in combination with a grooved wheel, of a punch or cutter provided with **M**-shaped teeth for perforating the paper, so that, in making a perforation, the ends of a tooth will cut across the paper at the ends of the perforation to be made previous to punching out the intermediate portion. With this object in view, I make the ends of each tooth sharp, but square transversely, so that they will punch the paper in advance of the action of the central part of the tooth. My invention consists, further, in an improvement in the device for lifting the cutter and feed-wheel off the paper at the end of the line of perforations. One device heretofore employed for that purpose consisted of cam-wheels mounted on the cutter-shaft near the sides of the frame, so that the cams could strike against studs on the frame, and thereby cause the cutter and feed shaft to be raised in its bearings until the cam had passed the stud. My device for lifting the cutter-shaft consists of a cam-wheel mounted on the counter-shaft; or,

if preferred, it may be placed on the cutter-shaft; and on the other shaft, and opposite to it, is fixed a wheel with a wide face, against which the cam runs. The cam-wheels are provided with a stationary cam on one side, and on the opposite side with an adjustable cam-piece, so arranged that it can be moved to the right or left, in order, in connection with the stationary cam, to prolong the time during which the cutter-shaft shall be raised. My invention consists, further, in combining with the machine a gage-rest, against which the edge of the paper shall rest when it is introduced into the machine, in order that it may be evenly and automatically adjusted under the feed-wheel and cutter, in readiness to be perforated when the cams have passed off the anti-friction wheels and allowed the cutter-shaft to fall. This gage-rest consists of two or more vertical pieces mounted adjustably under the cutter-shaft on a rising-and-falling frame, in such a manner that, when the frame is in its higher position, they come opposite the feed-table, so as to intercept the paper, which can be pushed into the machine under the cutter and feed-wheels until its edge meets the gage, and when the frame is in its lower position they sink below the level of the feed-table, and allow the paper to pass over them. The frame on which these gage-pieces are mounted extends across the machine, and its ends are turned down and slide in guides placed along the inner sides of the frame, and have, below the slides, arms which project toward one of the shafts, so that they can be pushed down, carrying the frame with them, by cams on the shaft, the cams being so timed as to come round and strike the arms and depress the gages just before the cutter and feed-wheels come into operation on the paper. The ends of the arms are lifted by springs to their former position after the cams have passed over them.

The letter **A** designates the frame of the machine, those portions of the machinery being represented which are necessary to explain the invention. The cutter-shaft **B** is

supported in the upper part of the frame, being journaled in rising-and-falling boxes C, arranged, as shown, at one end of the frame in Fig. 1, and below the cutter-shaft is a counter-shaft, running in stationary bearings in the frame. The cutter-shaft carries the cutter-wheel D and one of the feed-wheels, and also the anti-friction wheels, which run against the cams, by which the cutter-shaft is lifted. The cutter-wheel D is provided with double or M-shaped teeth, separated from each other by recesses, whose sides are straight, or as nearly so as the radial arrangement of the teeth will permit, and each tooth has an angular depression or notch in its face, so that at the ends of the teeth are formed pointed prongs F F, whose outer edges are straight, and whose inner edges are inclined toward and face each other. The sharp prongs F enter the paper and hold it from slipping while the tooth is punching out the paper, making the cross-cuts of the perforation previous to the parallel cut which completes it. Below the cutter-wheel, and on the counter-shaft D', is a grooved wheel, G, whose groove H is arranged to receive the teeth of the cutter-wheel, the face of the wheel G on each side of the groove being made wide enough to give proper support to the paper or other material to be perforated on each side of the perforations. The cutter-shaft is provided at a suitable point with a feed-wheel, I, whose surface is yielding, and which operates in conjunction with a supporting-wheel, J, opposite to it on the counter-shaft, to feed the material through the machine. The feed-wheel I is provided on its periphery with an elastic surface, consisting of an india-rubber ring, I', placed on a hub, K, of the wheel I, where it is confined against the side of the wheel by a clamp composed of a metal ring, L, placed outside of the rubber, so as to compress it by means of set-screws, as at M, against the side of the wheel. The outer edge of the rubber ring is tapered to reduce its width at the periphery where it acts on the paper or other material to be perforated. The set-screws M pass inside or through the rubber and into the wheel, and as the ring L is tightened or drawn against the wheel by the screws, the rubber ring is compressed and expanded in the direction of its circumference, and thereby the wear of the feed-wheels is compensated, and the feed adapted to changes of material or to different thicknesses of material to be fed. The cutter and feed-wheels are raised by means of cam-wheels, whose cams consist of stationary and adjustable enlargements, arranged on the opposite sides of the wheels, and which act against anti-friction wheels fixed on the cutter-shaft.

By the old plan the cam acted by striking against a stationary stud, so that the stud or other parts of the machine were liable to greater or less derangement or injury, according to the velocity of the cam-wheel. These

defects are removed by my device for raising the cutter-shaft. I provide on one of the shafts (in this example on the lower shaft, D') cam-wheels N, on one side of which is fixed the stationary cam-piece or enlargement O, and on the other the movable piece P, the latter being provided with concentric slots Q Q, through which pass set-screws R, which screw into the wheel and secure these cam-pieces at any position desired, toward the right or left as far as the length of the slots will permit with reference to the stationary cam-pieces, thereby enabling me to lengthen or shorten the cam-surfaces of the wheels and prolong or diminish their action upon the cutter and feed shaft. The cam-wheels effect the raising of that shaft by means of counter or anti-friction wheels S S, fixed on the cutter-shaft in such positions that the cam-pieces come around into contact with the faces of the wheels S S, and thereby, without a shock, lift their shaft B, so as to raise the cutter and feed-wheels off from the material which is being perforated. The shafts B and D are geared together to move with equal speed by means of toothed wheels T T, whose teeth are long enough to permit the rising and falling of the cutter-shaft B, the cam-pieces and the teeth of the gear-wheels being made of such proportions that the gear-wheels shall not become disconnected. The paper or material to be perforated is delivered to the feed-rollers upon a feed-table, U. (Shown partly broken away in Fig. 1, and shown in Figs. 2, 3, and 4.) The letter V designates gage-rests, which consist of vertical pieces, against which the edge of the paper strikes when it is pushed in by the operator over the feed-table U. They are arranged under the cutter-shaft, and are connected, by slotted arms W and screws X, with a frame, Y, which extends along the back part of the machine, its ends extending down through slides Z Z on the ends of frame A, and provided below the slides with arms 1, which project beneath the shaft D' in such a manner as to be depressed by cams 2, mounted on that shaft. The arms 2 push down the arms 1, and consequently force down the frame Y with its gage-rests, so as to take the latter below the level of the feed-table, and allow the paper to pass under the cutter and feed-wheels. After the cams 2 have passed the arms 1 the frame is immediately pushed up to its former position by springs 3 3, arranged beneath the arms 1, and the gage-rests are thereby restored to their place in line with the feed-table.

In the machine here shown only one cutter-wheel is shown on the cutter-shaft, but more than one cutter and the necessary feed-wheels can be employed in the same machine.

My improved cutter-teeth are applicable to reciprocating cutters as well as to rotating cutters or wheels.

What I claim as new, and desire to secure by Letters Patent, is—

1. The combination, with the grooved wheel G, of the cutter or punch D, provided with notched teeth, substantially as described.

2. The movable cam-piece P on the cam-wheel N, in combination with the stationary cam-piece O and the anti-friction wheel, against which the cams act, substantially as described.

3. The gage-rest V, operated automatically from one of the shafts of the machine, in combination with the feed and cutting devices, substantially as set forth.

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Witnesses:

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