(No Model.) 3 Sheets—Sheet 1.

C. L. GOEHRING.

MEANS FOR ORNAMENTING WOOD.

No. 480,462. Patented Aug. 9, 1892.

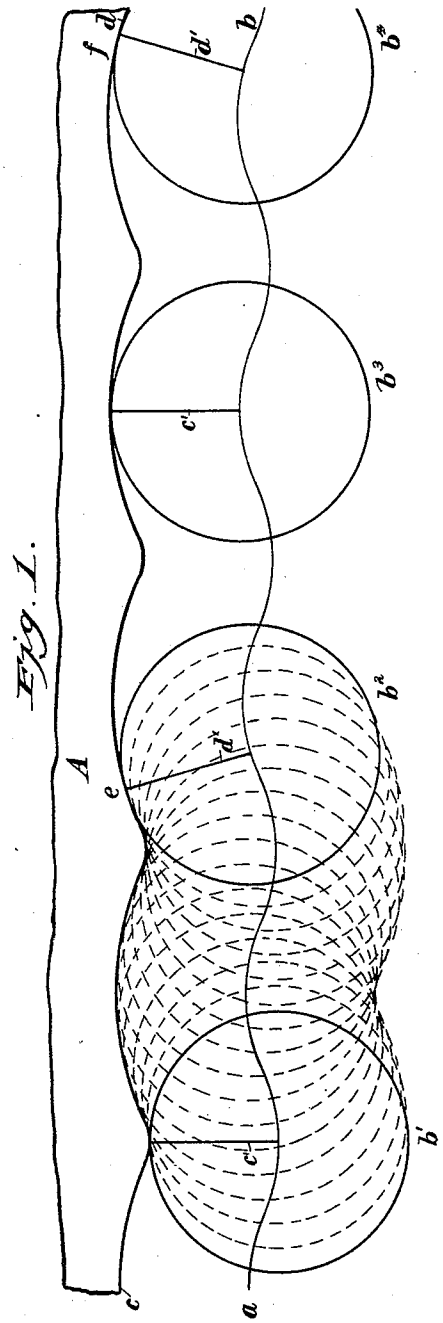

Fig. 1.

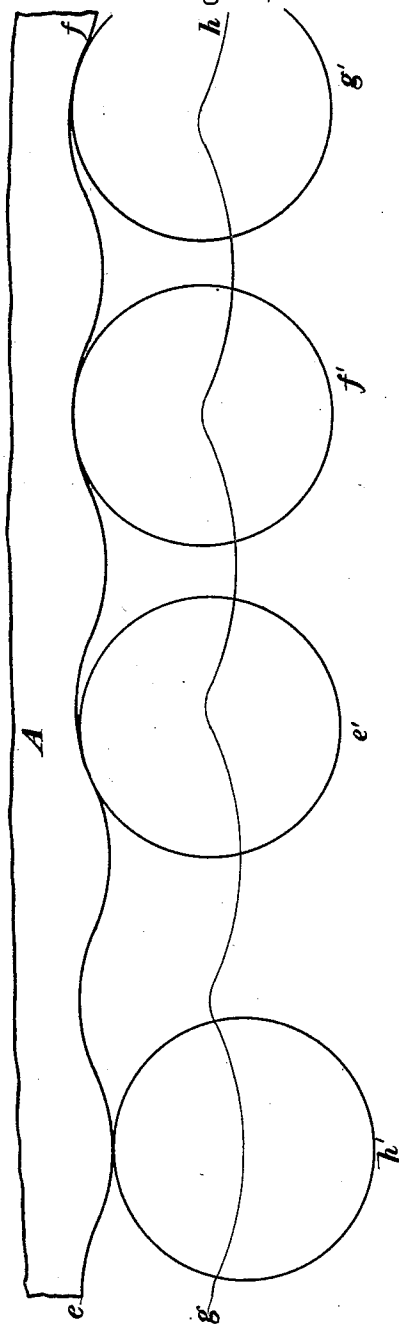

Fig. 2.

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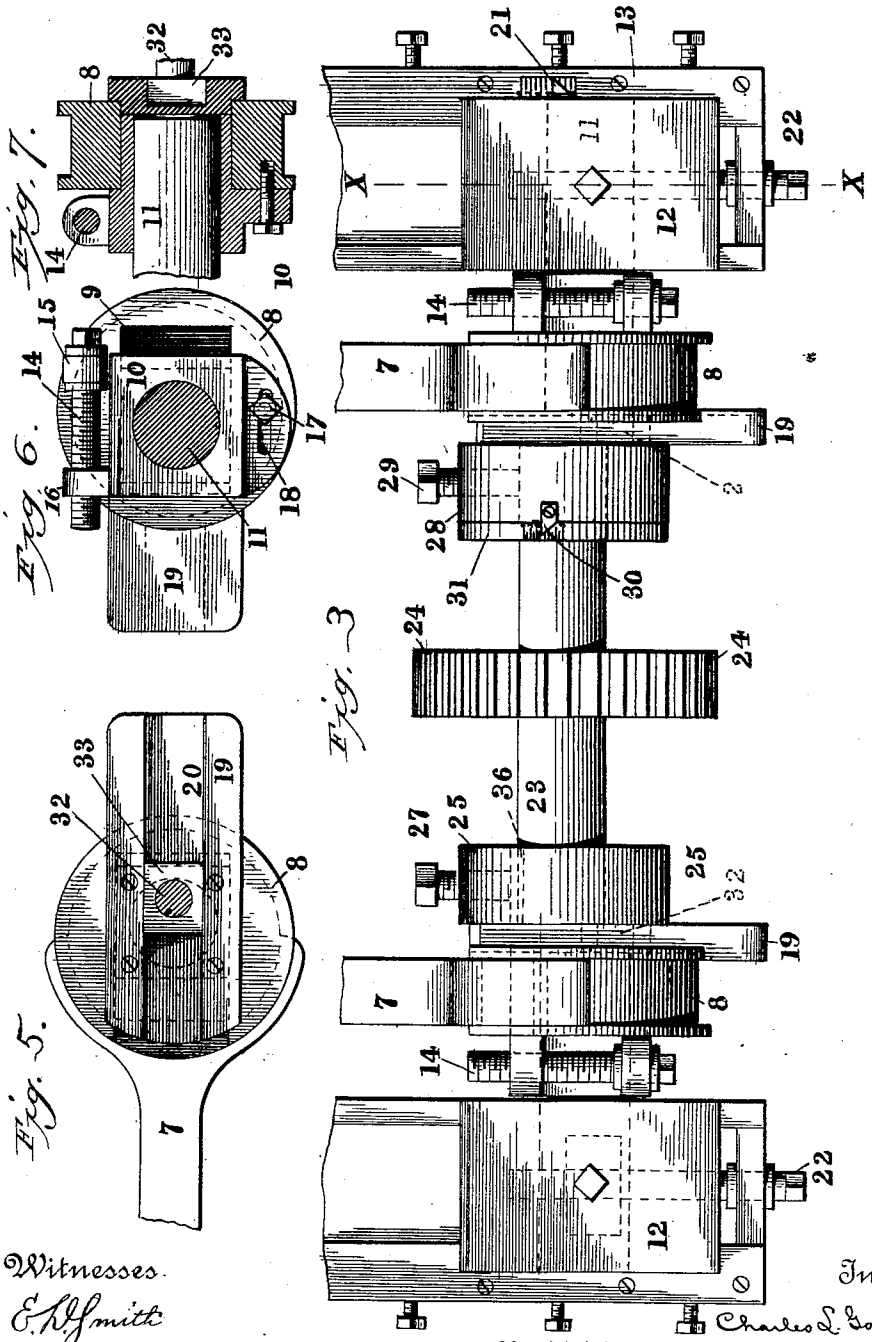

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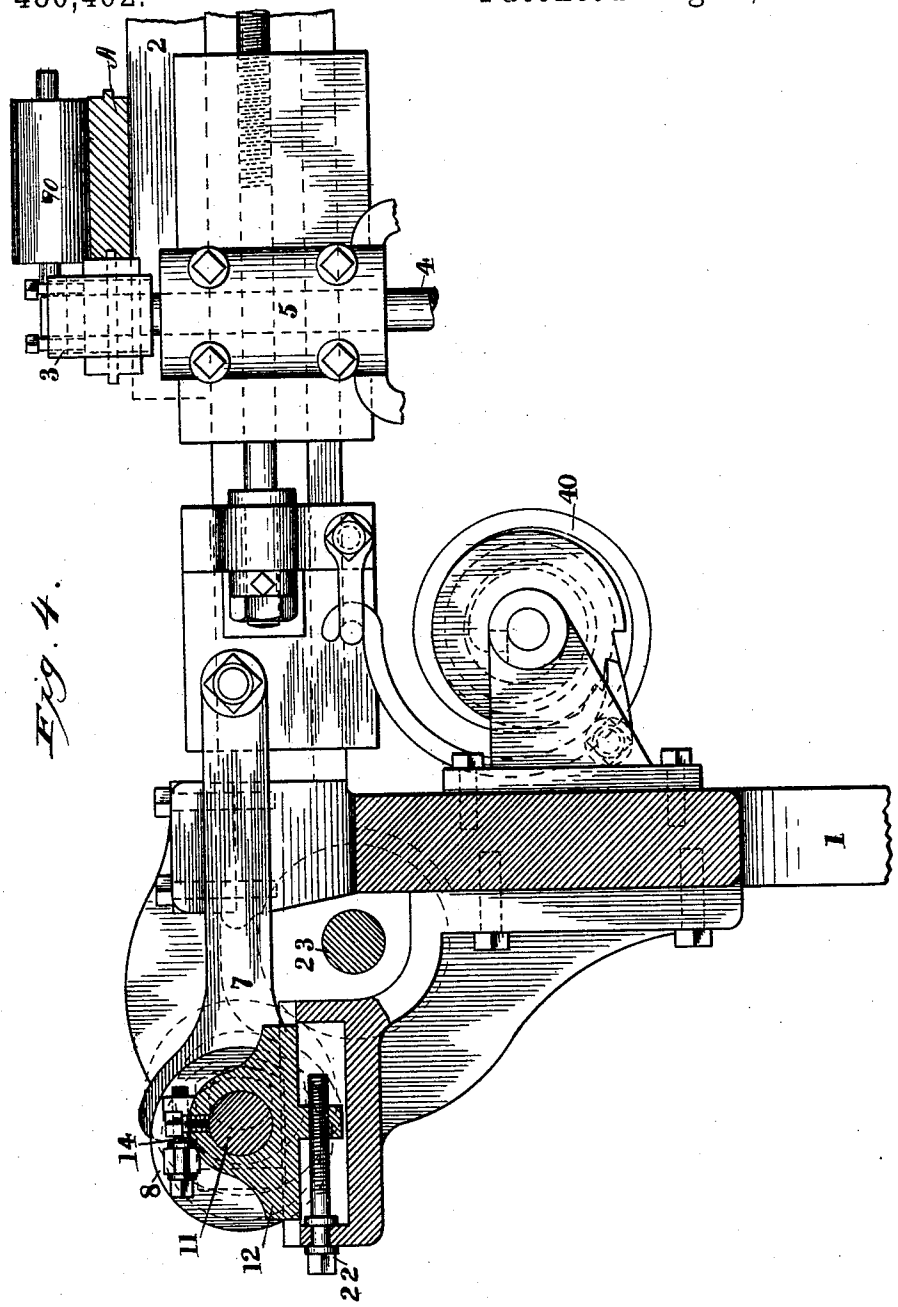

Fig. 4.

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UNITED STATES PATENT OFFICE.

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MEANS FOR ORNAMENTING WOOD.

SPECIFICATION forming part of Letters Patent No. 480,462, dated August 9, 1892.

Application filed September 6, 1890. Serial No. 364,163. (No model.)

To all whom it may concern:

Be it known that I, CHARLES L. GOEHRING, of Allegheny, county of Allegheny, State of Pennsylvania, have invented certain new and useful Improvements in Machines for Ornamenting Wood or other Material; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification, and to the figures and letters of reference marked thereon.

My present invention relates generally to the art of wood-working and that class of machines adapted to form flooring, wainscoting, &c., or cut wood on lines other than straight and parallel with the line of feed of the material; and it has for its objects to provide a machine embodying a rotary cutter-head that operates upon the material so as to cause it to cut a series of curves of any desired configuration, but particularly regular reverse curves or waves, the arcs of succeeding ones being equal without the use of special cams cut for each curve desired.

In the accompanying drawings, Figure 1 is a diagram showing the movement of a cutter-head and the line of cut when reciprocated by an ordinary eccentric cam or crank; Fig. 2, a diagram showing the movement when operated by my improved method and apparatus employed by me; Fig. 3, a plan view of the preferred form of means employed for carrying out the invention; Fig. 4, a sectional view on the line $x\ x$ of Fig. 3, showing a cutter-head and its actuating mechanism; Fig. 5, a face view of the eccentric cam; Fig. 6, a similar view of the other side; Fig. 7, a sectional view of the same.

Similar letters of reference in the several figures indicate similar parts.

Heretofore it has been impossible to cut true regular reverse curves on the edges of boards or strips by means of a rotary cutter-head actuated toward and from the progressively-moving strip by a true eccentric cam—*i. e.*, one formed by a circular rim set eccentric to its center of rotation—for the reason that the line of cut shifts from one side of the line in which the head travels to the other as different parts of the curve are traversed.

In the dragram Fig. 1, the line $a\ b$ will represent that in which the center of the cutter-head will travel relative to the strip or board A when reciprocated by an eccentric cam; but it will be noticed that the outer edge of the head, being thrown forward of the center, will traverse the line $c\ d$, this being caused by the shifting of the line of cut from one side of the line of movement of the head to the other. By reference to the circles $b'\ b^2\ b^3\ b^4$ in said diagram, indicating different positions of the cutters relative to the board, it will be seen that when they are at the crowns and hollows of the waves, respectively, the radial lines c' at right angles to the head intersect the strip at the cutting-points and are parallel with the line in which the cutter-head reciprocates; but along the inclines of the waves the intersecting radii d' of the cutting-points are at an angle to the strip and to the line in which the cutter reciprocates, and it will also be seen that these intersecting lines vary from e to f during the passage of the board from crest to hollow and from hollow to crest of the waves or curves, and that during such variations the movement of the cutter toward and from the strip must be accelerated at the points where the line of cut is in advance of the center or radial line c' and retarded when it is in the rear of it. In other words, the cutting-edge must be caused to travel in the line traversed by the center of the cutter-head when moved by an ordinary eccentric, and the center line of the head to traverse the line traversed by the cutter-edge when operated by the same means. This is shown diagrammatically in Fig. 2, wherein line $e\ f$ is the one desired to be cut, and $g\ h$ that traversed by the rotating center of the head, the forward movement of the head when moving from the position e' increasing up to the maximum at f' and decreasing at g' again, while from g' to h' it is slower, the slowest point being at h' or the crest of the wave, then gradually increases in speed to f' again when it is fastest. Of course this movement could be produced by a cam having an irregular surface, but the objection to this form of device is that it is very expensive to make; but more than all a different cam must be employed for each curve desired—that is, each curve of

different depth must have a different cam provided for it—but I have discovered that by moving the cutter-head toward and from or over the surface of the material by a device producing a determinate movement, constant in amplitude, (as an eccentric connection,) and causing the device to vary in speed at different portions of its movement, an infinite number of regular or irregular curves can be produced.

My invention therefore consists, broadly, in providing mechanism for moving a cutter-head toward and from the center of the progressively-moving material by means of a rotary eccentric or crank of determinate throw and varying the speed of said eccentric during its rotation to change the line of cut; also, in an improved machine for forming a series of regular reverse curves on boards or strips by moving a cutter-head toward and from the progressively-moving material by means of a rotary eccentric or crank of determinate throw and compensating for the shifting of the line of cut of said head by varying the speed of said eccentric during its rotation, and it is obvious that various modifications can be made of the mechanism shown, though, for reasons presently stated, I prefer to employ that illustrated in the accompanying drawings, which I will now proceed to describe, but do not desire to be limited to this form otherwise than as specified in the claims.

Referring particularly to Figs. 3 to 7, 1 represents a portion of the framework of any suitably machine embodying suitable support 2 for the board or strip A to be operated upon, over or by which it is positively fed forward past the cutter 3.

A roller 90 is shown in Fig. 4 as a conventional form of feed mechanism; but in practice I prefer the mechanism shown, for instance, in Patent No. 435,265, dated August 26, 1890; but other feeding devices could of course be employed.

The head 3 is mounted on a suitable spindle or shaft 4, rotated rapidly in frame 5, which latter is adapted to be reciprocated toward and permitted to move from the board by a pitman 7, having on its outer end a strip or yoke embracing an eccentric cam 8. The frame or slide 5 is pressed outward and its pitman held against the cam by a spring 40, operating upon it and the main frame, which form of device I prefer to an eccentric-strap connection, as all lost motion is thereby taken up. The cam 8 is provided with a rectangular elongated opening 9, fitting over a block 10, keyed or otherwise rigidly secured to a short shaft 11, having its bearing in a movable bearing-block 12, mounted on a stationary frame or way 13 on the main frame of the machine, and said cam is connected to the block 10 by a screw 14, passing loosely through a lug 15 on the cam and screwing into a lug 16 on the block 10, so that by moving said screw the eccentricity of the cam can be readily adjusted, and it can be secured in adjusted position by a bolt 17, passing through slot 18 in a flange formed on the block and entering the side of the cam. Secured rigidly to the other side of the cam 8 is a plate 19, having a way or slot 20 therein crossing the center of the shaft in the plane of movement of the cam of the shaft.

A suitable scale is provided on the way 13, with which co-operates a pointer or index 21 for indicating the amount of adjustment of the block 12, and said block may be adjusted on its way by means of a screw 22, rotating freely in the end of way 13 and screwing into the block, the longitudinal movement of the screw being prevented by suitable collars, as usual.

In a machine adapted to form flooring or wainscoting it is of course desirable to have both sides of the board or strip cut at the same time, and for this purpose two cutter-heads will have to be employed, the movement of the second head toward and from the strip relative to the first cutter-head being dependent upon its position, and in illustrating this device I have therefore shown devices for operating two heads supposed to be arranged on opposite sides of the material operated upon, but of course do not desire to be confined to this arrangement or construction of parts. The construction of the cams and pitmen for actuating the cutter-heads being the same, and the only difference being in their adjustment with relation to the motive power, the previous description will answer for both. Arranged between these shafts 11 and in the same plane therewith is a shaft 23, having a gear 24 thereon for rotating it at a regular speed, or any other suitable driving means may be employed. On one end of shaft 23 is provided a collar 25, preferably secured rigidly, though removably, in position by means of a movable key or spline 36, engaging the shaft and held in contact with the shaft by a set-screw 27, passing through the collar. The other end of the shaft is encircled by a collar 28, held in position by means of a set-screw 29 and provided with an index or pointer 30, co-operating with a graduated scale on a collar 31 on the shaft, so that the rotary adjustment of the collar 28 on the shaft can be determined to a nicety. Formed upon the outer sides of the collars 25 and 28 are crank-pins 32, having rectangular blocks 33 journaled thereon and arranged, when the parts are together, to slide in the ways 20 on the sides of the eccentrics.

As stated, the shafts 23 and 11 are in the same horizontal plane and when they are also in the same vertical plane or in line the pointers or indices 21 will be at the zero-points on the scales and the crank-pins 32 will cause the rotation of the shafts 11 and 23 synchronously and the greater or less movement of the cutter-heads by the cams 8, dependent upon the eccentrical adjustment, thereby producing the movement of the cutter-heads on the lines shown in Fig. 1; but by adjusting

the blocks carrying the eccentric-shafts 11 outward by means of set-screws 22, (the amount being determined by reading the scale with which index 21 co-operates and comparing it with a previously-prepared table,) the two shafts will be thrown out of a vertical plane and the crank-pin 32 will describe circles eccentric to the shaft 11 (the sliding blocks transmitting motion) and will vary the rotation of the latter, giving it a fast motion when near the center of rotation—that is, when passing from e' to g'—(see Fig. 2) while the crank-pins will be moving farther from the center when the line of cut from g' to e' is being made, and consequently the speed of rotation of the shaft 11 will be slower, thus causing the desired motion. By this adjusting of the cam on its shaft 11 the depth of the cut to be made can be easily regulated; but at the same time the shaft 11 will have to be adjusted also to produce the fast and slow motion at the proper points when making regular curves. However, if it is desirable to cut the board on different lines the adjustment of the cam and also the outward movement of the shaft can be changed relative to each other to produce an irregular but constantly-repeating curve, as will be understood. The length between the crests of the waves or curves can be changed by increasing the speed of the material relative to the frequency of the inward movement of the cutter-heads. As stated, the adjustment of the two collars or disks 25 and 28 relative each other will depend entirely upon their relation to each other in the direction of the movement of the board and the parts of the wave operated upon by them simultaneously.

It will be noticed that the various adjustments of the parts, particularly that of the shafts 11 and 23, relative to each other, also permits the elimination of the slight error that might otherwise occur in calculation, due to the up-and-down movement of the pitman operating on the eccentric.

The mechanism herein shown for carrying out my present invention is only one form of the many that can readily be devised for the purpose; but this I have practically operated and find it admirably adapted for the purpose, and by the use of a single eccentric cam I can produce an infinite number of different curves, either regular or irregular, so that if waved or serpentine flooring or wainscoting is to be made matcher cutter-heads can be employed and all the boards will be found to match and fit exactly and each of the curves being regular, and this at any point in their length; or, instead of employing cutter-heads operating on the sides of the boards, the mechanism illustrated in my prior patents, particularly No. 394,767, dated December 18, 1888, for forming geometrical figures on the surface of a board by a cutter having its axis parallel with the plane of movement of the board, could be operated by my herein-described mechanism and different designs produced.

In my machine I wish it understood that I regard a crank or any other similar device for producing an even reciprocation of the cutter-head, the speed of rotation of which is varied, as described, as the equivalent of an eccentric cam shown and described herein, the latter being but one form of device for the purpose.

I claim as my invention—

1. In a wood-working machine, the combination, with feeding mechanism for advancing the material, of a rotary cutter-head, a rotary eccentric or crank for operating the cutter toward and from or over the material at an angle to the line of feed, and mechanism for varying the speed of the eccentric during its rotation, substantially as described.

2. In a wood-working machine, the combination, with feeding mechanism for advancing the material, of a rotary cutter-head, a rotary eccentric or crank of determined throw for operating the cutter toward and from the center line of the material at an angle to the line of feed, and mechanism for varying the speed of the eccentric during its rotation, substantially as described.

3. The combination, with a movable frame, a cutter-head mounted thereon, and an eccentric cam reciprocating said frame, of a shaft, a crank-pin thereon engaging with and rotating the eccentric, and means for adjusting the crank and cam relative to the rotary center of the latter, substantially as described.

4. The combination, with a movable frame, a cutter-head mounted thereon, and an eccentric cam for reciprocating said frame, of a shaft, a crank-pin thereon engaging with and operating the eccentric, said eccentric and shaft being adjustable relative to each other in a plane parallel with the movement of the movable frame, whereby the position of the pin relative to the center of rotation of the cam may be changed, substantially as described.

5. The combination, with a movable frame, a cutter-head mounted thereon, a movable block, and a rotary eccentric cam mounted upon the block and connected to the frame for reciprocating it, of a rotary shaft mounted in stationary bearings and having a crank-pin for rotating the cam, substantially as described.

6. The combination, with a movable frame, a cutter-head mounted thereon, a movable block, and a rotary eccentric cam mounted on it having the groove in its face and connected to the frame for reciprocating it, of a rotary shaft, and a crank-pin thereon operating in the groove in the cam, substantially as described.

7. The combination, with the movable frame, a cutter-head thereon, an adjustable eccentric cam, of a rotary shaft having a crank-pin co-operating with the cam and rotating it, said cam and shaft being adjustable relative to each other, whereby the position of the pin

relative to the center of rotation of the cam can be adjusted, substantially as described.

8. The combination, with the rotary shaft having the two crank-pins thereon adjustable relative to each other, of two movable frames, each carrying a cutter-head, two eccentric cams, one connected to each head and each cam operated upon by one of the crank-pins and adjustable relative to the shaft, whereby the position of the pins relative to the center of rotation of the cams can be adjusted, substantially as described.

9. The combination, with the rotary shaft having the crank-pin and sliding block thereon, of the cam having the slot or way for said block, the movable block in which the cam is mounted, the movable frame and the cutter-head thereon, and connections between said frame and the cam for causing the reciprocation of the former by the rotation of the latter, substantially as described.

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