

(No Model.)

3 Sheets—Sheet 1.

M. E. KNIGHT & H. B. STEELE.
SOLE CUTTING MACHINE.

No. 494,784.

Patented Apr. 4, 1893.

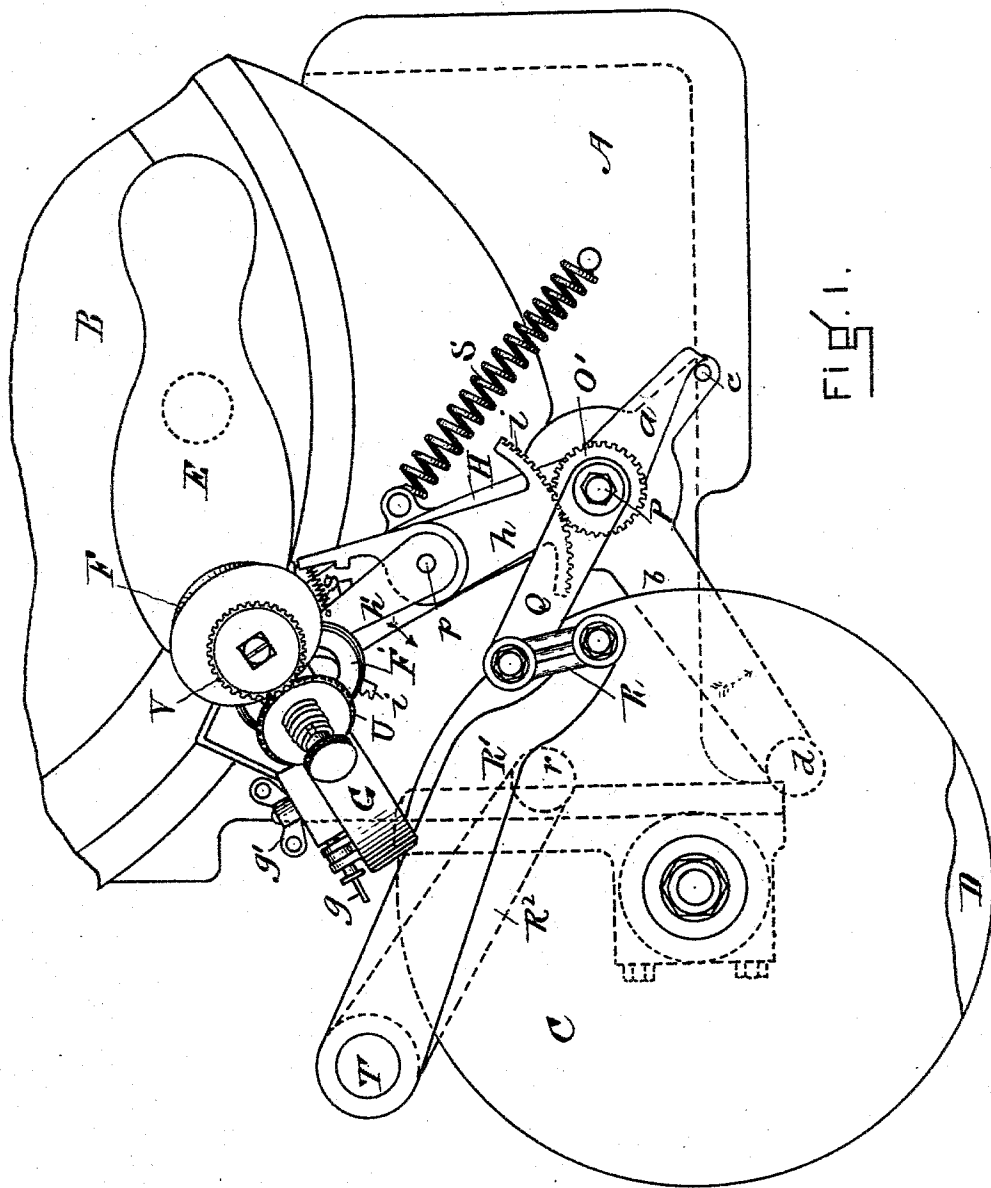


FIG. 1.

WITNESSES.

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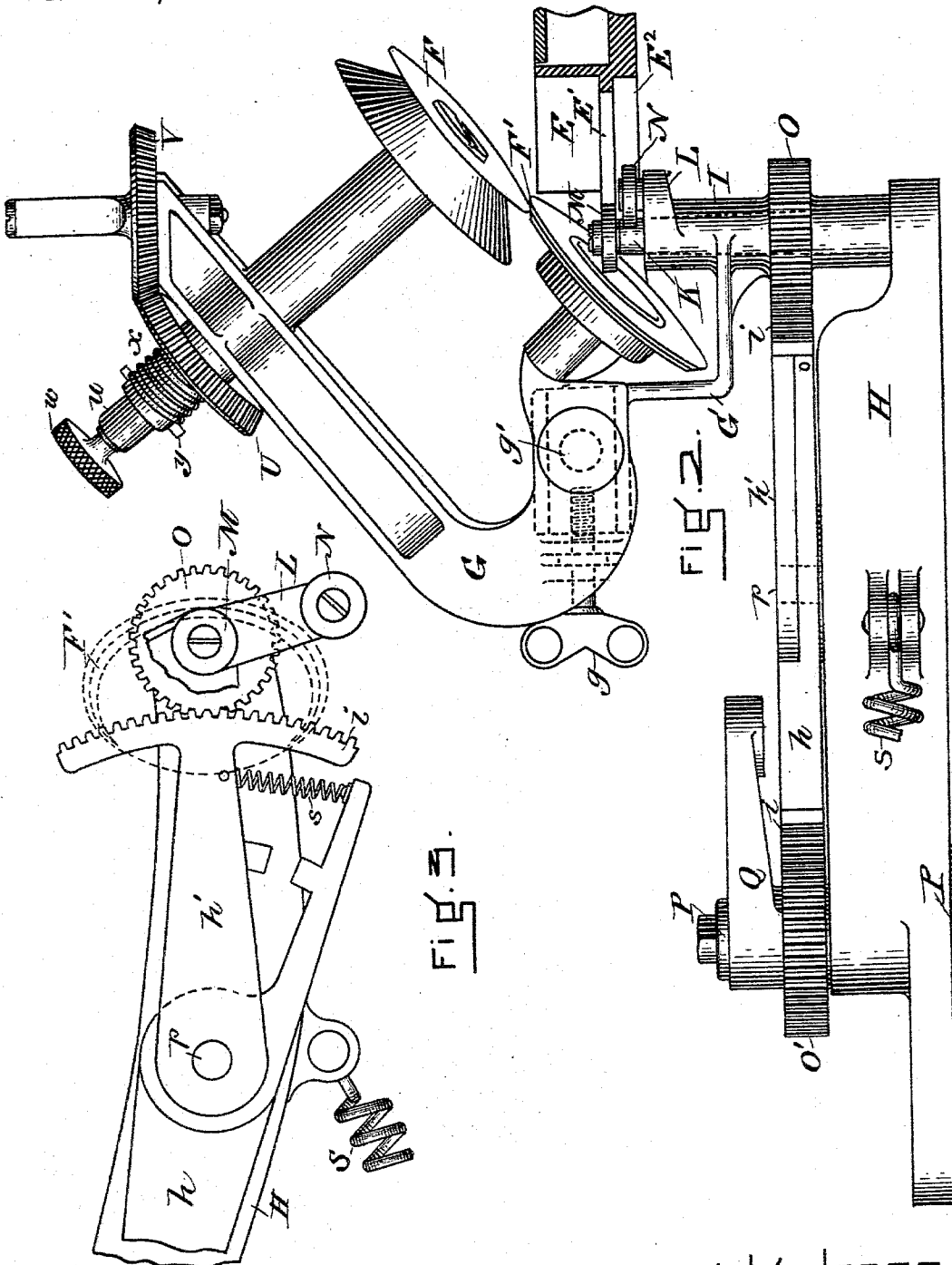
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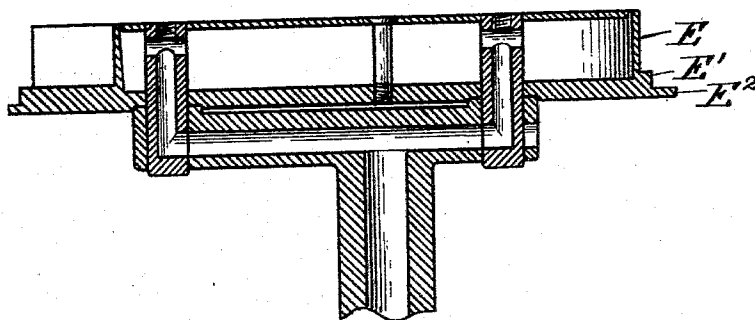


Fig. 4.

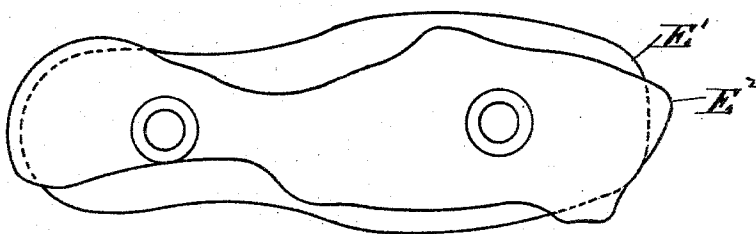


Fig. 5.

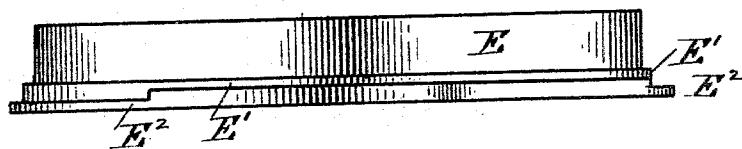


Fig. 6.

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UNITED STATES PATENT OFFICE.

MARGARET E. KNIGHT, OF SOUTH FRAMINGHAM, AND HERBERT B. STEELE, OF MEDFORD, ASSIGNORS TO SAID KNIGHT, AND ROBERT D. EVANS AND JOHN S. LOCKWOOD, OF BOSTON, AND DAVID C. MARR, OF HYDE PARK, MASSACHUSETTS.

SOLE-CUTTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 494,784, dated April 4, 1893.

Application filed September 9, 1892. Serial No. 445,415. (No model.)

To all whom it may concern:

Be it known that we, MARGARET E. KNIGHT, of South Framingham, and HERBERT B. STEELE, of Medford, both in the county of Middlesex and State of Massachusetts, have invented certain Improvements in Machines for Cutting Shoe-Soles and other Articles of Curvilinear Outline, of which the following is a specification.

Our improvement relates to and is especially applicable to a machine substantially like that described and shown in our patent No. 444,982, dated January 20, 1891, and it consists chiefly in the improved means by which the plane of the cutter blade or blades is automatically kept tangent to the varying curves of the form or pattern according to which the article is being cut, and in modifications of parts of the machine incidental thereto.

In the machine described in our said former patent, the relative distance between the cutters and the edge of the pattern according to which the sole or other article is to be cut, is maintained by a small friction roll pivoted upon the cutter frame beneath the cutters and which bears against the edge of the said pattern; but the axis of this roll is not in the line of the axis of the pivot upon which the cutter frame turns, and any inaccuracy in the cam by which rotary movement is given to the cutter-frame, for the purpose of always keeping the plane of the cutter blades tangent to the curves of the said pattern, is likely to be exaggerated by the position of the said friction roll. And also in the said prior machine it is necessary to provide a series of cams for effecting the said rotary movement of the cutter frame in order to meet the variations in the shapes of the patterns. In the present improved construction we place this friction roll upon a pivot, the axis of which is coincident with that of the pivot on which the cutter-frame turns. And upon the sleeve of the cutter-frame which fits upon the pivot we provide an arm which supports at its outer end another small friction roll, preferably in a plane a little below the first mentioned roll. This second roll bears upon a supplemental

cam or pattern, the contour of the periphery of which substantially corresponds to an irregular curved path traced by a given point in a line which is always kept tangent to the varying curves of the sole-pattern while being moved around said pattern, the distance between the tangent point and the tracing point of the line being constant.

To illustrate concretely, suppose a short ruler provided with two points near together and a third at a distance therefrom equal to the distance desired between the bearing point of the first mentioned roll upon the pattern in the machine, and the axis of the second roll; then the line traced by the said third point when the other two points are continually held against the edge of the sole-pattern while the ruler is caused to move around it, will be the path of the axis of the second roll and the shape of the said supplemental cam; and the size of this cam pattern for use with a second roll of any given size, will be determined by a line drawn parallel to and within the said traced path, and at a distance therefrom equal to the radius of the said second roll. These two friction rolls are held against their respective patterns by the action of springs, the second roll being independent of the mechanism which controls the first roll, so far as its effect upon the position of the cutter blades is concerned. The cutting point of the cutter blades and the bearing point of the first mentioned friction roll upon the edge of the sole-pattern are always substantially in the same perpendicular straight line, and as the sole pattern revolves the cutters follow the outline thereof, the plane of the cutter-blades being kept substantially tangent to its curves, by being swung upon the edge of said first roll as a fulcrum, by the operation of the cam within the machine. Independently of this action, the said second roll, upon the arm projecting from the cutter-frame, gives a supplemental and more accurate adjustment to the cutter blades by its movement in and out over the surface of the said supplemental cam pattern.

In the drawings accompanying this specification Figure 1, is a plan view of the portions

of the machine which contain our improvements; Fig. 2, a side elevation of the same with a small portion only of the sole-pattern and the accompanying cam pattern. Fig. 3, is a plan of the levers and supplemental spring by which the cutter-frame arm and its friction roll are controlled. Fig. 4, is a vertical longitudinal section of the hollow sole-pattern with the attached cam, showing the air pipes connected with the interior of the pattern. Fig. 5, is an inverted plan view of the said pattern showing the outline of the cam beneath. Fig. 6, is a side elevation of the hollow sole-pattern with its attached cam.

Referring to the drawings by designating letters, the same part of the machine having the same designation in each view, in Fig. 1, A represents a portion of the frame of the machine; B, a portion of the turret which supports and carries the sole-patterns E and their attached parts.

F, is the upper cutter and F', the lower cutter or grooved disk which operates in conjunction with the cutter F.

G, G' is the cutter-frame made in two parts. The upper part G supports the two cutters, and can be moved horizontally in guides upon the lower or bracket part G', by means of adjusting screws *g, g'*, (see Fig. 2,) thus adjusting the cutters in their relation to the pattern E.

The cutter-frame is supported upon one end of a swiveling arm H, by means of a sleeve I, upon a pintle K, projecting up from the arm H. From the upper end of the sleeve I, a short arm L, projects. Upon the upper end of the pintle K is a small friction roll M, which bears upon the edge E' of the pattern corresponding in shape to the sole or other article to be cut, and upon the outer end of the arm L, is another friction roll N, which bears upon the cam E², the form of which is produced from the shape of the sole pattern, in the manner hereinbefore explained. The arm H, swivels upon a pivot P, and by means of a spring S, one end of which is attached to said arm and the other to the frame of the machine, the roll M, is held in firm contact with the portion E' of the pattern E, and the cutters in operative relation to the upper edge of the pattern. A gear O, is attached to the sleeve I, which is, primarily, turned as in our former patented machine, by a lever *h*, having a segment gear *i* at either end and being pivoted at the middle of its length at *p*, to the arm H. One of these segment gears meshes with the gear O, and the other with the gear O', which is made fast to the lever Q. This lever Q is caused to move back and forth and thus turn the gear O', by its connection, through the link R, with the double arm lever R', R², pivoted to the frame of the machine at T. The portion R', is above the cam wheel C and the portion R², is below the said wheel and is provided with a cam-roll, *r* at its end, which runs in a properly shaped cam-groove on the under side of the wheel C.

In addition to the cam-groove which is upon the under side of the wheel C, and which through the interconnecting levers and gears referred to, turns the cutter frame, and thereby constantly keeps the plane of the cutter blade substantially tangent to the curves of the sole-pattern; there is the friction roll N, which as it follows the curves of the cam E² swings the arm L, to and fro, thus turning the sleeve I, and with it the cutter-frame and cutters, thereby acting as a supplemental adjuster of the cutters in relation to the sole-pattern. And in order that the operation of the cam E² upon the adjustment of the cutters may be independent of the cam upon the wheel C, the lever *h*, is made in two parts *h* and *h'*, both pivoted at *p*, but connected together by a spring *s*, so that when the cam E², through the roll N, moves the arm L, and thereby turns the sleeve I, and gear O, the part *h'*, will freely swing upon the pivot *p*, by reason of the resiliency of the said spring *s*, while the part *h*, remains at rest.

The cutter-frame with the cutters can be swung away from the pattern E, by turning the arm H, upon its pivot P. The mechanism for automatically accomplishing this is illustrated in Fig. 1, where *a*, is an extension of the arm H, below which, and upon the same pivot P, is a lever *b*, provided with a pin *c*, which projects upward from an extension of the lever *b*, in a position to bear against one side of the extension *a*, of the arm H. Upon the end of the lever *b*, is a cam-roll *d*, which runs in a suitable cam-groove in the cam-wheel D. This cam-groove is so formed and the revolution of the wheel D so timed, that it will move the end of the lever *b*, in the direction indicated by the arrow immediately after the cutting operation is completed. By the contact of the pin *c*, with the extension *a*, the arm H will be swung upon its pivot P, when the lever *b*, is turned thereon, and in the same direction; that is, the arm H, with the cutter-frame which it supports will be swung back away from the pattern E, in the direction indicated by the arrow.

The upper cutter F, is positively rotated through the gears U, V; while the lower cutter F', rotates only by friction during the cutting operation. The cutter F, can be adjusted in relation to its supporting frame by a thumb screw, W, within the sleeve *u*, which acts against the tension of the spring *x*, between the gear U, and a pin *y* in the spindle of the said cutter.

We claim—

1. In a machine for cutting articles of curvilinear outline the combination of one or more patterns to hold the material while being cut, a rotary cutter held in a swiveling frame, a guide upon said frame to bear upon the periphery of the said pattern, or patterns as presented a supplemental form with a cam to automatically adjust the plane of the cutter blades with relation to the curves of each pattern, and a second guide upon a projecting

part of said frame, to bear upon said cam-surface and thereby move the cutters substantially as described.

2. In a machine for cutting shoe-soles or
5 other articles of curvilinear outline, organized with a pattern to support the material while being cut; a cutter upon a pivoted support and mechanism adapted to turn said support and present the cutter to the said pattern with the plane of the cutter blade substantially tangent to the varying curves of
10 the edge of the pattern, a resilient connection between the cutter-support and the said turning mechanism, an additional cam combined with said pattern, a guide projecting from the
15 cutter-support, and bearing upon said cam, which is adapted, by its operation thereon, to give the cutter, supplemental adjustment independent of the other mechanism employed,
20 substantially as described.

3. In a machine for cutting articles of curvilinear outline, the combination of a stock-sup-

porting pattern and a cam, which have the same axis of rotation, a cutter upon a swiveling frame, a guide projecting from said
25 frame, adapted to bear upon said cam and mechanism to rotate the said pattern and cam, substantially as described.

4. In a machine for cutting articles of curvilinear outline, the combination of a rotating
30 stock-supporting pattern and cutter-adjusting cam; a cutter; a pivoted holder therefor; a swiveling support for said holder; a projecting guide upon said holder which is adapted by its bearing upon said cam to adjust the
35 cutter with relation to the edge of said pattern, when the said pattern and cam are rotated, substantially as described.

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