

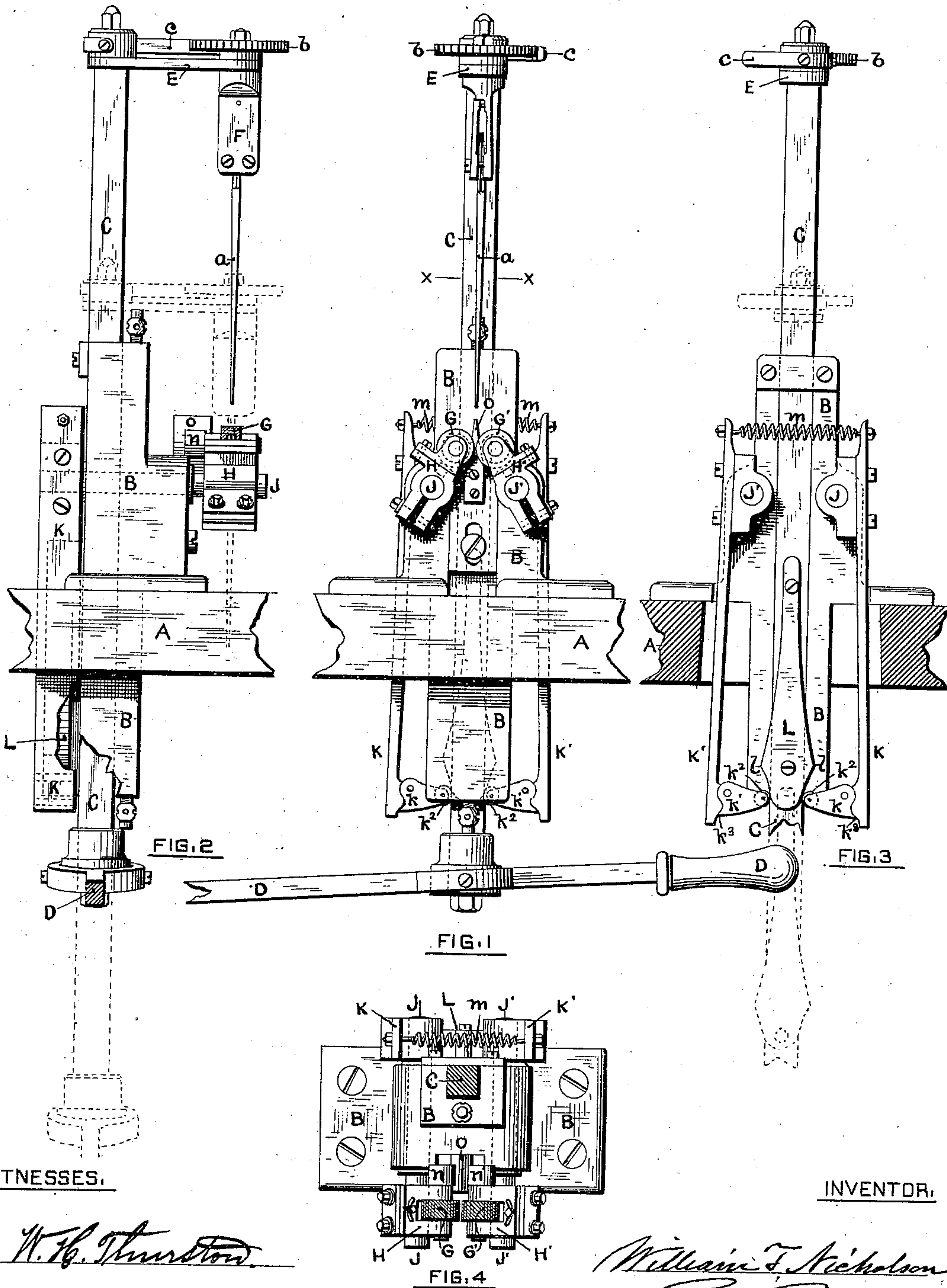
(No Model.)

W. T. NICHOLSON.

MACHINE FOR FORMING THE TEETH UPON FILE BLANKS.

No. 300,114.

Patented June 10, 1884.



WITNESSES.

*W. H. Thurston.*  
*Walter Hedrick.*

INVENTOR.

*William T. Nicholson*



# UNITED STATES PATENT OFFICE.

WILLIAM T. NICHOLSON, OF PROVIDENCE, RHODE ISLAND.

## MACHINE FOR FORMING THE TEETH UPON FILE-BLANKS.

SPECIFICATION forming part of Letters Patent No. 300,114, dated June 10, 1884.

Application filed May 28, 1883. (No model.)

*To all whom it may concern:-*

Be it known that I, WILLIAM T. NICHOLSON, of the city and county of Providence, and State of Rhode Island, have invented a new and useful Improvement in Machines for Forming the Teeth upon File-Blanks; and I do hereby declare that the following specification, taken in connection with the accompanying drawings, forming a part of the same, is a full, clear, and exact description thereof.

This invention relates to a combination of devices whereby teeth can be formed upon file-blanks by the pressure of a tooth-generating tool or tools upon the blank as the same is moved in the direction of its length past the revolving tooth-generator, or vice versa. The apparatus is particularly adapted to the forming of teeth upon file-blanks the cross-sections of which are rectangular, and it can also be employed with equal advantage for forming teeth upon blanks the cross-sections of which are circular.

Referring to the drawings, Figure 1 represents a front view of the apparatus. Fig. 2 shows a side view of the same. Fig. 3 represents a rear view. Fig. 4 shows a horizontal section on line *xx* of Fig. 1.

A represents a supporting-bench for the apparatus.

B is a frame upon which the several parts are mounted, and which is secured to the bench A.

C is a bar arranged to slide vertically in guides in the frame B, and it is worked up and down by means of a hand-lever, D, the fulcrum of which is located at any fixed convenient point. (Not shown in the drawings.) For this lever, however, any preferred means for imparting movement to the sliding bar C may be substituted.

To the upper end of the bar C a head-piece, E, is attached, and in this head-piece is located a holder, F, by which the file-blank *a* to be cut is clamped in any convenient way. This holder is so set in the head-piece that it can be rotated on its axis in order that file-blanks held by it can be turned on their axes to present fresh faces or sections of their surfaces to be cut by the tooth-generating tool, and the holder may be provided with an index, *b*, and

holding spring-pawl *c*, or other equivalent means for determining conveniently the number of degrees of a circle through which a blank is to be turned in forming thereon successive rows of teeth.

The tooth-generating tool in this instance consists of two hardened-steel cylinders, G G', placed opposite to each other; so as to operate at the same time upon the two opposite faces of a square file-blank or upon two opposite longitudinal sections of a round file-blank. Each of these cylinders or generators is furnished with teeth, the interspaces of which correspond, generally, with the teeth that will be formed on the blank, and is mounted so that it can revolve freely upon its axis. I prefer that the planes in which the generators revolve should be oblique to the path of movement of the file-blank, so as to produce a draw-cut action for sharpening the faces of the teeth; but it is not indispensable that this relation of the generator to the file-blank should exist to employ the present invention.

In place of the two tooth-generators G G', a single generator may be employed, and a smooth-faced cylinder may be substituted for its fellow; but under this arrangement the capacity of the apparatus would be reduced one-half.

The generators G G' are mounted, respectively, in arms H H', and these arms are clamped or otherwise secured, so that they can be conveniently adjusted in position upon rocker-shafts J J', which shafts are set in journal-bearings in the frame B. At the rear of the apparatus arms K K' are secured to these rocker-shafts, and it is obvious that when these arms are vibrated the generators G G' will be made to approach toward or be separated from each other. The free ends of the arms K K' are furnished with foot-pieces *k k'*, the ends of which are preferably provided with friction-rollers *k<sup>2</sup> k'<sup>2</sup>*, to take bearing upon the opposite faces of the pattern-block L, the contour of which corresponds for the time being with the taper or contour of the file-blank to be operated upon. The foot-pieces *k k'* are respectively hinged to the arms K K', as shown in Figs. 1 and 3, so as to turn on their hinge-pins, as hereinafter



explained, and shoulders  $k^3 k^3$  below the hinges prevent such foot-pieces from swinging too far downwardly.

From the foregoing description it will be understood that the file-blank to be cut is clamped in the holder F, as shown at Figs. 1 and 2, and in such a vertical relation to the tooth-generators G G' as to pass between them when the blank is moved downwardly, to have teeth formed upon its surface by said generators. By depressing the handle of the lever D the descent of the bar C causes the point of the blank to enter the space between the two tooth-generators G G'. While this movement is taking place, the pattern-block L, attached to the vertically-sliding bar C, has, from the downward movement of said bar, spread the foot-pieces  $k k'$  on the arms K K' to their farthest distance apart, from the fact that their rollers will then be at the points  $l l$  on the pattern-block L, Fig. 3, and consequently the rocker-shafts upon which the generators G G' are mounted will be turned in their bearings, and the generators will be brought close together, so as to press upon and indent the point-section of the blank. The continued downward movement of the vertically-sliding bar C, with the file-blank attached, will cause different sections of the pattern-block L to pass between the rollers  $k^2$  of the foot-pieces  $k k'$ , and, as the shape of the pattern-block corresponds with the figure of the file-blank, the generators will exert a proper degree of pressure throughout the length of the blank, for the reason that the pattern-block relatively to the file-blank is of such greater width as to cause the teeth of the generators to be pressed into the surface of the blank with a force due to the leverage obtained by the distance between the roller  $k^2$  and the center of the shaft J as compared with the distance between the center of the shaft J and the acting surface of the generator G. Upon commencing the return movement of the sliding bar C the tooth-generating tools will be relieved from pressure upon the surface of the blank which has been covered with teeth during the downward movement of the bar, for the reason that the inclined faces of the pattern-block L, in combination with its upward movement, will cause the two foot-pieces  $k k'$  to be tripped by being turned upwardly upon their hinge-joints. The file-blank is now to be rotated on its axis a fraction of the circle by turning the index-plate  $b$ , attached to the holder, so that fresh sections or faces of the blank will be presented to the tooth-generating tools upon the next downward stroke of the sliding bar, and the operation before described is repeated after the foot-pieces  $k k'$  have been turned backward to a position in which their axes are at right angles with the arms K K', to which they are hinged. This bringing the foot-pieces into position is accomplished by that double-inclined section of the pattern-block which is below the points  $l l$  thereon, in combination

with the downward movement given to it in bringing the blank into the opening between the faces of the two generators.

The purpose of the coiled spring  $m$  is simply to exert so much force as will compel the rollers  $n n'$ , Fig. 4, which are located on the axles of the generators to take bearing against a gage-block,  $o$ , whereby the distance between the faces of the generators can be regulated or determined, so as to give room for the insertion of the points of the blanks.

I do not limit myself to a combination in which the file-blank is moved in the direction of its length, so that longitudinal sections of its surface will be brought under the influence of a tooth-generating tool while such tool is relatively at rest, as it is obvious that the generating-tool may be made to travel over the portions of the surface of the blank to be provided with teeth while the blank is relatively at rest without essentially changing the character of the apparatus. Besides, too, it is evident that the devices and means for causing the generators to approach toward or recede from each other through the influence of a pattern-block, so as to conform to the varying cross-sections of a tapering file-blank, are not indispensable in case the blank is cylindrical or is slightly tapering, and that a very good result can be obtained by causing the generators to have a tendency to approach each other by means of springs applied to the frames in which they are mounted, and exerting sufficient force to mold or raise up teeth on the blank.

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

1. The combination, substantially as before set forth, of a holder for a file-blank, a revolving tooth-generator, as described, means, substantially as specified, for causing the longitudinal sections of the surface of the blank to be traversed by the generator, a pattern-block conforming to the shape of the blank, and means, as described, for causing the generator to be governed in its path of revolution by the pattern-block, and to exert suitable pressure upon the surface of the blank to mold up teeth thereon.

2. The combination, substantially as before set forth, of a pair of generators so mounted that the axes upon which they revolve may be made to approach toward or recede from each other, and arranged to operate upon opposite sections of a file-blank inserted between them, a pattern-block corresponding with the shape of the file-blank which is to have teeth formed thereon, levers or equivalent means for causing the generators to approach toward or recede from each other, tripping foot-pieces attached to such levers, and means, as described, for causing the surface of the blank to be traversed by the generators, whereby pressure can be exerted upon the opposite sides of the blank by the generators while the blank is passing between them in one direction, and such press-



ure be relieved when the direction of the movement is reversed.

3. The combination, substantially as before set forth, of a file-holder adapted to clamp a  
5 file-blank by its tang, a pair of tooth-generating tools adapted to operate under pressure upon opposite longitudinal sections of the blank to be furnished with teeth, and arranged relatively to the blank, as described, and suit-

able means, as described, for causing the blank to be moved in a right line in the direction of its length between the faces of the generators, as specified.

WILLIAM T. NICHOLSON.

Witnesses:

W. H. THURSTON,  
WALTER ALDRICH.