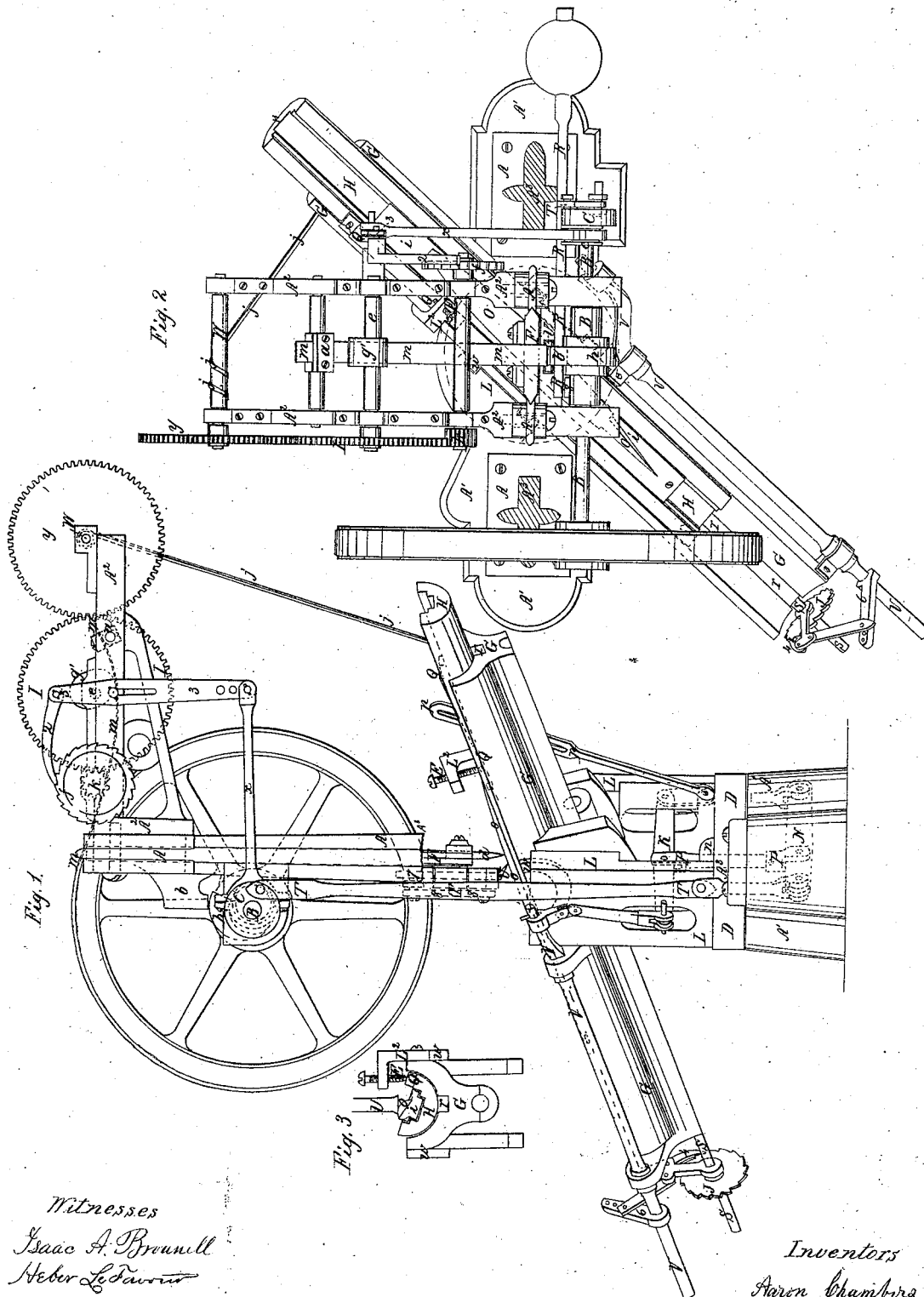


*A. Chambers.*  
*File-Cutting Machine.*

*N<sup>o</sup> 53,113.*

*Patented Mar. 13, 1866.*



*Witnesses*  
*Isaac A. Brownell*  
*Heber LeSauter*

*Inventors*  
*Aaron Chambers*

# UNITED STATES PATENT OFFICE.

AARON CHAMBERS, OF NORTH PROVIDENCE, RHODE ISLAND.

## IMPROVEMENT IN MACHINES FOR CUTTING FILES.

Specification forming part of Letters Patent No. 53,113, dated March 13, 1866.

### *To all whom it may concern:*

Be it known that I, AARON CHAMBERS, of North Providence, in the county of Providence and State of Rhode Island, have invented certain Improvements in Machines for Cutting Files; and I do hereby declare that the following is a full and exact description of the same, reference being had to the accompanying drawings, making part of this specification, in which—

Figure 1 is a side elevation of a file-cutting machine to which my improvements are applied, the frame-work being broken away at A<sup>3</sup> A<sup>3</sup> to give an unobstructed view of the working parts. Fig. 2 is a plan of the same machine. Fig. 3 is an end view of the tipping-bed and the rolling bed, hereinafter referred to, shown detached from the machine.

Similar letters refer to like parts in all the figures.

The improvements which I have invented are applicable more particularly to the construction of machine for cutting files set forth in Letters Patent of the United States granted to Etienne Bernot, of Paris, France, dated July 24, A. D. 1860, to which reference is to be had.

In the said machines of Bernot the graver or chisel used to cut the file moves perpendicularly in a sliding carriage, and the file-blanks to be cut are held in a kind of bed beneath the graver or chisel, and this bed is so constructed as to be capable of moving in a number of ways to present the surface of file-blanks of different kinds to the graver or chisel for the same to be cut. These movements of the bed and their purpose, respectively, may be specified as a rocking or tipping movement on trunnions at each side of the bed, by means of which the plane of the bed is set at an angle with the movements of the graver or chisel to obtain the requisite inclination of cut; a swinging movement on a central pin, by means of which the angle of the cut across the face of the file is obtained in either direction; a sliding movement endwise of the bed that is graduated and intermittent for feeding the file-blanks beneath the graver or chisel to produce the successive cuts, and a rolling or oscillating movement by means of which the bed is set in slightly-varying positions from time to time, so as to cut the rounded surface or edge of a file-blank.

Of the several movements specified above

the rocking or tipping movement, by means of which the file-blank is placed at the proper angle with the cutting-chisel to produce the cut, and the rolling or oscillating movement, by means of which the rounded surface or edge of a file-blank is properly presented to the cutting-chisel, are, in some respects, imperfect and ineffectual for the full and complete performance of their respective functions. The defect in the rocking or tipping movement being that, as the bed is adjusted to and held in one position at the same angle of inclination during the cutting of the file from end to end, no provision is made for the gradual taper and consequent inclination from the general plane of the file's surface from the belly toward the end, so as to present this inclined surface at the same angle relatively to the cutting-chisel as to the other part of the file, in consequence of which the chisel cuts the inclined tapering portion at a less acute angle, which fails to raise the cut or tooth in perfect form to cut with the rest of the teeth, and this is therefore obliged to be done by another operation.

The defect in the rolling or oscillating movement is that the bed is adjusted and held at a certain angle to cut upon a round surface, and in such position moves in a right line by the feeding movement while cutting from the point to the shank of the file, and as a consequence no provision is made for the taper both in thickness and in width of the half-round file, so that a portion of the surface near the edges remains uncut, and is required to be finished in this respect by another operation.

Now, the object of my invention is to remedy or remove these defects and make the cutting uniform and complete over the entire surface from the point to the shank.

My invention for this purpose consists in tipping the bed gradually, while the cutting operation is being performed, from the more acute angle at which the point of the file should be presented to the chisel to the more obtuse angle at which the bed is held while cutting over the plane surface from the belly to the shank, in order to adapt the inclination of the cuts or teeth to the variation of the file's surface from a general plane; and my invention, also, consists in rolling the bed gradually while the cutting operation is being performed, and in so controlling the rolling movement, by

means of suitable self-adjusting mechanism, to vary the position of the file-blank from time to time in such a manner, with respect to the cutting-chisel, as to adapt the action of the chisel to the irregularity of the file's outline or surface, and thereby dispose the cuts uniformly over the surface and edges of the rounded tapering part of the file.

In the drawings, A A is the frame of the machine. *d* is the cutting-chisel, secured at the lower end of the sliding carriage F, which slides perpendicularly in guides formed in the frame by means of the revolving cam *h* on the main shaft B, which lifts the carriage by the projection *b* thereon and the force of a spring, *m*, held at *a*, and bearing with its free end on the top of the carriage to drive it downward on the file-blank with sufficient force to make the cut, when liberated by the cam *h*, and the force of this spring is varied during the cutting operation, to make it cut deeper on certain parts of the blank, by means of the eccentric-cam *g'* on the shaft *e*, which revolves at the requisite speed by means of the gear I and the pinion *k*, the ratchet *j*, operated by the pawl 2 on the arm 3, and the connecting-rod *x*, connecting with an eccentric-cam, C, on the main shaft, whereby an impulse or movement is given to the cam *g'* with each cutting-stroke of the chisel, to increase or diminish the force of the spring *m*, against which it bears, as the case may require.

The rocking bed is marked G. It is of cast-iron, formed as shown, and suspended on trunnions *w* or bearings between the two upright stands L L, on the swivel-plate D, which swings on a center-pin, *n*, passing through the plate and the bed-plate A' of the frame. By means of these trunnions and the center-pin *n* the bed is tipped or inclined from a horizontal position to the position shown, at an angle with the movement of the chisel, to give the requisite inclination of cut, and also swung at an angle with the cutting-edge of the chisel to obtain the proper angle of the cut across the face of the file.

The rolling or oscillating portion of the bed is marked H, and is semi-cylindrical in form, and rests in a correspondingly-shaped cavity in the rocking part of the bed, wherein it slides, besides oscillating to feed the file-blank beneath the cutting-chisel, the sliding movement being effected in a suitable manner by means of a toothed rack occupying a recess, *r*, in the bottom of the cavity in the bed, and a screw or worm on the end of the shaft S, which is revolved intermittently, after each cut is made, by means of the ratchet J and the pawl 4, operated by the arm 6 on the shaft V, which is connected to the levers K and N, and these connected by the rod T to the crank C on the main shaft.

The levers K and N, it will be observed, are connected in the center by a sliding swivel, P, passing through the center-pin, by means of which the levers and their connections are made capable of working to produce the feed-

ing movement in all positions in which the bed is capable of being placed or during any progressive movement of the bed.

The file-blank to be operated upon is held by suitable appliances on the oscillating bed H, and is pressed down upon the bed by means of a guide and presser, U, which is formed with a chisel-like face, which bears against the file-blank and is subjected to the pressure exerted by the weighted lever R, pivoted to the guide at 7, and by the link 8 to the frame.

The parts thus far described correspond with those of the file-cutting machine set forth in the above-mentioned Letters Patent; and it should be understood before proceeding to describe my improvement of this machine that the rocking or tipping of the bed G is simply a movement which the bed, as constructed, is capable of making to attain the desired position for cutting, and that in its use heretofore it was firmly fixed in this position while the cutting of the file is going on; also, in respect to the rolling or oscillating movement. The bed H is simply capable of rolling or oscillating to attain the requisite position from time to time for cutting rounded surfaces, and when said position is attained it was fixed firmly during the operation of cutting from end to end of the file in its use heretofore.

When the rocking or tipping bed is fixed in one position while the file is being cut from the end to its shank the teeth will all have the same inclination with the plane of the bed on which the file rests; but as the blank tapers from the belly to the point the teeth on this portion of the surface will incline more toward the shank, and as the chisel meets this surface at a more obtuse angle than it does the body of the blank the cut is not made as deep, and a blunt, unfinished tooth that is incapable of cutting is formed over the tapering portion of the blank. To remedy this defect in the operation of the machine I give the bed G a gradual tipping movement while cutting from the tapering point back to the belly, starting at the point with a more acute angle of inclination and tipping the bed to the more obtuse angle in approaching the belly, at which the bed is held while the cutter passes over the general plane from the belly to the shank without tipping, as heretofore. This tipping movement may be produced by means of the mechanism shown in Figs. 1 and 2 of the drawings, the same consisting of a windlass, W, turning in bearings formed near the extremity of the brackets A<sup>2</sup> A<sup>2</sup> over one end of the bed by suitable gearing Y, meshing with the gear I of the eccentric-cam *g'*, and winding or unwinding a band, *j*, attached by its opposite end to the tipping bed G. By means of this mechanism the bed is tipped or inclined to the most acute angle required for forming a perfect tooth on the tapering end of the blank, and as the cutting proceeds from this point the windlass unwinds the band or strap *j* by intermittent movements coincident with the feeding

movement of the sliding bed H, and by that means gives a gradually-decreasing inclination to the successive cuts as the belly of the file is approached, when, by means of a stop fixed on the slotted arm *p*, the tipping movement of the bed is arrested, and the cutting over the remaining portion of the blank proceeds with the bed held stationary in the same plane. By this means perfectly-formed cutting-teeth may be cut from one extremity of the file to the other, and the nature of the improvement is such that by means of some well-known appliance for reversing the rotation of the windlass, a different inclination of tooth may be produced in approaching the shank, as well as from the point to the belly, if it is found desirable to do so; also to arrest the tipping movement at any desired point or points in the traverse of the bed by means of one or more stops arranged on arms like *p*, as described.

The oscillating movement of the bed, as above described, serves to present successive radial sections or strips of a rounded file surface or edge to the action of the cutting-chisel, and its position is shifted after each row of cuts is made, in order to present a fresh surface to the cutter or chisel. But it happens in cutting a half-round file-surface that, owing to the narrowing of the blank near the point, such is the contour of this part of the blank that a narrow strip next to the edges remains uncut in cutting the last row of teeth, which impairs the usefulness of the file; and if to remedy this another row of cuts was made with a view to cut over this vacant space, the cuts, from being so near the edge, would penetrate too deeply and injure the file more than the complete cutting in this way would compensate for. To remedy this defect is the object of the second part of my improvement, and this is accomplished by oscillating or rolling the bed H during the operation of cutting, and by so guiding and controlling the oscillating movement as to dispose the cuts uniformly over the irregular rounded surface and completely up to the file's edge. The mechanism for this purpose may consist of a wedge or pattern, Q, fixed in the proper position on one side of the bed H, and tapering to the surface on which it rests; and a screw-stud, E, in a projecting stand, L<sup>2</sup>, which is secured on the side of the bed G.

The file-blank O is placed in a suitable hold-

er, *i*, on the opposite side of the bed from the pattern, so that the pressure exerted by the weighted lever on the guide U has a tendency to depress this side of the oscillating bed and elevate that side on which the pattern Q is fixed, and this depression, which is due to the rolling movement, is controlled by the pattern by turning down the screw-stud E, so that its point will bear against the face of the pattern, and as the bed G slides by the feeding movement, the pattern, being properly formed to effect the purpose, will so guide and direct the rolling or oscillating movement as to present the irregular curve of the file's edge to the cutting-chisel in a position to cut as near the edge as may be required to complete this part of the file on the machine. I contemplate substituting for the screw-stud an index-stud that is provided with a number of holes for the reception of a set pin, so that the stud may be slipped to a given position in its stand and held there by the pin during the cutting of one or more of the rows of teeth, and then again slipping the stud to another position to guide the movement of the oscillating bed in cutting the next row of teeth, and so on over the entire surface.

I also wish it understood that a curved pattern and other well-known mechanism, if skillfully arranged, may be made to control the rolling movement of the bed substantially in the manner described, and that I do not, therefore, limit myself to the use of the mechanism described, but that I intend to use such other mechanism as will effect the rolling of the bed in substantially the same manner.

Having described my invention, what I claim, and desire to secure by Letters Patent, is—

1. Giving to the rocking bed a gradual tipping movement during the operation of cutting the file, substantially in the manner and for the purpose described.

2. Rolling and controlling the rolling or oscillating movement of the bed by means of a pattern and other suitable appliances, substantially in the manner and for the purpose specified.

In testimony whereof I have hereunto subscribed my name this 15th day of December, A D. 1865.

AARON CHAMBERS.

In presence of—

ISAAC A. BROWNELL,  
HEBER LE FAVOUR.