W. McGREGOR.

Improvement in File-Cutting Machines.

No. 131,767. Patented Oct. 1, 1872.

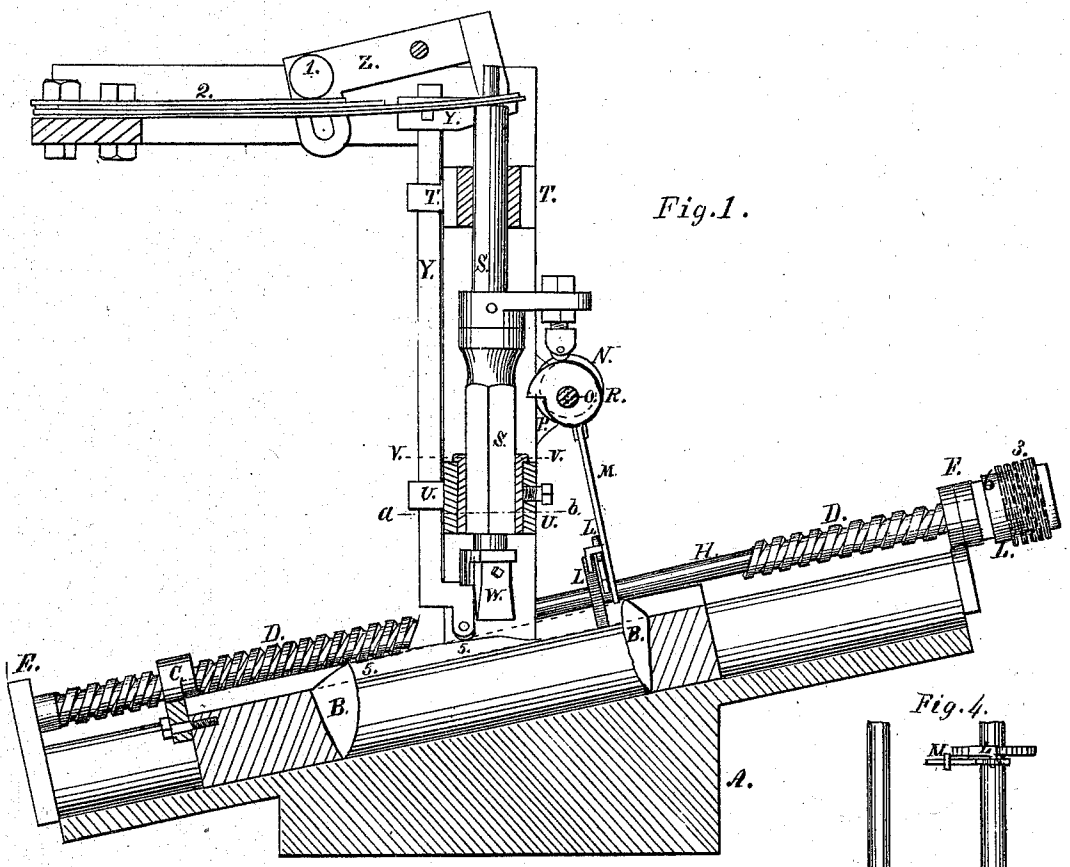

Fig. 1.

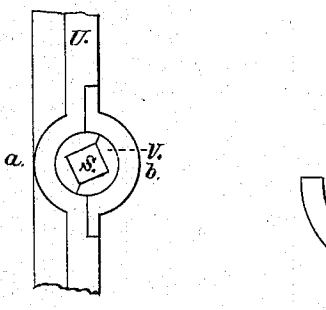

Fig. 3.

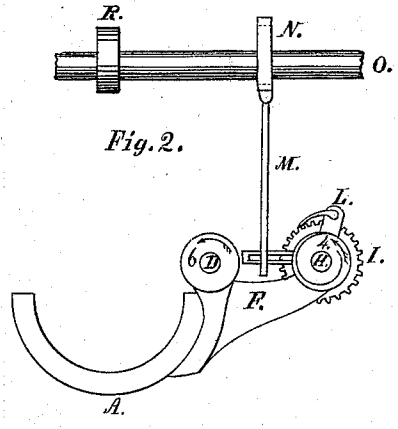

Fig. 2.

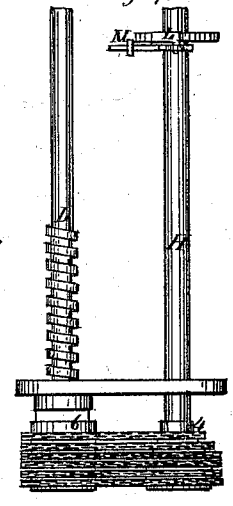

Fig. 4.

Witnesses.

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WILLIAM McGREGOR, OF MANCHESTER, ENGLAND.

IMPROVEMENT IN FILE-CUTTING MACHINES.

Specification forming part of Letters Patent No. **131,767**, dated October 1, 1872.

To all whom it may concern:

Be it known that I, WILLIAM McGREGOR, of Manchester, in the county of Lancashire, England, have invented certain Improvements in File-Cutting Machines, of which the following is a specification:

My invention relates to a combination of certain parts, whereby the rate of speed at which the file is fed under the chisel shall be less, relatively, to the number of blows of the chisel when the point of the file is being cut, thus making a greater number of teeth to the inch near the point of the file; also to the use of an eccentric ratchet-wheel to cause irregular "rowing" of the teeth of the file.

The accompanying drawing represents my invention. Figure 1 is a longitudinal section through the machine, with the movable bed or slug, and also the screw, broken away to show the part beyond. Fig. 2 is an end view of parts of the machine, showing the combined barrel and scroll and the drum, and the ratchet with its connection to the eccentric, the chain being left off to show the scroll more clearly; the direction in which the combined barrel and scroll and the drum revolve, when the machine is in operation, being shown by the arrows. Fig. 3 is a section on *a b* through the lower stay. Fig. 4 is a top view of the parts shown in Fig. 2.

A is the body or block resting upon a solid foundation, as of stone, and constitutes, with the two uprights bolted to its sides and the arms projecting backward from the top of the uprights and the connecting-stays, the frame of the machine, which should be substantially constructed to resist vibration. B is a movable bed, upon which the file is placed beneath the chisel, and is attached by a bolt at its rear or lower end to the nut C in such a manner as to allow of the bed making a partial revolution. C is also connected to the incline 5, sliding upon the edge of the block A. Through the nut C passes the screw D. E and F are brackets, which serve as bearings for the screw D. I is a ratchet-wheel keyed to a short shaft, H, which lies parallel to the screw D. L is a ratchet-lever, provided at one end with a dog, and turning on the shaft H, and at the other end connected with the eccentric rod M. N is an eccentric turning with the shaft O. The shaft O has at one end a driving-pulley, to which the power is applied. Upon said shaft is the cam R, which, alternately, lifts the ram S. The ram S, where it is squared, passes through the collar V, retained in the stay U by a set-screw, so that said ram can, by changing the position of the collar, be made to cut the file at any desired angle. The presser-bar Y is forced upward by the forward motion of the incline under its foot, as the screw D turns, raising the forward end of the lever Z and depressing the further end of said lever, and pressing the stud 1 upon the spring 2, thus increasing the force with which the cutter strikes the file. Upon the forward end of the screw D is a drum, connected, by the chain or band 3, with the scroll and barrel 4 on the forward end of the shaft H. When the machine starts, the chain which is wound about the drum, gradually unwinds from the drum, and winds upon the scroll and barrel, thus causing the screw D to revolve. The ratchet-wheel I is not perfectly concentric with the shaft H, the center of the wheel being about an eighth of an inch from the center of the shaft, the object of the eccentricity being to secure irregular "rowing" of the teeth of the file—that is, the teeth do not follow each other at uniform distances apart, thereby improving the cutting properties of the file. The file is retained upon the bed, while being cut, in the usual manner.

The operation of my machine is as follows: The chisel being first set at the required angle, I first secure the file-blank upon the semi-cylindrical bed B, lengthwise of said bed, the point of the file being toward the upper end of the bed, the center line of the file-blank being directly over the center line of the bed, and the bed being at the lowest or back part of the block A, and the ram S being meanwhile raised upon the cam R. Power is then applied to the shaft O, which revolves, dropping the ram S from the cam R, and making the first cut upon the point of the file. As soon as the chisel at the lower end of the ram has made the first cut it is again raised by the cam. Meanwhile the eccentric N is revolving, and, as soon as the chisel leaves the first cut, depresses the eccentric rod M and the ratchet-lever L, thus causing the dog upon the latter to turn the ratchet-wheel I, and causing the shaft H to make part of a revolution. The combined scroll and barrel 4 being fixed on the shaft H

revolve with it, and begin to wind the chain or band 3, (which chain, when the machine starts, is wound about the drum,) upon the part of the scroll having the least diameter, so that a very little of the chain is wound upon the scroll and unwound from the drum, causing a partial revolution of the screw. This revolution of the screw draws the nut C and bed B forward, carrying the file-blank forward under the chisel or cutter of the ram S. The bed then stops and the ram falls, making a second cut parallel to and very near the first cut. The operation is then repeated, but as the diameter of the scroll becomes greater a greater length of the chain is unwound from the drum and wound upon the scroll part of the barrel, causing a greater revolution of the screw D, and thereby imparting a greater forward motion to the bed, and causing a continually-growing interval between each successive cut and the preceding cut until the chain is wound entirely around the scroll part of the combined scroll and barrel, and begins to wind upon that part of the barrel which has a uniform diameter, when the same length of chain is unwound from the drum and wound upon the barrel at each succeeding partial revolution of the ratchet-wheel, making equal partial revolutions of the screw, and drawing the bed which carries the file-blank forward at a uniform rate, and making the cuts at equal distances from each other, except so far as this result is modified by the eccentricity of the ratchet-wheel I, the effect of which is hereinafter stated. The cuts begin to be at equal distances from each other at about an inch from the point of the file. After the file-blank has been cut in one direction the screw is revolved backward by a winch or wrench applied at the forward or upper end of the screw D, (the dog being lifted out of the ratchet-wheel,) and the chain is unwound from the scroll and barrel and wound upon the drum, the bed is drawn back to its original position, and the point of the partly-finished file-blank is again brought under the chisel. The set-screw, which retains the socket V in position is then loosened, the ram is turned by the hand carrying the socket around with it until the chisel fixed in the end of the ram makes the angle (with the center line of the file-blank) required to give the other cuts on the same face of the blank, and the socket V is set by its set-screw. The machine is again started, the cuts are made at gradually-increasing distances on the blank for about an inch, as before, and then at regular intervals to the end of the blank, when the file is completely cut on one side. During the cutting of the file, as the nut C drawn by the screw D pushes the bed forward under the chisel, the incline 5 connected with said nut is pushed along on the edge of the body or block A under the presser-bar Y, which in turn raises the forward end of the lever Z (which turns upon a pivot near its middle point) and depresses the rear end of said lever, bringing the stud 1, which projects from said rear end of said lever down upon the spring 2 between the top of the ram and the rear end of said spring, thereby stiffening said spring, throwing down the ram with greater force, and increasing the depth of the cuts upon the blank.

As has been already stated, the ratchet-wheel I is very slightly eccentric, so that the cuts upon the file are never at exactly uniform intervals upon any part of the file, and the teeth do not follow each other in perfectly-straight lines or "rows"—in other words, the "rowing" is irregular—because the amount of revolution of the scroll and barrel, and consequently the amount of revolution of the screw and the advance of the bed carrying the file-blank, other things being equal, will depend upon whether the part of the ratchet-wheel acted upon by the dog upon the ratchet-lever L is nearer or more remote from the center on which said wheel turns; for, of course, the further from the center of the shaft H the part of the ratchet on which said dog acts, the less the amount of revolution and the slower the file-blank is fed under the chisel and the nearer the cuts are together. Now, although the coarser cuts in the "up-cutting" and "over-cutting" will, with each other, make regular "rowing," and, although the finer cuts will, with each other, make regular "rowing," yet it is evident that cuts of different fineness crossing each other will make irregular "rowing." It is plain that by varying the length of the scroll relatively to the length of the combined scroll and barrel the distance from the point of the file to that place on the file where the teeth become comparatively uniform may also be varied; also, that the general fineness of the teeth may be increased or diminished by simply increasing or diminishing the diameter of the drum, allowing the combined scroll and barrel to remain of the same size and shape.

The advantages of my invention are the fewness of its parts and the simplicity of its arrangement, and the close resemblance which the files cut by it have, not only in appearance, but still more in their serviceable cutting properties, the difficulty with machine-cut files heretofore having been that they were too regular.

I claim as my invention—

1. The combination of the drum 6, scroll 4, and the rotating mechanism thereof with the bed B, and screw D, as and for the purpose herein set forth.

2. The combination of the eccentric ratchet-wheel with the drum 6, scroll 4, and screw D, as and for the purpose herein specified.

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Witnesses:

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