

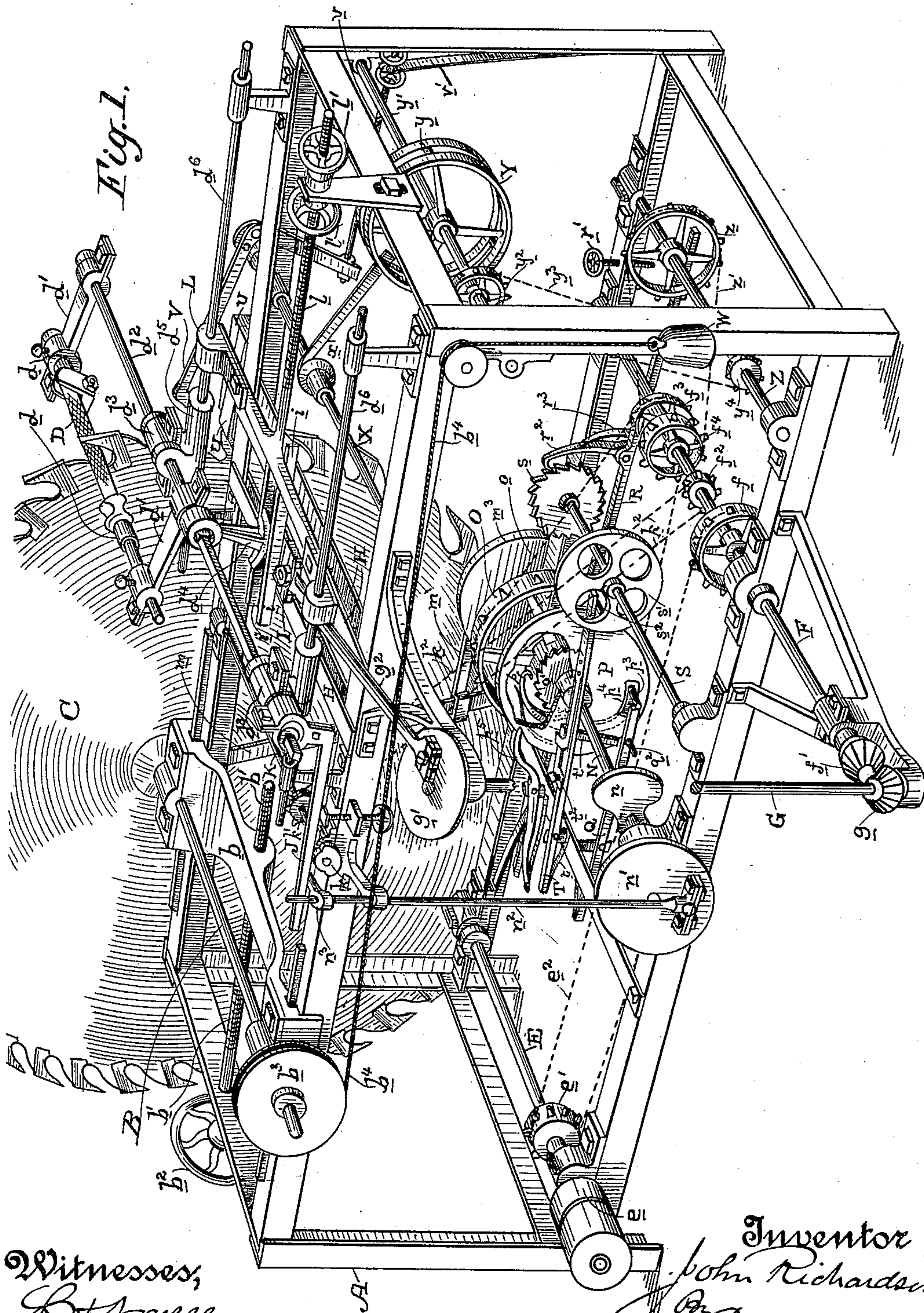
(No Model.)

2 Sheets—Sheet 1.

J. RICHARDSON.
SAW FILING AND SETTING MACHINE.

No. 481,823.

Patented Aug. 30, 1892.



Witnesses,
Attest
J. A. Bayless

Inventor,
John Richardson
By Durey & Co.
attys

UNITED STATES PATENT OFFICE.

JOHN RICHARDSON, OF SAN FRANCISCO, CALIFORNIA.

SAW FILING AND SETTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 481,823, dated August 30, 1892.

Application filed December 28, 1891. Serial No. 416,362. (No model.)

To all whom it may concern:

Be it known that I, JOHN RICHARDSON, a citizen of the United States, residing in the city and county of San Francisco, State of California, have invented an Improvement in Saw Filing and Swaging Machines; and I hereby declare the following to be a full, clear, and exact description of the same.

My invention relates to the class of machines for sharpening and swaging saw-teeth.

It consists in the novel mechanism for operating the file or other sharpening-tool, in the novel mechanism for effecting the adjustment or feed of the saw to present successive teeth to the action of the sharpening-tool, and finally in the novel mechanism for operating the swaging-hammer, all of which, together with the several details of arrangement, construction, and combination, will be hereinafter fully described, and specifically pointed out in the claims.

The object of my invention is to provide an effective and automatic machine for sharpening and swaging saws.

Referring to the accompanying drawings for a more complete explanation of my invention, Figure 1 is a perspective view of my machine. Fig. 2 is a detail elevation of a portion of the trip mechanism for effecting the feed of the saw. Fig. 3 is a plan detail of the same. Fig. 4 is a detail elevation showing the pawl-and-ratchet mechanism for operating the feed mechanism. Fig. 5 is a detail side elevation showing the means operated by the feed mechanism for turning the saw and also showing the swaging-hammer. Fig. 6 is a detail elevation showing an arrangement for filing the back of the tooth simultaneously with the filing of its front.

A is the frame or stand of my machine.

B is the saw-supporting shaft mounted transversely upon the machine and carrying the saw C upon one end of it. This shaft is mounted in bearings upon the sliding carriage b, which is adapted to be adjusted by means of a screw b' and hand-wheel b², whereby the saw may be primarily adjusted with relation to the tooth-sharpening file. Upon the other end of the shaft B is a pulley b³, from which a cable b⁴ extends, said cable supporting a weight W, the object of which is to keep the

saw with its teeth pressed closely against the file.

D is the file or other tooth-sharpening tool. This is carried by holders d, mounted in the ends of arms d', which are firmly clamped to a rock-shaft d², mounted in fixed boxes d³ and adapted to slide back and forth in said boxes, as well as to turn axially therein.

A reciprocating motion is given to the file by the following mechanism: E is the power-shaft, mounted in the lower portion of one end of the frame and having the usual fast and loose pulleys e upon one end. This shaft carries a sprocket-pulley e', from which an endless chain e² extends to a sprocket-pulley f on a counter-shaft F at the other end of the machine. The end of this counter-shaft has a beveled pinion f', which engages with a beveled pinion g on the lower end of a vertical shaft G, the upper end of which carries a crank-wheel g'.

In suitable transverse guides or tracks H, mounted upon the frame, is fitted and adapted to slide a cross-head I, which is connected by a pitman g² with the crank-wheel g'. This cross-head has an elongated grooved bearing i, in which is fitted and with which engages the lower end of a crank-arm d⁴, secured firmly to the rock-shaft d² of the file-frame. Now it will be seen that power being communicated from the shaft E to the counter-shaft F the crank-wheel g' is rotated, and through the connecting rod or pitman g² the cross-head I is moved back and forth, and this movement, through the crank-arm d⁴, causes the shaft d² to be reciprocated, and with it the file, said file drawing across the front of the tooth and sharpening it.

In order to provide that the file shall not touch the tooth on one stroke and shall touch it on the other, I have the following mechanism for temporarily withdrawing the file from contact with the tooth on one stroke. Secured firmly to one end of the rock-shaft d² is a crank-arm J, under which and in contact therewith operates a cam k, which is on the end of a shaft K, which said shaft carries a sprock-wheel k', from which an endless chain k² extends downwardly to a sprocket-wheel f² on the main counter-shaft F. The effect of the cam k on the crank-arm J is to raise and

lower said arm. As it raises it it rocks the shaft d^2 backwardly, and thereby lifts the file from contact with the tooth. As it lowers it the shaft returns and the file returns to contact with the tooth to sharpen it on its other stroke.

The file is adjusted with relation to the tooth by the following mechanism: The bearings d^3 , in which the rock-shaft is mounted, form part of or are connected with sliding sleeves d^5 , mounted upon guide rods or tracks d^6 . Upon these tracks is also mounted a cross-bar L, with which is connected a screw-shank l , operated by wheel-nuts l' . As these nuts are set up they force forwardly the cross-bar L, and the ends of this bar, coming in contact with the ends of the sliding sleeves d^5 , carry said sleeves and their bearings d^3 forwardly, thereby adjusting forwardly the rock-shaft d^2 with its file. In this adjustment the crank-arm d^4 of the rock-shaft simply slides in the slotted or grooved guide i of the cross-head I, which is the object of having this connection, as also to permit the shaft d^2 to rock, as heretofore described, without breaking the connection of its crank-arm d^4 with the slotted or grooved guide i , wherefore the cross-head acts to reciprocate the file, notwithstanding its forward-and-back adjustment and its tilting adjustment.

When one tooth is sharpened, it becomes necessary to turn the saw so that a succeeding tooth shall be brought into relation with the file, and during this turning of the saw it is obvious that the file must be lifted out from between the teeth to allow the succeeding tooth to come into place. To provide for these movements I have the following mechanism: Referring to Fig. 5, a pawl M will be seen, which is adapted to engage the tooth of the saw. This pawl is carried by a pivoted hanger m , and said hanger is vibrated by a connecting-link m' , the connection of which with said hanger is an adjustable one by means of the sliding sleeve m^2 , whereby the stroke of the hanger is regulated. The connecting-rod is operated by a crank-wheel m^3 , said crank-wheel being also shown in Fig. 1, and is carried by the end of a shaft N. Upon this shaft is loosely mounted a sprocket-wheel O. (Shown also in Fig. 4.) A continuous rotary motion is imparted to this loose sprocket-wheel by means of an endless chain o , which extends to and is driven by a sprocket-wheel f^3 on the main counter-shaft F. The sprocket-wheel O has attached to or formed with it a ratchet o' . (Seen in Figs. 1, 2, 3, and 4. Upon the shaft N is rigidly secured and adapted to rotate with said shaft a disk P, to which is pivoted a pawl p , Fig. 2, controlled by a spring p' , which has a tendency to hold it normally to engagement with the ratchet o' of the sprocket-wheel O. The pawl p has an extension-arm p^2 , the end of which is provided with a pin p^3 , which, as shown in Figs. 1 and 3, extends outwardly through an elongated slot p^4 in the disk P. Q, Figs. 1, 2, and

3, is a pivoted stop-bar controlled by a spring q and adjustable by means of a set-screw q' . The end of this bar lies normally in the path of the pin p^3 , which extends outwardly from the extension-arm p^2 of the pawl p .

The operation of this mechanism as far as described is as follows: The spring p' causes the pawl to engage with the ratchet o' , and consequently the motion of the sprocket-wheel O, to which the ratchet is attached, is communicated through the pawl to the disk P, and said disk and the shaft N, to which it is attached, are thereby rotated. This rotation continues until the outwardly-projecting pin p^3 of the pawl comes in contact with the end of the stop-bar Q, and this contact forces the pin backwardly, and thereby raises the pawl out of engagement with the ratchet o' , whereby the disk P and the sprocket-wheel O become disconnected, the latter continuing its rotation, while the former comes to a state of rest. The shaft N thus remains at rest and the saw-moving pawl M is inactive.

Now to drop the stop-bar Q and allow the disk P to be moved once more and to rotate the shaft N, I have the following mechanism: R, Figs. 1 and 4, is a pawl-carrier bar supported by a spring connection r at one end and having its other end free, whereby it may move up and down, the extent of this movement being regulated by a set-screw r' . This bar carries a pawl r^2 , controlled by a spring r^3 . The movement of the bar is effected by means of a cam o^2 , connected or formed with the continuously-rotating sprocket-wheel O, Fig. 4. The pawl r^2 engages a ratchet-wheel s on a cross-shaft S, said shaft carrying a wheel s' , which is provided with a contact-pin s^2 . (Shown in Fig. 1, but seen best in Fig. 2.)

T is a pivoted lever controlled by a spring t , and said lever has its outer end lying in the path of rotation of the pin s^2 of the wheel s' . To this lever is attached a downwardly-extending trip-arm t' . (Shown in Fig. 1 and seen in dotted lines in Fig. 2.) This arm is connected with the lever by a spring connection t^2 , so that it is a yielding one. Its lower end is adapted to come in contact with a pin q^2 on the stop-bar Q. The rotation of the sprocket-wheel O effects through its cam o^2 the vibration of the pawl-carrying bar R. The pawl r^2 of this bar, acting on the ratchet s , turns said ratchet and rotates the shaft S. This carries the wheel s' around with it, and as its contact-pin s^2 comes up under the end of the lever T it gradually raises said lever until slipping the end of the lever the latter is suddenly thrown downwardly by its spring t , and its trip-arm t' , coming in contact with the pin q^2 of the stop-bar Q, forces said stop-bar down and removes its end from the projecting pin p^3 of the pawl p . Immediately the pawl p is thrown to its engagement with the ratchet o' , and the disk P being thus connected with the sprocket-wheel O said disk rotates and turns the shaft N. By adjusting

the set-screw r' the stroke of the pawl-bar R can be regulated to cause its pawl to engage a greater or less number of teeth of ratchet-wheel s , thus providing for any required number of file strokes before the movement of the saw takes place. The object of the spring connection with the contact-arm t is to cause it to immediately slip by the pin q^2 after knocking it and to not stand in the way of the return of the stop-bar Q. The rotation of the disk P continues until the projecting pin p^3 of the pawl p again meets the stop-bar Q, whereupon the disk is disconnected, as before, and the shaft N ceases to rotate. The disk is prevented from turning backwardly by means of a pawl p^5 , which engages a notch in the disk, as shown in Figs. 1 and 2.

An assisting-weight n is placed upon the shaft N, as shown in Fig. 1, for the purpose of bringing disk P well around. This periodical rotation of the shaft N causes the rotation of its crank-wheel m^3 and the operation of the saw-moving pawl M of Fig. 5. The saw is thus moved one tooth at the proper time. The removal of the file from between the teeth during this movement is accomplished as follows: Upon the other end of the shaft N is crank-wheel n' , Fig. 1, from which extends upwardly a rod n^2 . The upper end of this rod carries an arm n^3 , which is adapted to bear under the crank-arm J of the shaft d^2 of the file-frame. Now when the shaft N begins to rotate for the purpose of effecting the movement of the saw the crank-arm J is at the same time raised, thereby rocking the shaft d^2 and lifting the file out from between the teeth.

In Fig. 6 I show a connection with the first file, by which the back of the succeeding tooth may be filed simultaneously with the filing of the front of the previous one. This is effected by extending upwardly from the ends of the file-holders d the arms d^7 through holes, in which are passed rods d^8 , set in place by screws d^9 and carrying in their ends a cross-file, the end of which is represented by d^{10} in said figure. This file is in position to operate on the back of the succeeding tooth, as shown.

Upon one side of the frame is an anvil-block U, having a beveled forward edge, as shown in Fig. 5. This block is hinged at u in a frame u' , so that it may be thrown back out of the way when not in use. When in use, it is thrown forwardly, as shown in said figure, and it is adjusted so that the point of the tooth shall lie upon it in position to receive the blows of the hammer V. This hammer is an angular one, as shown, and has a rod v connected with its lower arm, which said rod is acted upon by a spring v' , Fig. 1, to control it.

The hammer is operated by having its angle connected with the end of an oscillatory shaft X, from which extends a crank-arm x , fitting between the slotted rim of a wheel Y, which is provided with a series of cross-pieces

y , adapted to come successively in contact with and to slip the crank-arm x , whereby the shaft X is oscillated. The wheel Y is mounted upon a shaft y' , which is driven by a sprocket-pulley y^2 through an endless chain y^3 , extending down to a sprocket-wheel y^4 on a cross-shaft Z. This cross-shaft is driven by a sprocket-wheel z , operated by an endless chain z' from a sprocket-wheel f^4 on the main cross-shaft F.

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

1. In a saw-filing machine, the combination of a file, mechanism for reciprocating it in contact with the tooth of the saw, and mechanism for automatically feeding said saw to present a fresh tooth to the action of the file, comprising a pawl adapted to engage the saw-teeth, a pivoted hanger for the pawl, and a crank-wheel and connection for operating the hanger, substantially as described.

2. In a saw-filing machine, the combination of a file for operating upon the tooth of the saw, mechanism for reciprocating said file, mechanism for feeding the saw to present a fresh tooth to the action of the file, comprising a pivoted hanger carrying a pawl for engaging the teeth of the saw, a crank-wheel, and an adjustable connection between the same and the hanger, and means for raising the file out from between the teeth during the movement of the saw and returning it to a succeeding tooth, substantially as described.

3. In a saw-filing machine, the combination of the file, the holder thereof, the sliding shaft carrying the holder, and the means for reciprocating said shaft, consisting of a transversely-movable cross-head engaging an arm on the shaft, a pitman connecting with the cross-head, the crank-shaft G for driving the pitman, the cross-shaft F, and gearing between said shaft and crank-shaft, and means for driving the cross-shaft, substantially as described.

4. In a saw-filing machine, the combination of the file, the holder therefor, the sliding and rocking shaft carrying the holder, the crank-arm d^4 of said shaft, the reciprocating cross-head I, and the slotted or grooved bearing i of said cross-head, into which the crank-arm d^4 fits, whereby the shaft d^2 may be both reciprocated and rocked, substantially as described.

5. In a saw-filing machine, the combination of the file, the file-holder, the sliding rock-shaft, to which said file-holder is connected, and the means for rocking said shaft, consisting of the crank-arm J of the shaft and the rotating cam k , operating under said crank-arm, substantially as described.

6. In a saw-filing machine, the combination of the file, the rock-shaft to which said file is attached, and the means for rocking said shaft at each stroke of the file, consisting of the crank-arm J, secured to the shaft, the cam k , operating under the crank-arm, the cross-shaft

F, and power-transmitting connections between said cross-shaft and the cam-shaft, substantially as described.

7. In a saw-filing machine, the combination of the file, the sliding and rocking shaft d^2 , carrying said file, the means for reciprocating said shaft, consisting of the sliding cross-head having the slotted or grooved bearing, the crank-arm of the shaft fitted in said bearing, the crank-shaft G and pitman g^2 connecting it with the cross-head, the counter-shaft F for driving the crank-shaft, and the means for rocking the file-holder shaft, consisting of the crank-arm J, secured thereto, the cam k , shaft K, and power-transmitting connections between the cross-shaft F and said shaft K, substantially as described.

8. In a saw-filing machine, the combination of the file, the holder therefor, the reciprocating shaft carrying the holder, the sliding sleeves and their bearings d^3 , carrying the shaft, and the means for adjusting said shaft to regulate the position of the file with respect to the saw-tooth, consisting of the tracks on which the sleeves slide, the sliding cross-bar on said tracks, adapted to come in contact with the sleeves, a screw-stem of the cross-bar, and the wheel-nuts l^1 for operating the screw-stem, substantially as described.

9. In a saw-filing machine, the means for feeding the saw at stated intervals, consisting of the pawl M, engaging the teeth of the saw, the vibrating hanger carrying the pawl, the crank-wheel m^3 , connected with the hanger, and the periodically-moving shaft N, carrying the crank-wheel, and a connection from the crank-wheel to the hanger, substantially as described.

10. In a saw-filing machine, the combination of an engaging mechanism for the saw for turning it and the means for periodically operating said mechanism, consisting of the shaft N, by which it is operated, the continuously-rotating wheel O, loose upon said shaft, the disk P, fast thereon, a pawl-and-ratchet mechanism between the wheel and disk, and a means for throwing the pawl and ratchet into and out of engagement at stated intervals, substantially as described.

11. In a saw-filing machine, the combination of an engaging mechanism for turning the saw and a means for periodically operating this mechanism, consisting of the shaft N, the continuously-rotating wheel O, loose thereon, the disk P, fast thereon, the normally-engaged pawl-and-ratchet connection between the wheel and disk, the projecting pin of the pawl, and the stop-bar for limiting said pin and throwing the pawl and ratchet into and out of engagement at stated intervals, substantially as described.

12. In a saw-filing machine, the combination of an engaging mechanism for turning the saw, a means for periodically operating this mechanism, consisting of the shaft N, the continuously-rotating wheel O, loose thereon, the disk P, fast thereon, the normally-engaged

pawl-and-ratchet connection between the wheel and disk, the projecting pin of the pawl, the stop-bar for limiting said pin and throwing the pawl out of engagement with the ratchet, and a tripping mechanism for throwing the stop-bar out of the way at stated intervals to permit the re-engagement of the pawl with the ratchet, substantially as described.

13. In a saw-filing machine, the combination of an engaging mechanism for turning the saw, a means for periodically operating this mechanism, consisting of the shaft N, the continuously-rotating wheel O, loose thereon, the disk P, fast thereon, the normally-engaged pawl-and-ratchet connection between the wheel and disk, the projecting pin of the pawl, the stop-bar for limiting said pin and throwing the pawl out of engagement with the ratchet, and a tripping mechanism for throwing the stop-bar out of the way at stated intervals to permit the re-engagement of the pawl with the ratchet, consisting of the drop-lever T, having the contact-arm t' , and means for operating the drop-lever, substantially as described.

14. In a saw-filing machine, the combination of an engaging mechanism for turning the saw, a means for periodically operating this mechanism, consisting of the shaft N, the continuously-rotating wheel O, loose thereon, the disk P, fast thereon, the normally-engaged pawl-and-ratchet connection between the wheel and disk, the projecting pin of the pawl, the stop-bar limiting said pin and throwing the pawl out of engagement with the ratchet, a tripping mechanism for throwing the stop-bar out of the way at stated intervals to permit the re-engagement of the pawl with the ratchet, consisting of the drop-lever T, having the contact-arm t' , and the rotating shaft S, having the wheel, with its pin, for operating the drop-lever, substantially as described.

15. In a saw-filing machine, the combination of an engaging mechanism for turning the saw, a means for periodically operating this mechanism, consisting of the shaft N, the continuously-rotating wheel O, loose thereon, the disk P, fast thereon, the normally-engaged pawl-and-ratchet connection between the wheel and disk, the projecting pin of the pawl, the stop-bar for limiting said pin and throwing the pawl out of engagement with the ratchet, and tripping mechanism for throwing the stop-bar out of the way at stated intervals to permit the re-engagement of the pawl with the ratchet, consisting of the drop-lever T, having the contact-arm t' , the rotating shaft S, having the wheel, with its pin, for operating the drop-lever, the ratchet on the shaft, the vibrating pawl-carrying bar R, the pawl of said bar engaging the ratchet, and the cam on the continuously-rotating wheel for operating the pawl-bar, substantially as described.

16. In a saw-filing machine, the combination of the reciprocating and swinging file, pe-

riodically-operating mechanism engaging the saw for turning it to present a fresh tooth to the file, and the means for lifting the file out from between the teeth during this movement, consisting of the periodically-rotating shaft N, the crank-wheel n' on its end, the vertical rod n^2 , and the crank-arm J of the swinging file-frame, substantially as described.

17. In a saw-filing machine, the combination of the file, the reciprocating and rocking shaft d^2 , to which the file is attached, the mechanism for feeding the saw to present a fresh tooth to the file and for raising the file out from between the teeth during the movement of the saw, consisting of the pawl M, engaging the teeth of the saw, the shaft N, and connections between said shaft for operating the pawl, connections between said shaft and the rock-shaft of the file-holder for raising the file, the continuously-rotating wheel O, loose on the shaft N, the disk P, fast thereon, a pawl-and-ratchet connection between said wheel and disk, the outwardly-projecting pin of the pawl, the stop-bar Q for breaking the connection between the pawl and ratchet, the drop-lever T, with its contact-arm t' , for relieving the pin of the stop-bar to re-establish the connection, the pin-wheel for operating the drop-bar T, the vibrating pawl-bar, and the pawl and ratchet for operating the pin-wheel, substantially as described.

18. In a saw-filing machine, the combination of a file and file-holder, means for reciprocating the same and raising the file out of engagement with the saw-teeth, a sliding carriage, a shaft journaled therein having a pulley at one end, and a cable connected with the pulley and carrying a weight at its outer end, whereby the saw is fed toward the file, substantially as herein described.

19. In a saw-filing machine, the combina-

tion of the reciprocating file, the shaft B, carrying the saw and having the pulley b^3 , the weighted cable b^4 for keeping the saw tight against the file, the pawl M for turning the saw, the shaft N for operating the pawl, the disk P on the shaft, and the pawl p^5 , engaging the disk, substantially as described.

20. In a saw-filing machine, the combination of the reciprocating file, the counter-shaft F, and power-transmitting connections between said shaft and file for reciprocating it, periodically-operating mechanism for turning the saw to present a fresh tooth, and a pawl-and-ratchet connection between said mechanism and the counter-shaft F, whereby said mechanism is operated at stated intervals, substantially as described.

21. In a saw-filing machine, the file D, with its reciprocating holder for sharpening the front of one tooth, the file d^{10} for sharpening the back of the succeeding tooth, and the arms d^7 and rods d^8 , forming the holding-frame for said latter file, supported from the holding-frame of the former file, substantially as described.

22. In a saw-filing machine, the combination of the anvil-block, the vibrating hammer, and the means for operating said hammer, consisting of the oscillating shaft X, to which the hammer is secured, the crank-arm x of said shaft, the barred wheel operating on said crank-arm, and the spring connection for controlling the hammer, substantially as described.

In witness whereof I have hereunto set my hand.

JOHN RICHARDSON.

Witnesses:

W. C. RALSTON,
J. ANDERSEN.