3 Sheets—Sheet 1.

E. ANDREWS.

SAW SHARPENING MACHINE.

No. 179,500. Patented July 4, 1876.

Fig. 1.

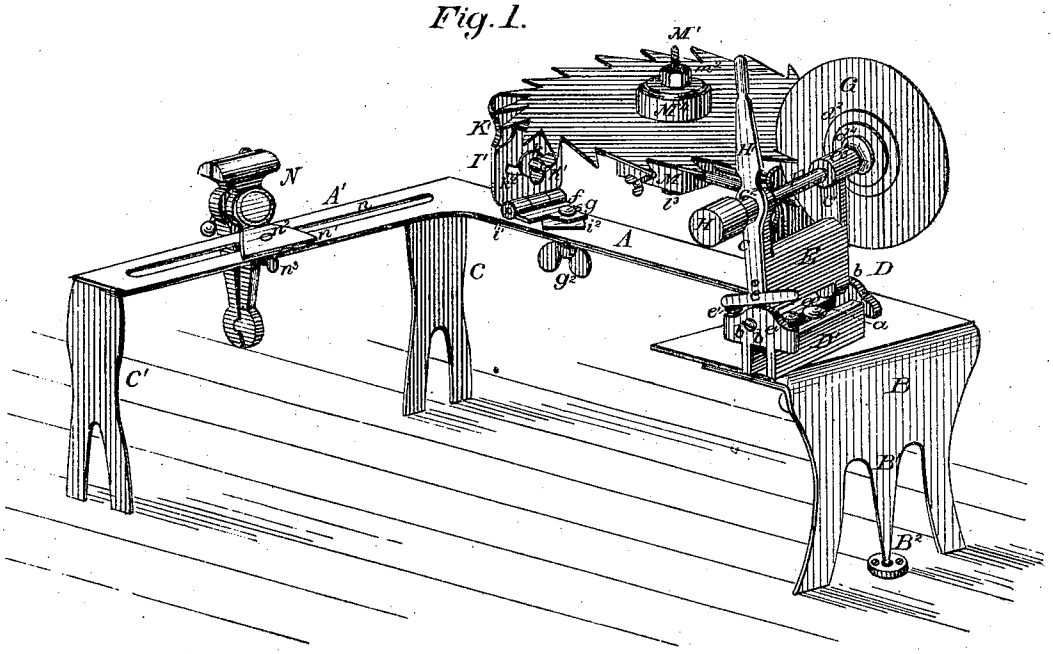
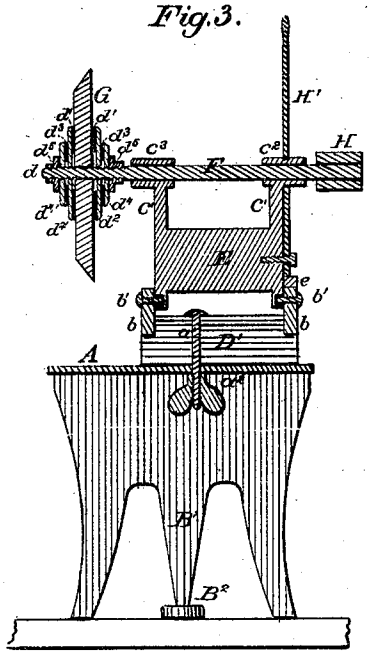


Fig. 3.



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E. ANDREWS.

SAW SHARPENING MACHINE.

No. 179,500. Patented July 4, 1876.

Fig. 2.

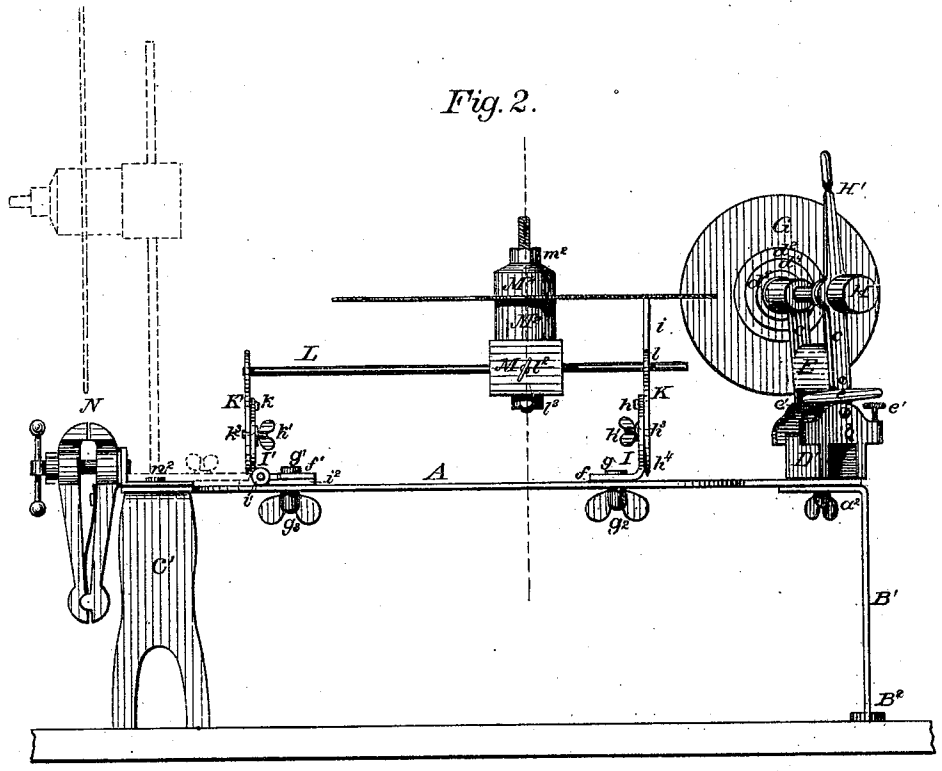
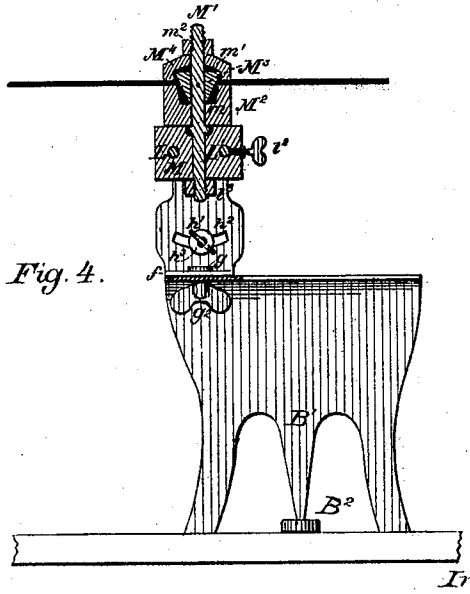


Fig. 4.



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SAW SHARPENING MACHINE.

No. 179,500. Patented July 4, 1876.

Fig. 5.

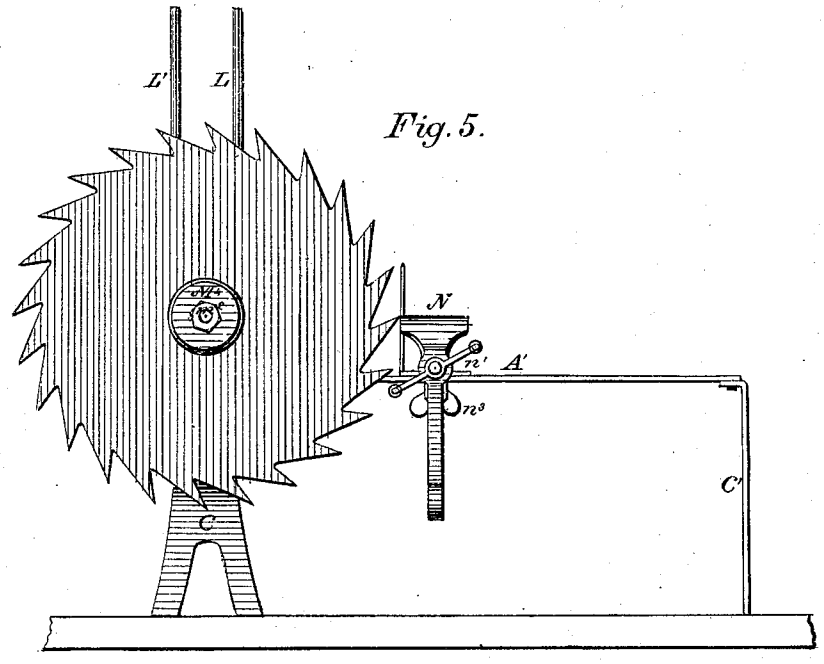
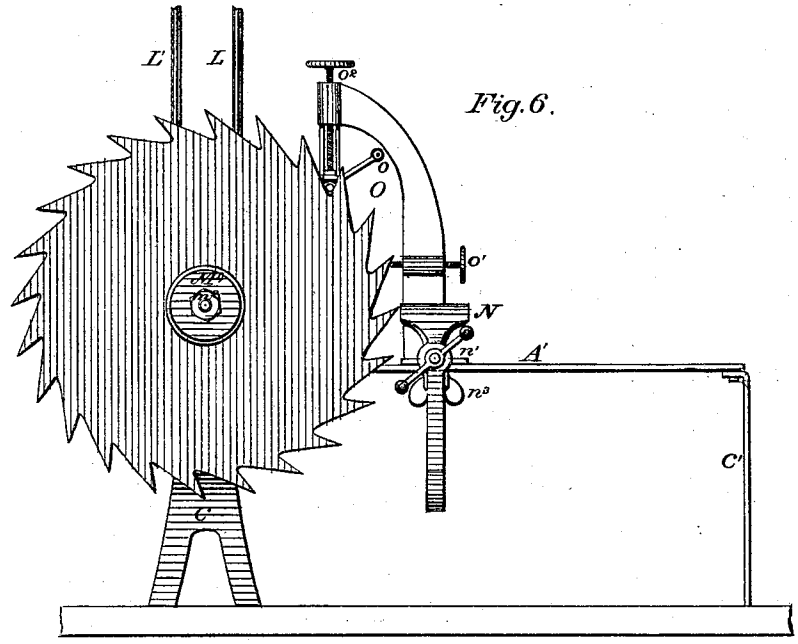


Fig. 6.



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UNITED STATES PATENT OFFICE.

EMANUEL ANDREWS, OF WILLIAMSPORT, PENNSYLVANIA.

IMPROVEMENT IN SAW-SHARPENING MACHINES.

Specification forming part of Letters Patent No. **179,500**, dated July 4, 1876; application filed February 19, 1876.

To all whom it may concern:

Be it known that I, EMANUEL ANDREWS, of Williamsport, in the county of Lycoming and State of Pennsylvania, have invented a new and useful Improvement in Saw Sharpening and Gumming Machines; and I do hereby declare that the following is a full and exact description of the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

The object I have in view is an improvement in saw gumming and sharpening machines, in which the saw can be conveniently upset, swaged, filed, or jointed, the machine being also adapted to the grinding of the various hand and removable tools used in workshops, and being cheap, durable, convenient, and effective in operation.

My invention therein consists in the means employed for conveniently handling and sharpening the saws; in the means employed for conveniently jointing, swaging, and filing the same; and in the construction and arrangement of the several parts of the machine, all as more fully hereinafter explained.

In order to enable those skilled in the art to make and use my machine, I now describe the same in connection with the drawings, in which—

Figure 1 is a perspective view of my entire machine; Fig. 2, a side elevation of the same, showing, in dotted lines, the position of the parts when the saw and its supporting-rods are swung into a vertical position. Fig. 3 is a vertical section of the same on the line of the emery-wheel shaft. Fig. 4 is a vertical section on the line $x\ x$, Fig. 1. Fig. 5 is a side elevation, with the saw swung into a vertical position, and a file clamped in the vise for jointing the saw; and Fig. 6 is a similar view with a "burr-gummer" secured in the vise for gumming and gulleting saw-teeth.

Like letters denote corresponding parts in each figure.

The frame of my machine is composed of a table, A, having at its rear a transverse wing, A′. The table A is supported at its front end by a double-footed standard, B, between the feet of which depends a bolt, B^1, resting in a socket, B^2, secured to the floor of the shop. This bolt and socket allow the entire machine to be swung upon the pivot formed by them, for the purpose hereinafter explained. The rear end of the table A, at the angle formed by such table and its wing, is supported by a standard, C, and the outer end of the wing by a similar standard, C′. These last two standards are not secured to the floor. On the front end of the table A is pivoted the emery-wheel-carrying frame D. This frame is composed of a bed-piece, D′, having a longitudinal slot, a, in which a screw-threaded bolt, a^1, is placed, passing down through the table, and having a thumb-nut, a^2, on its lower end. Upon the ends of the bed-piece are cast blocks b, through the upper ends of which are passed screw-threaded bolts b', setting inwardly into sockets in the lower ends of a frame, E, pivoting such frame to the bed-piece. The frame E has two standards, $c\ c^1$, having at their upper ends cylindrical journal-boxes $c^2\ c^3$, in which the emery-wheel shaft F is journaled. On the outer end of the emery-wheel shaft, outside of the standard c^1, is placed the emery-wheel G, which is secured and supported in the following manner: The shaft from the standard to its end is screw-threaded, as shown by d. Next to each side of the wheel is placed a rubber ring, d^1, then a metal disk, d^2, of the same size as the rubber ring, then a smaller rubber ring, d^3, and then a metal disk, d^4, corresponding in size with the rubber ring d^3, and so on for as many series as may be desired, the driving-shaft passing through all of them. On each side of the wheel, outside of the outer disk, is a washer-nut, d^5.

The inner nut is first screwed onto the shaft until it abuts against the box c^3. The inner series of metal disks and rubber rings are then slipped over the shaft. Then the emery-wheel is put on, and next the outer series of metal disks and rubber rings, and then the outer washer-nut d^5 is screwed onto the shaft, clamping the parts closely together.

It is evident, then, that the emery-wheel may be held with a firm, but elastic, pressure, avoiding the danger of fracture consequent upon a rigid clamping of it, and at the same time the means for securing and supporting the wheel are not so expensive as to condemn their use.

Instead of having the disks and rings ar-

ranged as shown, the disks and rings next to the wheel may be nearly as large in diameter as the wheel, and the other disks and rings graduated from the same, so that as fast as the wheel is worn away in use the larger disks and rings may be removed, and the wheel utilized until it becomes very small in diameter.

This manner of securing emery-wheels is essential in saw-grinding machines, which require these wheels frequently less than one-quarter inch in thickness, and which require these wheels to have a beveled edge and to run at high velocities. It follows, then, that such wheels, as ordinarily secured upon shafts, necessarily have a small diameter, as otherwise they would fly in pieces, and, being thus small, do not work to advantage. By my mode of securing the wheel upon the shaft I am enabled to employ, without risk, a wheel of much larger diameter, and, consequently, capable of more effective work.

On the opposite end of the shaft from which the emery-wheel is secured, outside of the standard *c*, is keyed the pulley H, connected, by belting, with shafting above or below. This pulley, in connection with the emery-wheel, prevents the longitudinal movement of the driving-shaft in its boxes c^2 c^3. H′ is a hand-lever for rocking the frame E upon its pivots in the bed-piece D′. It is attached to the outside of the standard *c* by a screw at its lower end, and has an enlarged central part, which rests over the box c^2. This lever is fixed in position before the pulley H is keyed on the emery-wheel shaft. On the inner lower end of the frame E is cast a small cross-piece, *e*. In the rocking of said frame the ends of the cross-piece strike on set-screws e^1, directly under in the bed-piece D′, by the vertical position of which set-screws the movement back and forth of the said frame E is limited, or such movement wholly arrested, and the frame held in a rigid position, while the adjusting-screws are protected by the cross-piece above them from the particles of emery thrown off by the grinding-wheel and the particles of steel ground away from the saw.

To the rear of the emery-wheel, on the table A, are secured two plate-standards, I I′, the former being next to the emery-wheel, having feet *f f′*, through which pass suitably-threaded bolts *g* g^1, having thumb-nuts g^2 g^3 on the under side of such table. The standard I is connected rigidly to its foot *g*, and has pivoted to its upper part, by a screw, *h*, a plate, K. This plate has a thumb-screw, h^1, in its lower end, which projects inwardly through a circular slot, h^2, in the standard I. A washer, h^3, is placed on the screw inside of the standard. The plate K can by these means be tilted and held at any desired angle. The plate K is extended upwardly above the standard to form a rest, *i*. A pointer, h^4, may be provided on the lower end of the plate K, and a scale (not shown) cut or painted on the standard to ascertain the degree of inclination of the said plate. The standard I′ is hinged, as shown at i^1, to its foot *f′*, and a plate, i^2, is slipped on the bolt g^1, between the foot and the table, which raises the foot off the table to allow the hinged standard free movement backward.

Near the top of the standard I′ is pivoted a plate, K′, by a screw, *k*. This plate has a thumb-screw, k^1, situated similarly to the thumb-screw h^1, projecting through a circular slot, k^2, in the standard, allowing the plate to be tilted and held firmly at any desired angle, similar to the plate K. A washer, k^3, is slipped on the thumb-screw k^1, between the head of the screw and the standard. A pointer, similar to the pointer h^4, may be constructed on the lower end of the plate K′, and a scale placed on the standard I′, for the same purpose as the similar parts on the plate K and standard I.

In the upper part of the plate K′ are rigidly secured the ends of two parallel guide-rods, L L′, projecting toward the emery-wheel, and resting in open-top sockets *l* l^1 in the sides of the plate K, on the same level as their connection with the plate K′. These rods, being secured to the plate K′, when that plate is swung back with its standard, rise out of the sockets *l* l^1, and swing into a position at right angles with the table. Upon these guide-rods slide back and forth a bed, M, the rods passing through holes in such bed. A set-screw, e^2, is tapped through one side of the bed, setting against one of the rods, to hold the bed at any point. Up through the center of this bed is passed a rod, M^1, secured by a screw-nut, l^3, under the bed. On top of the bed is placed a circular block, M^2, keyed on the rod. This block has a cavity, *m*, in its top. Upon the top of the block may be placed a circular saw. Through the eye of the saw projects downwardly a conical block, M^3, which fits closely around the rod M^1 and centers the saw. Over the conical block is placed a circular block, M^4, having a cavity, m^1, fitting over the conical block. Upon the rod, above the block M^4, the upper end of the rod M^1 being threaded, is screwed a nut, m^2, which forces the block M^4, conical block M^3, and circular saw firmly down upon the block M^2. By loosening the nut l^3 on the lower end of the rod M^1, the saw can be turned freely.

By the means above described a saw placed in position on the block M^2 can be centered immediately, the conical block sliding freely down the rod M^1 and adjusting itself, and the saw is held firmly between the blocks, the upper block M^4 forcing the conical block into the eye of the same. This manner of securing the saw is further advantageous, for the reason that very little time is lost in removing the saw after being sharpened, and substituting another one therefor. When, however, as is frequently the case, the eye of the circular-saw plate differs in size, and cannot be accurately centered by the conical block M^3, it will be found desirable to dispense with the same, and use, instead, a block with plane

sides. The saw then, being arranged so that one side of the eye should press firmly against one side of the block above spoken of, and the saw being marked at that point, may then be clamped firmly in position, as before described. The saw then, being jointed will become a circle, having for its center a point which represents the distance from the marked portion of the eye to the center of the rod M^1. This mark will enable the operator ever after to center the saw properly for all purposes.

N is a vise, of any ordinary construction, sliding on the outside of the wing A′ to the table. A slot, *n*, is made in such wing nearly its entire length. The vise N has a bracket, n^1, extending from the side of the vise over the wing A′, and a bolt, n^2, with a nut, n^3, on its lower end, passing through said bracket n^1, down through the slot *n*, and holds the vise in place.

The following is the method of operation of my machine: The operator stands by the side of the machine, where he can have one hand upon the lever and the other upon the saw. The saw being fixed in its place, and the nut l^2 loosened, the bed M is slid up to the proper position and secured by its set-screw, and the bed-piece D′ secured to the table A at the proper angle. He turns the saw so as to present the proper tooth to the emery-wheel, and throws the same toward the saw by the lever, so as to grind the tooth. The plates K K′ are set at the proper angle by their thumb-screws to give the tooth any desired bevel. The saw is then turned slowly around, presenting the wheel to each tooth in turn until all are sufficiently ground, by which means the saw is kept cool, and the work is better done.

It will be seen that by the construction and arrangement of the parts a tooth can be ground at any bevel or on either side, or gummed to any desired extent. In the securing of the saw the conical block, passing through the hole in the same, allows saws of various sizes to be held firmly and accurately centered.

When it is desired to sharpen the teeth of long mill-saws the bed and guide-rods are preferably swung back, the emery-wheel fixed in position, as before explained, and the saw, resting upon the ledge *i*, is conveniently presented, tooth by tooth, to the edge of the grinding-wheel. In this case, if desired, an adjustable shelf can be conveniently placed upon, and connected with, the rest; but ordinarily it will not be required. When it is desired to joint the saw the same is swung back, and its bed lowered and secured, as shown in Fig. 5. The vise, having the file clamped in the side of the same, is then slid into proper position with regard to the saw, so that the longest teeth will strike the file in its revolution when turned by hand, and the file is moved up in the vise until the teeth are all of the same length. The saw in this manner is accurately jointed. In place of simply clamping a file in the vise I can provide a holder for the file to be clamped in the vise, so arranged that the file can be adjusted forward by a screw or other means. Another manner of jointing a saw is to throw it and the guide-rods into a horizontal position and fix the emery-wheel frame in the desired position by the set-screws e^1, before described, and turn the saw around, allowing the long teeth to be ground off at the ends; but I do not consider this method so perfect as that first described. When it is desired to file or swage the teeth of the saw the hinged standard is thrown back and the saw clamped in the vise, which enables it to be conveniently filed or swaged by means of any hand-tool provided for that purpose, the saw being held firm enough by the vise to allow the use of such a tool. In Fig. 6 is represented a "burr-gummer," which is generally secured to the saw by set-screws, but in my machine is clamped in the vise N. This "burr-gummer" is shown by O, and has a hand-wheel, *o*, for working the cutter and adjusting-screw o^2, and a backing-screw, o^1, which sets against the teeth to prevent the saw from turning. The "burr-gummer" is used in this connection for the ordinary purposes of gumming and gulleting the saw.

When in the use of my machine it is found necessary to straighten the belt to the driving-pulley this is done by simply moving the free end of the machine on the floor, the effect of which will be to bring the emery-wheel shaft parallel with the driving-shaft and take the twist out of the belt.

In the grinding of all sorts of tools commonly found in workshops which can be handled, the course described for grinding long mill-saws may be advantageously followed.

The principal advantages arising from the construction of my machine lie in the convenience with which the saw can be handled, and the simplicity in construction of the several parts.

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

1. In a machine for grinding circular saws, the main frame pivoted at one end to the floor of the shop by a leg, B^1, resting in a socket, B^2, secured to the floor, substantially as described and shown.

2. The combination of the main frame, pivoted at one end to the floor of the shop, and the emery-wheel-carrying frame, adapted to turn upon the said frame, substantially as described and shown.

3. In combination, the sliding bed M, the rod M^1, the blocks M^2 M^4, the downwardly-projecting conical block M^3, sliding freely upon said rod M^1, and the nuts l^3 m^2, constructed and arranged substantially as described and shown.

4. The combination, with the table A, of the standards I I′, the pivoted plates K K′, and supporting guide-rods L L′, constructed and

arranged substantially as described and shown.

5. The combination, with the table A, of the standards I I′, the pivoted plates K K′, guide-rods L L′, sliding bed M, and a saw-securing device, substantially as described and shown.

6. In a saw-grinding machine, the combination, with the table A A′, of the vise N sliding thereon, and the sliding bed M, to which the saw is secured, adapted to be swung from a horizontal to a vertical position, substantially as described and shown.

7. The combination, with the hinged standard I′, guide-rods L L′, and sliding bed M, of the adjustable vise N, constructed and arranged substantially as described and shown.

8. In a saw-sharpening machine, and in combination therewith, an emery-wheel secured upon a screw-threaded shaft, and secured thereon by a series of metal disks of gradually-decreasing size, with interposed rubber rings, substantially as and for the purposes set forth.

This specification signed and witnessed this 8th day of February, 1876.

EMANUEL ANDREWS.

Witnesses:
DANL. RILEY,
F. D. BEEBER.