4 Sheets--Sheet 1.

J. L. KNOWLTON.

Saw-Sharpening Machine.

No. 162,392. Patented April 20, 1875.

FIG. 2.

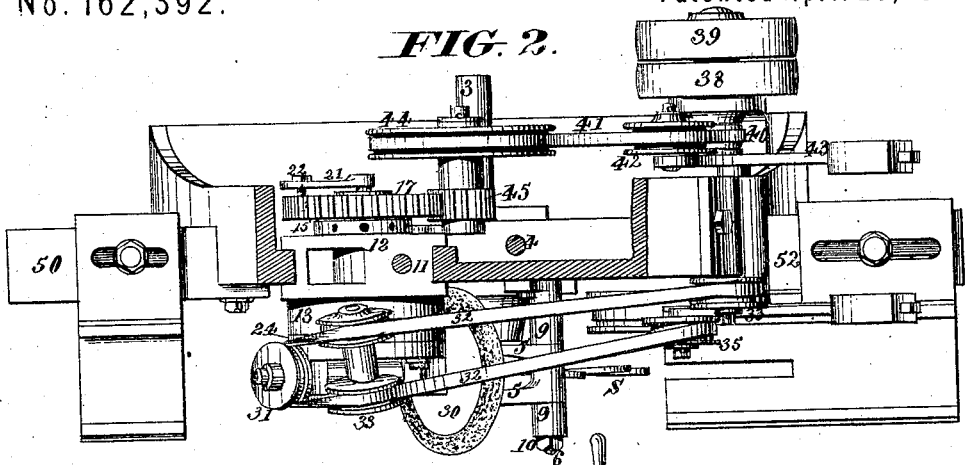

FIG. 1.

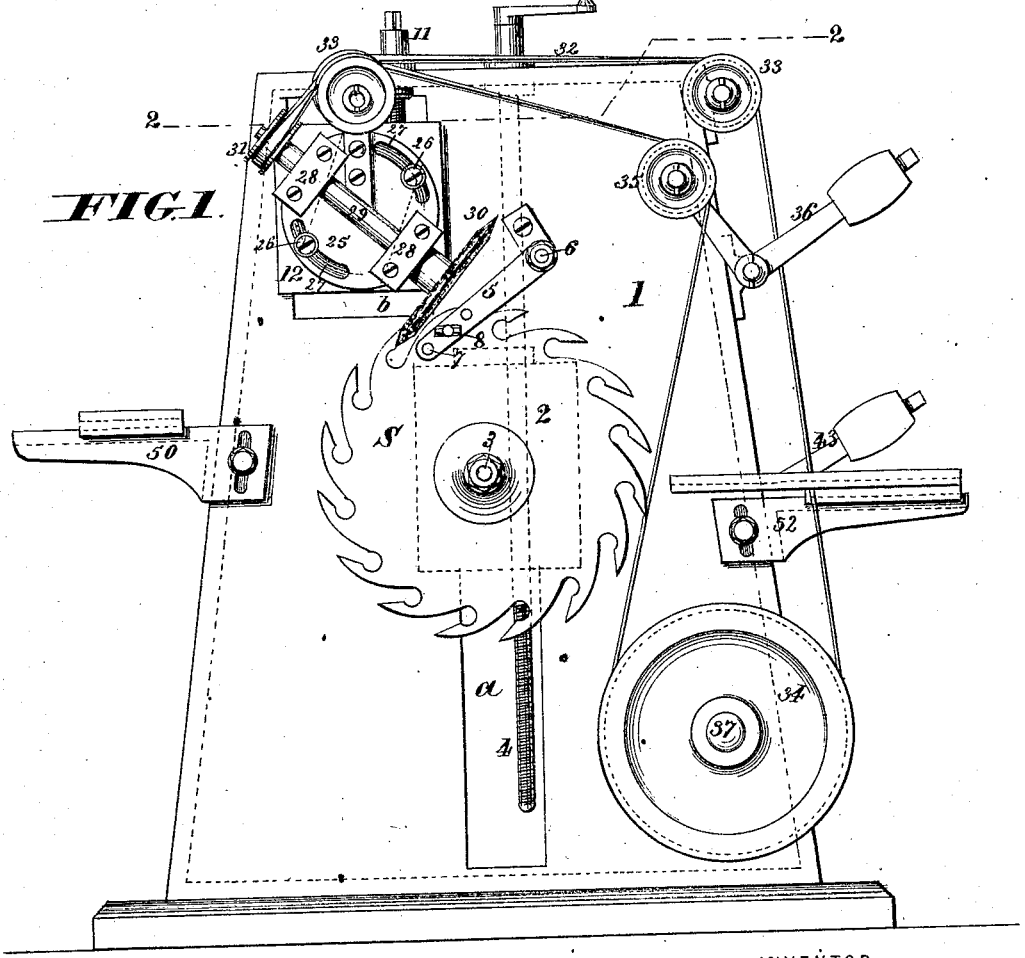

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FIG. 4.

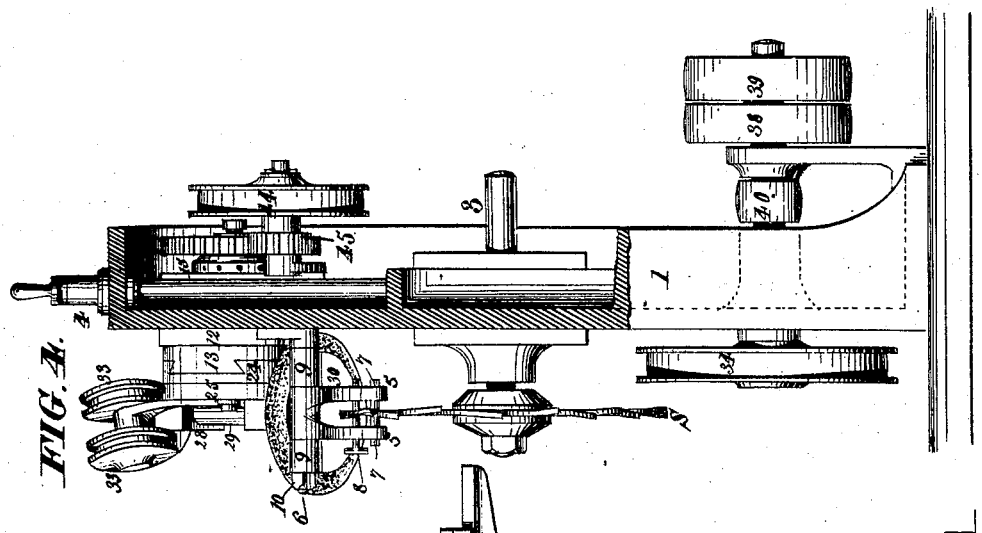

FIG. 3.

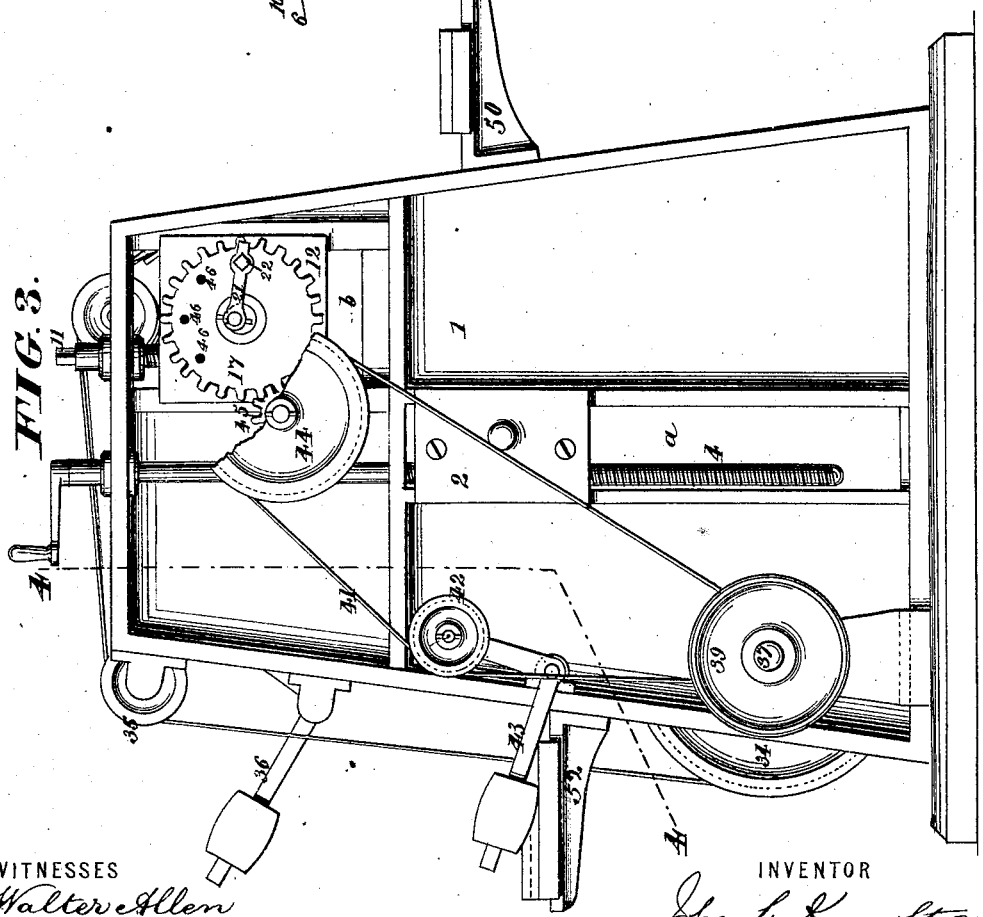

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FIG. 5.

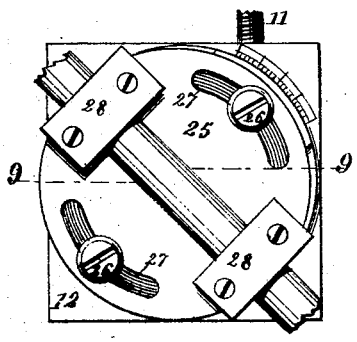

FIG. 7.

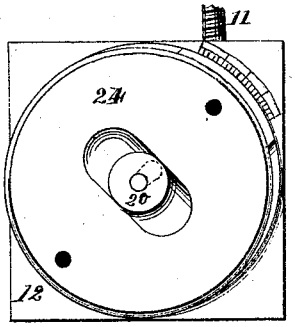

FIG. 8.

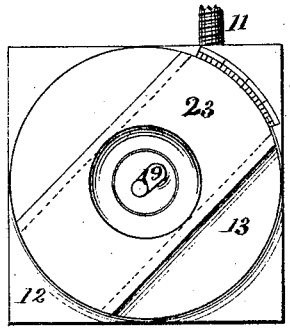

FIG. 6.

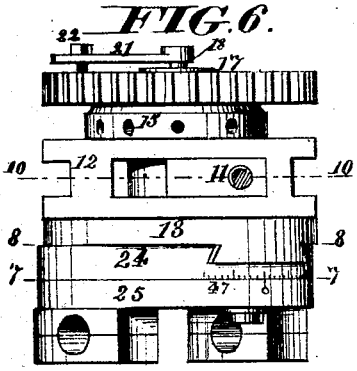

FIG. 9.

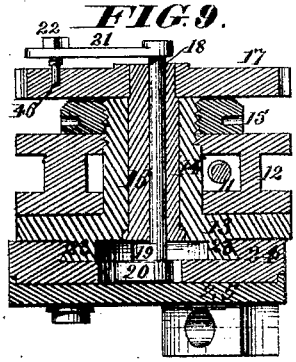

FIG. 10.

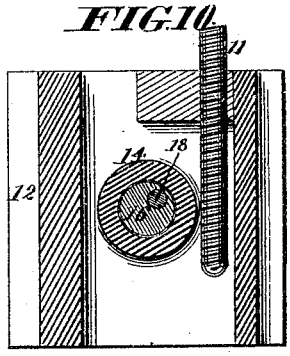

FIG. 11.

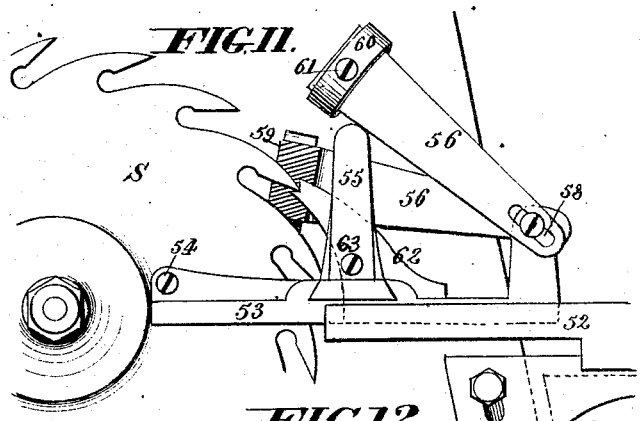

FIG. 13.

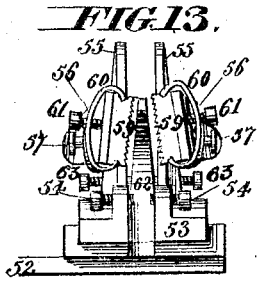

FIG. 12.

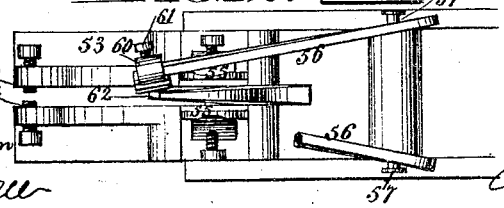

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FIG. 14.

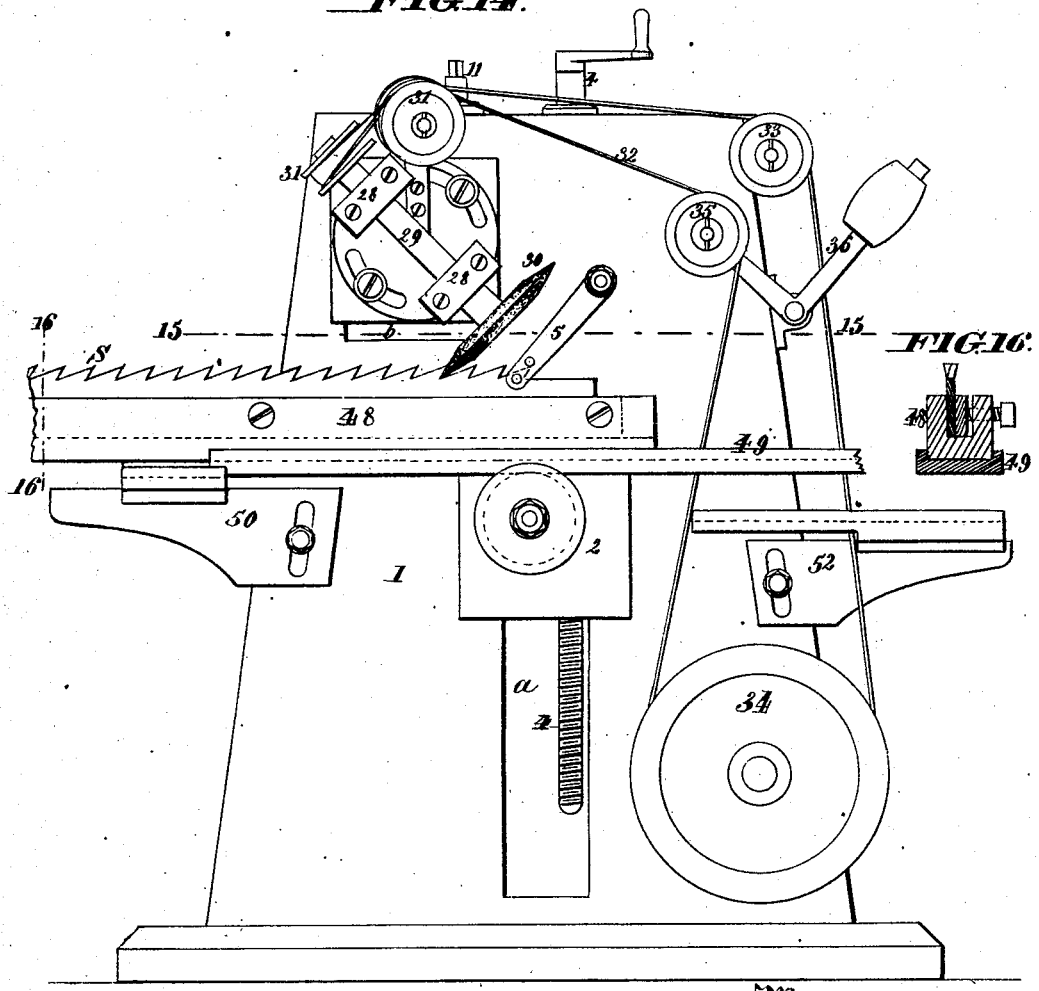
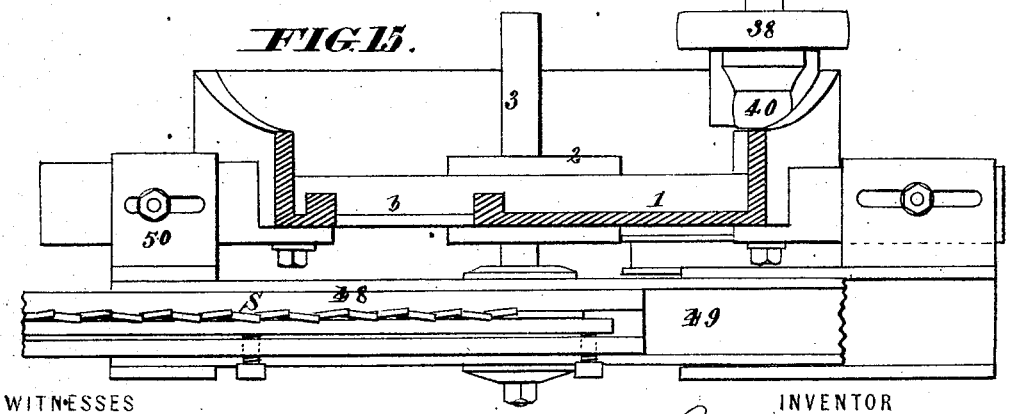


FIG. 16.

FIG. 15.



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UNITED STATES PATENT OFFICE.

JOHN L. KNOWLTON, OF SHARON HILL, PENNSYLVANIA.

IMPROVEMENT IN SAW-SHARPENING MACHINES.

Specification forming part of Letters Patent No. **162,392**, dated April 20, 1875; application filed February 5, 1875.

To all whom it may concern:

Be it known that I, JOHN L. KNOWLTON, of Sharon Hill, in the county of Delaware and State of Pennsylvania, have invented a new and Improved Machine for Gumming, Sharpening, and Truing Saws, of which the following is a specification:

My machine is constructed with a compound head carrying a revolving emery-wheel, in such a manner that the said wheel may be adjusted in position to operate on the front or back of the saw-tooth, and to operate upon teeth of all kinds, shapes, and sizes, and will receive, in addition to its rotary motion, a reciprocating sliding movement, to prevent any irregular grinding or wearing of the saw-teeth, or of the wheel. The device further adapts the wheel to be used alternately on each side of its beveled edge, so as to prevent the formation of shoulders thereon.

The machine is further provided with a device for dressing the sides of saw-teeth to the proper width and bevel.

The apparatus is adapted to operate upon circular and straight saws of all kinds, the cutters of mowing and reaping machines, and all cutting-instruments having cutting-teeth analogous to saw-teeth.

In the accompanying drawing, Figure 1 is a front elevation of my machine, showing its operation upon a circular saw. Fig. 2 is a plan view, partly in horizontal section on the line 2 2, Fig. 1. Fig. 3 is a rear elevation. Fig. 4 is a sectional elevation on the line 4 4, Fig 3. Fig. 5 is a front view of the adjustable head which carries the rotary wheel and imparts a reciprocating sliding movement thereto. Fig. 6 is a plan view of the said head. Fig. 7 is a front elevation of the intermediate member of the said head, on the line 7 7, Fig. 6. Fig. 8 is an elevation of the rear member thereof, on the line 8 8, Fig. 6. Fig. 9 is a horizontal section on the line 9 9, Fig. 5. Fig. 10 is a vertical section on the line 10 10, Fig. 6. Fig. 11 is a front elevation of the device for dressing and truing the edges of the teeth, showing their operation upon a circular-saw. Fig. 12 is a top view of the said device. Fig. 13 is an end view thereof. Fig. 14 is a front view of the machine, showing its operation upon a straight saw. Fig. 15 is a horizontal section of the same, on line 15 15, Fig. 14. Fig. 16 is a vertical section of the saw-clamp, on line 16 16, Fig. 14.

The operating parts of the machine are mounted in a frame or housing, 1, constructed with a slot, *a*, which works a sliding box or bearing, 2, for carrying a saw-mandrel, 3, which is made adjustable in and out to suit either straight or crosscut saws, and bring the teeth in either case in proper position against the grinding-wheel hereinafter described. The bearing 2, carrying the mandrel, is raised and lowered by means of a screw, 4, to suit saws of different diameters. 5 5 represent a pair of arms, connected together and swinging upon a stud, 6, fastened to the housing 1. These arms straddle the saw S, and are provided each with a steady-pin, 7, to hold the saw steady while being ground. The arms are further provided with holes to receive a movable pin, 8, which serves as a rest for one of the teeth while an adjacent tooth is in course of being ground.

The grinding of one tooth having been completed, the pin 8 is withdrawn, and the saw turned to bring the next tooth under the action of the grinding-wheel. The pin 8 is then replaced, and the tooth brought to bear against it.

The arms 5 are made adjustable in and out relatively to the frame 1, so as to accommodate all kinds of saws and saw-teeth, suitable loose collars 9 9 on the stud 6, and a nut, 10, on the threaded extremity of said stud, being employed to hold the arms in the position to which they may be set. *b* represents a slot in the frame or housing to receive a box or bearing, 12, for holding a compound sliding head, consisting of several circular plates, the construction and connection of which are represented in detail and on a larger scale in Figs. 5 to 9, inclusive. The bearing 12 is adjusted up or down by means of a screw, 11. The first plate 13 is constructed with a long boss, 14, extending through the bearing 12, and threaded at its rear end to receive a nut, 15, by which the said plate 13 is clamped to its bearing. The boss 14 constitutes also a journal box or bearing for a hollow spindle, 16, which is driven by a gear-wheel, 17, and contains within it, in eccentric position, a pin or shaft,

18, carrying on its front end a crank, 19, with a friction-roller, 20, and on its rear end an arm, 21, which is fixed in any desired position upon the face of the wheel 17 by means of a pin, 22, passing through the arm 21 into any one of a concentric series of holes prepared to receive it in the face of the wheel 17, for a purpose to be presently described. On the face of the disk 13 is formed a dovetailed guide, 23, upon which is adapted to slide the second disk, 24, said disk being formed with a dovetailed groove to fit the guide 23. The third or front disk 25 is fitted to turn to a limited extent—that is to say, through an arc of sixty degrees, more or less—upon the face of the disk 24, for which purpose it is secured thereto by means of screws 26, fixed in the disk 24, and passing through concentric slots 27 in the outer disk 25. On the face of the outer disk 25 are boxes 28 for the shaft 29 of the revolving emery-wheel 30, the periphery of which has the customary beveled form, (clearly shown in Fig. 1.) On the other extremity of the shaft 29 is keyed a pulley, 31, through the medium of which the wheel is revolved by means of a belt, 32, carried over pulleys 33 33, and driven by the large drum or pulley 34. 35 is a tightening-pulley, mounted upon the upper end of a weighted bell-crank lever, 36. On the rear end of the shaft 37 of the drum 34 are the customary pair of tight and loose pulleys 38 39, to receive the belt of the driving-power. Upon the shaft 37 is also keyed a pulley, 40, driving a belt, 41, which is carried over a tightening-pulley, 42, on the weighted bell-crank lever 43, and imparts rotation to a pulley, 44, the shaft of which carries a pinion, 45, gearing with the wheel 17, the rotation of which is communicated, through the pin 22, arm 21, and shaft 18, to the crank 19.

It will now appear that the above movement will impart a rapid rotation to the grinding-wheel 30, and at the same time, by the action of the crank 19 and friction-roller 20, working in a suitable cavity prepared therefor in the disk 24, will cause a reciprocating movement in a vertical line, or nearly so, the parts being so adjusted that the line of the reciprocating movement will be parallel with what is, for the time being, the grinding-surface of the beveled wheel 30. The action of the wheel upon the front of the saw-teeth may be understood from the illustration given in Fig. 1.

To bring the other side of the periphery of the wheel to bear against the back of the tooth when required, the entire head carrying the bearings of the grinding-wheel is adjusted in an angle by turning the first disk 13 within its box 12 in the frame. To place the grinding-surface of the wheel in precisely parallel position with the guide 23, on which the disk 24 receives a reciprocating movement to impart the sliding motion to the wheel, the disk 25 is adjusted upon the disk 24, and, when properly set, it is clamped in the required position by means of screws 26. To graduate the extent of the sliding movement as required the arm 21 is adjusted on the face of the wheel 17, being fixed in any required position by setting the pin 22 in any one of the holes 46, Fig. 3, prepared for its reception in the face of the wheel 17. As the shaft 18 is eccentric to the axis of rotation of the hollow spindle 16, by which the crank is driven, it is evident that an adjustment of the crank 19, which is effected by turning the shaft 18, as before stated, will vary the eccentricity or projection of the crank 19, and the consequent throw or strike imparted to the sliding disk 24 to suit different sizes of teeth. The index 47 on the disk 24 enables the operator to set his machine to give the required hook to the teeth of saws from six feet to one foot in diameter. A similar index also serves for properly adjusting the wheel to operate on the top or bottom of the teeth of straight saws. The mode of applying the invention to operate on straight saws is illustrated in Figs. 14 and 15, in which S represents the saw held by a sliding clamp, 48 49, resting upon adjustable brackets 50, attached to the front of the frame 1.

The apparatus for dressing off the sides of saw-teeth and gaging the same is illustrated in Figs. 11, 12, and 13. It is composed of a slotted base, 51, supported by a bracket, 52, projecting from the frame 1, and carrying a sliding carriage, 53, which is slotted in front, so as to embrace the edge of the saw, and is provided with a pair of adjustable steady-pins, 54, to hold the saw while under treatment. On the carriage 53 are a pair of adjustable guides or gages, 55, arranged so that they can be set to suit different thicknesses of teeth by screws 63. These guides or gages have two bevels—one in a vertical line with the base, the other in a horizontal line with the base. 56 56 represent a pair of arms, slotted at their rear ends, and secured to the carriage 53 by pivots or screws 57 passing through the slots 58 in the said arms, so that the arms may be capable of a longitudinal sliding movement, and also a reciprocating movement upon their pivots. To the forward extremities of the arms 56 are secured files 59 by means of clips 60 and screws 61. 62 represents a rest placed between the gages 55, and formed at its upper end with a notch to receive the point of the tooth and constitute a firm bearing therefor while it is being filed and dressed.

From the above description and the representation given in Figs. 11, 12, and 13, it will now appear that the combined movement afforded to the arms 56 allows the operator to work the files 59 upon the sides of the tooth with as much freedom as he would do by hand, controlled only by the double-bevel guides or gages, which latter cause the teeth to be finished perfectly true. The tooth is thus ground off to the required double bevel to give it clearance in both directions. The combined movement effectually prevents the files wearing irregularly or in grooves.

The following is claimed as new:

1. A grinding-wheel, 30, reciprocated longitudinally of the saw-tooth simultaneously with its rotation transversely of the tooth, by means of a slide having the bearings of the grinding-wheel thereon, in combination with a guide, 23, adapted to be set at different angles, so as to make the line of reciprocating movement coincident with the surface to be ground, substantially as herein shown and described.

2. The adjustable compound head 13 24 25, constructed and employed substantially as described, in combination with the grinding-wheel 30 and its shaft 29, to provide for the adjustment of the said wheel to operate upon the front or back of a saw-tooth of any form or size by a combined rotary and sliding movement.

3. The vibrating and sliding arms 56, carrying files or grinding-tools 59, and guided by gages 55, for the purpose of dressing and truing the sides of saw-teeth, as explained.

4. The combination of the rest 62, guides or gages 55, vibrating arms 56, and grinding-tools 59, substantially as shown, for the purposes set forth.

JOHN L. KNOWLTON.

Witnesses:
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HENRY MCALLISTER.