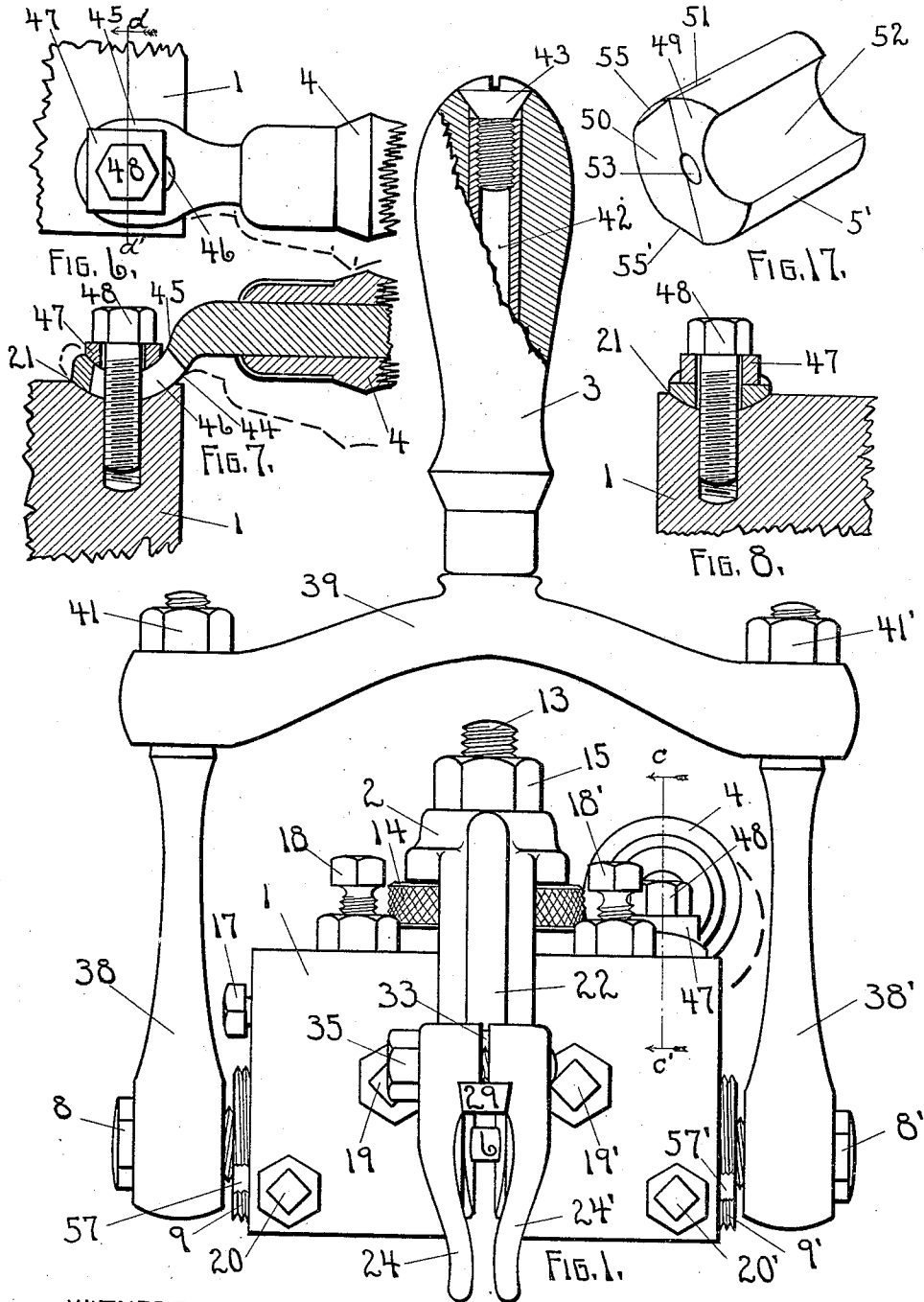


W. R. ANTHONY.
SHAPER FOR SWAGED SAW TEETH.
APPLICATION FILED FEB. 12, 1912.

1,064,419.

Patented June 10, 1913.

3 SHEETS—SHEET 1.

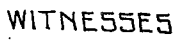


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3 SHEETS—SHEET 2.



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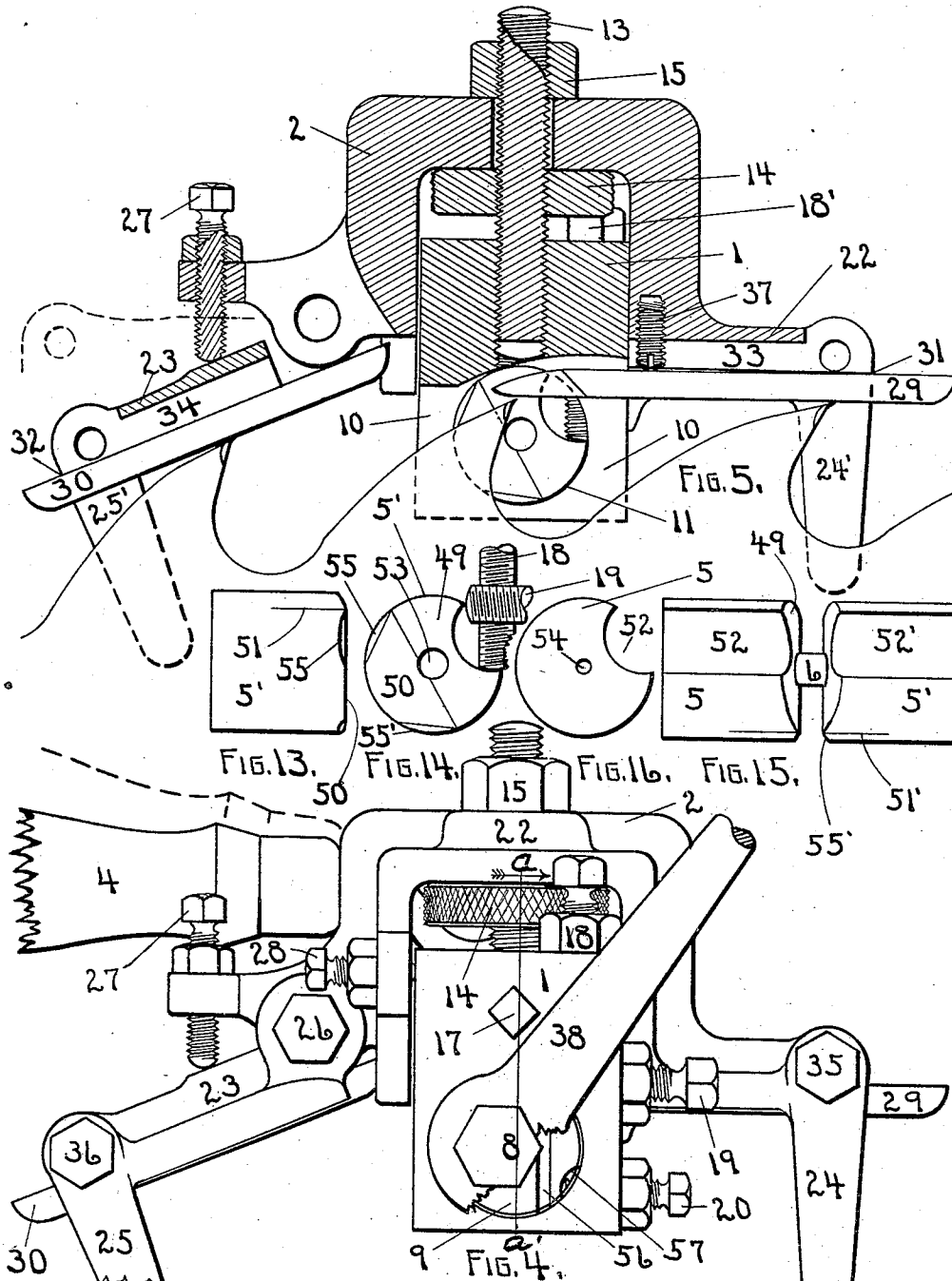
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SHAPER FOR SWAGED SAW-TEETH.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, WILLIAM RICHARD ANTHONY, residing at Memphis, in the county of Shelby, State of Tennessee, have
5 invented certain new and useful Improvements in Shapers for Swaged Saw-Teeth, of which the following is a specification.

The object of my present invention is to provide a tool for shaping teeth of circular, band, and gang saws, which will more fully
10 meet all requirements. It embodies certain improvements upon that forming the subject matter of my Patent No. 935,138, and is broadened in its scope of usefulness.

15 Referring to the accompanying drawings, which are made a part hereof, and on which similar reference characters indicate similar parts, Figure 1 is a front elevation; Fig. 2 a rear elevation; Fig. 3 a central, vertical, transverse section on line *a-a'* of Fig. 4; Fig. 4 is a right side elevation; Fig. 5 is a central, vertical, longitudinal section on line
20 *b-b'* of Fig. 2; Fig. 6 is a top plan view of the connection of the supporting handle 4 with the rear, left corner of the body block; Fig. 7 is a vertical, sectional view of said connection on line *c-c'* of Fig. 1; Fig. 8 is a vertical section of same on line *d-d'* of
25 Fig. 6; Figs. 9, 10, 11, and 12 are detail views of the lever connections; Fig. 13 is a rear elevation of the left die; Fig. 14 is a view in elevation of the operative end of Fig. 13; Fig. 15 is a front elevation of the two dies connected; Fig. 16 is a view in elevation of the inoperative end of the right
30 die; and Fig. 17 is a perspective view of a die.

The body block 1 is suspended within the arch of the supporting frame 2, and is vertically adjustable therein by means of the
40 stud bolt 13, which is screwed into said body block and held from turning therein by the lock pin 16 (preferably of softer material than the stud bolt) being forced
45 against the threads of the stud bolt by the set screw 17, as shown in Fig. 3, said stud bolt passing freely through a hole in the top of said arch with a knurled, or serrated, edge
50 nut 14 below and a jam nut 15 above the arch. Said body block is provided with a saw groove 10 through its lower half extending from front to back, and also perpendicular to and crossing said saw groove is a cylindrical die socket 11 of uniform diam-
55 eter to receive the shaping dies 5 and 5',

which socket is threaded at each end to receive the hardened, insertible, internally and externally threaded bushings 9 and 9' which receive the clamp screws 8 and 8'. These bushings 9 and 9' are each provided
60 with a slit 56, shown in Fig. 4, for the purpose of being turned by a screwdriver, and when in position are held from further turning by the shallow groove, or set screw seat, 57 and 57', shown in Fig. 1, being engaged
65 by the set screws 20 and 20' which are then locked by their respective jam nuts.

The cylindrical dies 5 and 5' are slidably connected in their centers by a hardened pin 6 entering the hole 53, shown in Fig. 14, and
70 crossing the passage for the saw forming a reliable tooth stop that strikes the tooth below the swage mark, as shown in Fig. 5; said dies being held apart when not compressed, by the coil spring 7 pressing against
75 the end of stop pin 6 and the inside end of pin hole 53, which is a shoulder formed around the air vent hole 54, as shown in Figs. 3 and 16.

The operative end of each die, as shown
80 in Fig. 14, comprises a square face 50 to close against the body of the tooth, a bevel face 49 to form the side dress of the swaged portion, and two chamfers 55 and 55'. The upper chamfer assists the swaged tooth in
85 entering readily between the dies, and the lower chamfer serves the same purpose when they become the upper chamfers by interchanging the dies for additional wearing
90 surfaces.

On the front and upper side of each die, and parallel to its axis, is a concave groove 52 or 52', shown in Figs. 5, 14, 15, 16, and 17, which in each die independently is engaged near its upper edge by the front tilt-
95 ing screw 19 or 19', and near its lower edge by the top tilting screw 18 or 18', so that by turning one tilting screw backward and the other forward in either direction a rotary adjustment may be obtained for either inde-
100 pendently, or for both as desired. This adjustment is to accommodate the difference in pitch of teeth for different classes of work.

On opposite sides of each die are lines
105 51 and 51', shown in Figs. 13 and 15, which are accurately and uniformly made to govern the correct position where the bevel face 49 should meet the square face 50, which lines also serve to indicate the correct rotary
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position of each die relative to the other. Their positions may be adjusted together by setting the corresponding lines on each die so as to exactly coincide; then the jam nuts 5 on each tilting screw may be locked.

The flexible supporting frame 2, having its front member 22 and its rear member 23 pivotally joined by a hinge bolt 26, is adjustable for circular saws of various sizes, 10 or it may be lined straight for use on band or gang saws by means of the alinement screw 27 which is locked by its jam nut, the hinge bolt clamping the two members together securely.

15 The arched supporting frame 2 fits loosely over the body block 1, which is tightened sufficiently to prevent lost motion and still permit the necessary vertical adjustment by means of two contact screws 28 and 28' 20 threaded into the supporting frame and engaging the body block within shallow vertical grooves 12 and 12', shown in Fig. 2, which screws are then locked by their respective jam nuts.

25 At each end of the supporting frame 2 are depending fingers 24, 24' and 25, 25', shown in Figs. 1, 2, 4, and 5, to straddle the saw and help guide the shaper from tooth to tooth, maintaining its true alinement with 30 the saw and preventing it from bending the teeth of thin saws.

In the under side of the front member 22 and the rear member 23 are inserted hardened plates 29 and 30 to resist wear from 35 contact with the teeth points. These plates are clamped between the walls of the grooved seats 31 and 32 of Fig. 5 which grooved seats are deepened, preferably in the middle, by narrow slits 33 and 34 to 40 permit said walls being clamped against the sides of the plates by the binder screws 35 and 36. The rear plate 30 may be fitted tightly between parallel walls of the groove 32, but the front plate 29 must be slidably 45 fitted between oblique walls of the groove 31. This front plate 29 extends into the saw groove 10 of body block 1 to cover the point of the tooth being shaped, and is pointed from each side to correspond to the 50 opening between the bevels 49 on each die as shown in Fig. 5. Threaded into the front member 22 of the supporting frame, above the front plate 29, is a screw 37 to regulate the pressure of the front plate upon the 55 tooth being shaped.

The dies 5 and 5' are simultaneously compressed by means of the oppositely threaded clamp screws 8 and 8' being turned by the clamp levers 38 and 38', which are slidably 60 mounted upon the screw heads, and are joined at their upper ends by the connecting yoke 39 carrying a central clamping handle 3. This central clamping handle 3, as shown in Fig. 1, is provided with a receptacle 42 to retain an extra stop pin 6

and a retracting spring 7 for an emergency, and the opening to said receptacle is closed by a screw 43. These clamping levers 38 and 38' are reversible laterally upon the 70 screw heads 8 and 8' for additional changes of positions as will be hereinafter fully explained, and each receives one end of the connecting yoke 39 upon its abruptly tapered shank 40, secured by nut 41, as shown in Figs. 1 and 2. The polygonal heads of 75 the clamp screws must be equilateral, but may have any number of sides. For convenience, consider herein screws 8 and 8' with hexagon heads of uniform size in cross section, and the levers 38 and 38' with 80 hexagon eyes of corresponding uniform size, thus enabling the levers each to be placed upon its corresponding screw head from either side, which, owing to the particular angular relation of the sides of 85 the heads to the longitudinal axes of the levers engaging them, enables the two levers jointly to be so manipulated upon the two screw heads that, with the levers always stopping in the same position, the 90 screws may assume such positions that, in one complete revolution of each, six times as many equal variations of distance between the approaching ends of said screws, as either head has sides, may be obtained. 95 This is accomplished in the manner presented in Figs. 9, 10, 11, and 12. In Fig. 9 the axis of the handle passes through the center of the eye on the vertical line A B. The diagonal lines A C and A D each pass 100 through the center, joining two opposite vertices in the hexagon perimeter. The angle C A D is equal to 60 degrees, including one of the sides of the hexagon head, which included side is disposed at such an 105 angle to the axis A B that the angle C A D is divided by said axis into two unequal angles, C A B 10 degrees and B A D 50 degrees. By considering the handle 38 and the screw head 8 in the position shown in 110 Fig. 9, then by reversing sides of said handle, leaving the screw head in the same position, so that the axis will fall upon the line A E of Fig. 10, it may be seen that by bringing the axis of the handle back to vertical, as shown in Fig. 11, the screw head 115 will be turned so that the vertices in the perimeter upon line A C of Fig. 10 will fall upon line A F of Fig. 11. The angle C A B being 10 degrees and B A F an equal angle 120 makes the travel of the screw head from line A C to line A F 20 degrees. This being the first change of distance between the approaching ends of the screws, the second will be a similar change of the lever 38' 125 upon corresponding screw head 8', which will result in a 20 degree advance, or 1/18 revolution, upon each of the oppositely threaded screws toward each other. The third change will be accomplished by again 130

reversing one of the levers, say 38, upon its screw head 8, in the same direction, and then reversing the other lever in the opposite direction, and bringing both levers back to vertical. By thus reversing lever 38 its axis will fall upon line A G of Fig. 12. The angle C A D of Fig. 9 being 60 degrees, the equal angle H A F of Fig. 11, which also includes one of the sides of the hexagon perimeter, is also equal to 60 degrees. Deducting the angle B A F, which is 10 degrees, and the equal angle H A G, being 10 degrees, from the angle H A F, 60 degrees, leaves the angle G A B, in Figs. 11 and 12, equal to 40 degrees. Thus it may be seen that by returning handle 38 from its position on Fig. 12, with its axis upon line A G, back to the vertical line A B, said handle will have turned the screw head 8 40 degrees, or $1/9$ revolution toward the screw 8'. This bringing an unequal variation of change in space between the approaching ends of the screws, the variation may be equalized by simply reversing sides of the other lever 38' upon the screw head 8' in the opposite direction from the original, and returning said lever to the vertical position, which will turn said screw 8' backward 20 degrees, or $1/18$ revolution. Deducting the $1/18$ revolution of backward movement of screw 8' from the $1/9$ revolution of forward movement of screw 8 leaves the desired uniform variation of $1/18$ revolution for screw 8. Thus it may be seen that, with both levers in a given position, by reversing sides of one lever in a given direction and turning it to its original position; then reversing sides of the other lever in the same direction and turning it to its original position; then reversing sides of both levers in opposite directions and returning them both to their original positions; by thus manipulating two levers so situated upon polygonal heads of oppositely threaded screws of common axes, three uniform variations of space between the adjacent ends of the screws may be obtained for each side of each screw head, or six times as many variations as either head has sides.

The supporting handle 4, as shown in Figs. 1, 2, 4, 6, 7, and 8, is attached to the body block, preferably the top side of the rear left hand corner, in a manner permitting its being set in various positions above or below horizontal, and in or out of parallel line with the saw. The curved end of the handle joining the body block has a spherical-convex lower surface 44, shown in Fig. 7, fitting into a spherical-concave seat 21 in the body block. The upper side of said curved portion 45 is cylindrical-concave receiving a washer 47 with a cylindrical-convex lower surface and a flat upper surface. Through the longitudinal slot 46

in the handle 4, and through the washer 47, passes a screw 48 to secure the handle in any position it may be set.

To operate this shaper, first place it upon the saw with the teeth uppermost. Whether on circular, band, or gang saws, next adjust the front and rear hardened plates 29 and 30 to fit the teeth by means of the hinge bolt 26 and alinement screw 27, always locking the latter by its jam nut. If desired the front plate 29 may be made to press harder upon the tooth being shaped by means of screw 37. Then remove nuts 41 and 41', and the connecting yoke 39. Set the clamp levers 38 and 38' upon the screw heads 8 and 8' so that, when both dies are pressed against the saw, and the saw equally distant from the side walls of saw groove 10 through which it passes, both levers 38 and 38' will stand in the same position to the rear about 45 degrees from vertical. Then join said levers by the connecting yoke 39 and tighten nuts 41 and 41'. Next see that the dies conform to the pitch, or hook, of the teeth. If necessary to change their rotary positions, set them by the tilting screws 18, 18' and 19, 19', always observing the guide lines 51 and 51' on each die to see that they exactly coincide. Set the tilting screws to touch the die lightly so as to permit their sliding freely, and lock same by jam nuts. Then adjust the shaper for correct width of finished swage by means of the knurled nut 14 and lock nut 15 on the stud bolt 13. Raise the body block to narrow the swage and lower it to widen same; then tighten the jam nut securely. Then lastly, with binder screw 35 loose, the front hardened plate 29 should be adjusted lengthwise to cover the tooth being shaped and almost fill the space between the dies when closed against the saw, but the dies must never close against the front plate 29. With the left hand upon the supporting handle 4 and the right hand upon the central clamping handle 3 and this handle 3 well forward, push the shaper forward over the next tooth and draw it back quickly until the stop pin 6 strikes the face of the tooth. Then draw back the clamping handle until the dies 5 and 5' firmly clamp the tooth. Repeat this operation as rapidly as desired.

Having thus fully described my present shaper, what I claim as new and original is;—

1. A shaper having a supporting frame to rest upon the saw teeth, with insertible hardened plates in contact with said teeth, each held between the side walls of a groove in the under side of said supporting frame, said grooves each being additionally deepened by a narrow slit to permit the walls being compressed against the sides of said hardened plates by screw means.

2. In a shaper for swaged teeth of cir-

cular, band, and gang saws, a supporting frame consisting of an arched front member 22 and an adjustable rear member 23 flexibly joined and securely clamped together at a hinge connection by a bolt 26 permitting different degrees of alinement of the under side of each member, said variations of alinement being effected by a screw 27 in a portion of one member pressing against a portion of the other member, all as herein shown and described.

3. A swage shaper having a supporting frame resting upon the saw teeth and carrying a body block grooved in its under side for the passage of a saw, deeper in the front side than in the back, said body block having in its lower half a cylindrical socket of uniform diameter, perpendicular to and crossing said groove, extending the length of said body block, and threaded at each end, said cylindrical socket containing two interchangeable, cylindrical shaping dies, and receiving, at its threaded outer ends, inside and outside threaded bushings to engage the oppositely threaded clamp screws.

4. A swage shaper comprising a flexible supporting frame carrying within its arched portion a body block with vertical grooves on one of its sides, engaged therein by screws secured in the adjacent wall of the arch inclosing same, said body block having a groove in its under side for the passage of a saw, and, perpendicular to and crossing said groove, a cylindrical opening of uniform diameter the full length of the body block to receive and conduct the two duplicate, interchangeable, cylindrical shaping dies and means for compressing same, said dies being centrally joined by and slidable upon a connecting pin or tooth stop, and having, within the opening into which said tooth stop pin slides, a coil spring pressing against the end of said stop pin and the inside end of said opening to hold the dies apart when not compressed.

5. A shaper having a supporting frame carrying a body block with a cylindrical opening its entire length to conduct the shaping dies of like parallel faces and like bevel faces which form the side dress for the tooth being shaped, said dies being simultaneously compressed by oppositely threaded clamp screws with lever means for turning same in the threaded bushings screwed into the ends of the die opening, and each held from further turning therein by a screw in the body block setting into a groove in the side of said threaded bushing.

6. A shaper with a supporting frame and body block conducting cylindrical shaping dies centrally connected, slidable and rotatable upon a round tooth stop, said dies having uniform opposing bevel faces, equal parallel faces with corners chamfered near the bevel faces, and each alike having uni-

form, fixed guide lines cut on the sides, where the bevel face meets the parallel face, to determine the correct rotary position of each die relative to the other and to the pitch of the saw teeth being shaped, the adjustment of said rotary position being effected by means of a concave groove in the front upper side of each die, parallel to its axis, being engaged by opposed tilting screws in the front and upper side of body block.

7. A shaper of the character described having a supporting frame and body block carrying duplicate, centrally connected, cylindrical shaping dies, with means for rotating same, means for indicating their equal rotary positions, means for causing the tooth to enter between the dies, means for stopping the tooth between the dies without action upon the cutting point, means for holding the dies apart when not compressed, and oppositely threaded clamp screws simultaneously turned by independent levers slidably fitted and laterally reversible upon their uniform equilateral heads to compress said dies, said levers being joined at their upper ends by a cross connection carrying a central clamping handle, all as herein specified.

8. A shaper comprising a supporting frame carrying a block with duplicate dies simultaneously compressed by oppositely threaded screws having polygonal heads of uniform cross section each engaged by an operating lever with corresponding eye slidably fitted upon said head, said levers being detachably connected at their upper ends by a yoke carrying a central clamping handle, said connection permitting said levers being laterally reversible upon said polygonal screw heads for intermediate changes of position, all as herein fully described.

9. A shaper having a flexible supporting frame with depending fingers to straddle the saw, a body block carried therein with a cylindrical opening of uniform diameter its entire length, duplicate cylindrical shaping dies, means for slidably connecting said dies in their centers, means for holding them apart, oppositely threaded screws for compressing them with uniform polygonal heads having levers slidably fitted thereon, each reversible laterally, and having its eye so situated with relation to its longitudinal axis that the two levers may be so manipulated as to jointly effect in one complete revolution of each screw three times as many uniform variations of space between the approaching ends of said screws as both screw heads have sides, all as herein described.

10. A shaper with an adjustable frame supporting a body block, carrying two duplicate cylindrical shaping dies slidably joined by a bar of common axis, independently rotatable by screw means with guide

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lines to indicate their relative rotary positions, held apart by a coil spring within one of the dies, and compressed by oppositely threaded clamp screws with uniform
 5 polygonal heads, turned simultaneously by independent levers connectedly operated, said levers each having its eye so situated with relation to its longitudinal axis that a line drawn through two opposite vertices in
 10 the perimeter of said eye will bear such relation to the axial line that the included angle will be equal to one sixth of the whole angle including one of the sides.

11. A shaper comprising a supporting
 15 frame, a body block carried therein with two shaping dies simultaneously acted upon by oppositely threaded clamp screws having independent levers detachably connected together and centrally operated, each with its
 20 polygonal eye slidably fitted directly upon the corresponding screw head, and having said polygonal eye so situated with relation to its longitudinal axis that the two levers may be so manipulated upon equilateral
 25 heads of oppositely threaded screws that, in one complete revolution of each, six times as many equal variations of distance may be obtained between the screws thus acted upon as either head has sides.

30 12. In a side shaper for saw teeth, a flexible, two member supporting frame with an insertible plate of hardened material clamped in the under side of each member, the

front plate extending into the deepened portion of the saw groove in a body block to
 35 cover the tooth being shaped, and adjustable lengthwise therein, also having screw means for regulating its pressure upon said tooth, as herein specifically set forth.

13. A device of the kind herein described
 40 having a supporting frame, a body block carried therein, a supporting handle attached to said body block by a spherical-convex portion clamped against a spherical-concave
 45 seat in body block, secured by a screw passing through a curved longitudinal slot and carrying a washer having a flat upper surface to fit the screw head and a cylindrical-convex lower surface fitting into the cylindrical-concave upper surface of the curved
 50 portion of said handle.

14. In a machine for the purpose herein described, a main body block supported by a frame with a flexible joint affording means for alining same to teeth of either circular,
 55 band, or gang saws, separate means for holding hardened plates in the under side of said frame permitting slidable endwise adjustment to the front plate, and means for vertically adjusting the inner end of same to
 60 vary the pressure of its point upon the tooth being shaped, all as herein specified.

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Witnesses:

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