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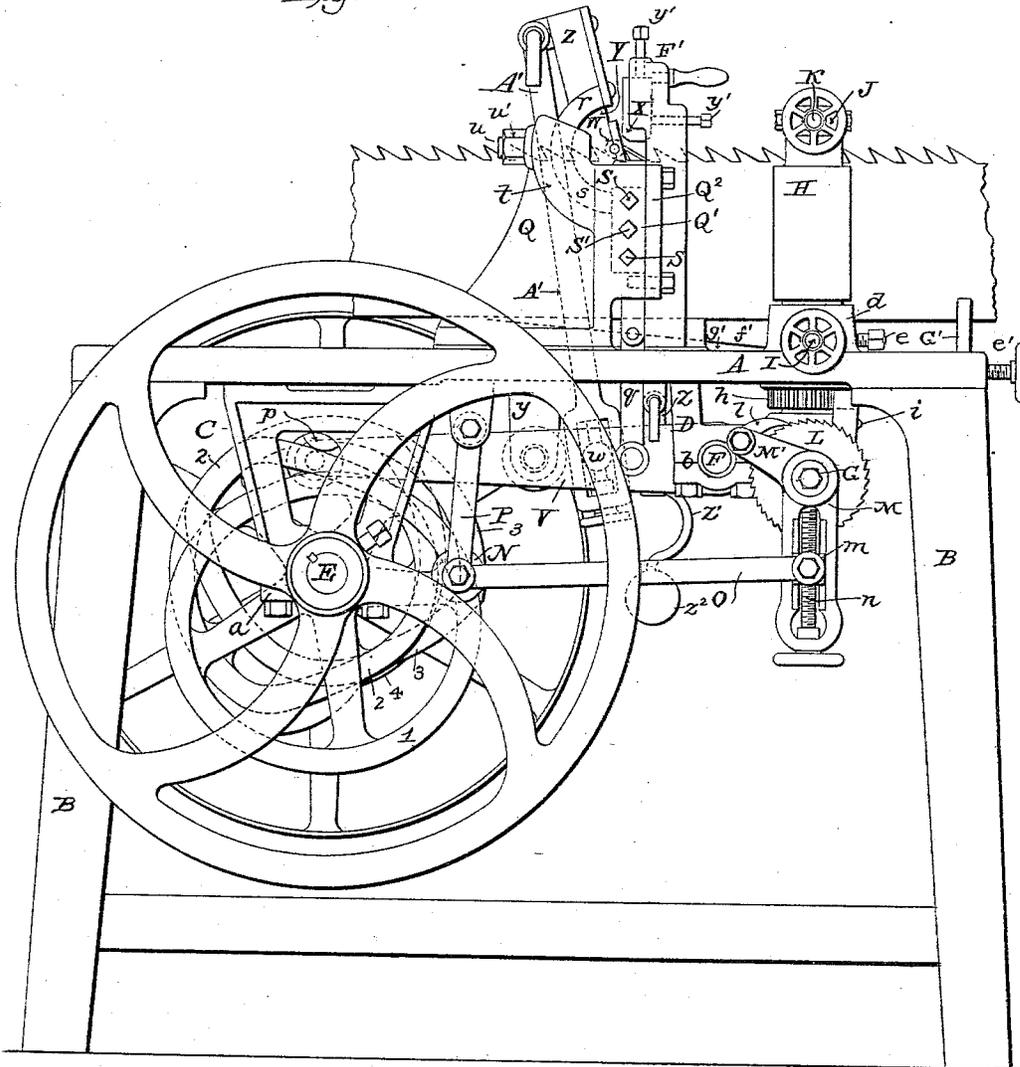
4 Sheets—Sheet 1.

G. M. HINKLEY.
SAW SWAGING MACHINE.

No. 373,740.

Patented Nov. 22, 1887.

Fig. 1.



Witnesses:
James F. DuKamel
Walter S. Dodge.

Inventor:
George M. Hinkley,
by his Attorneys,
Dodge & Son.

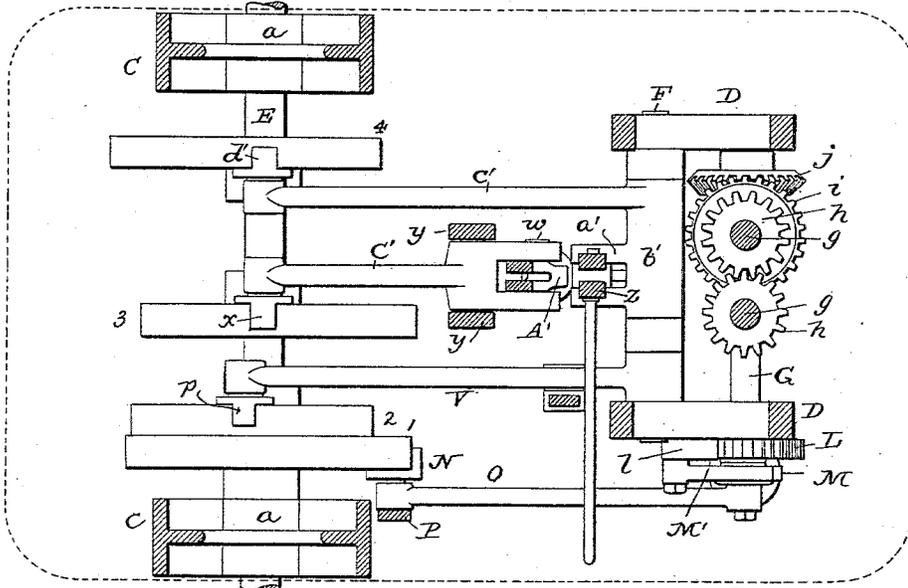
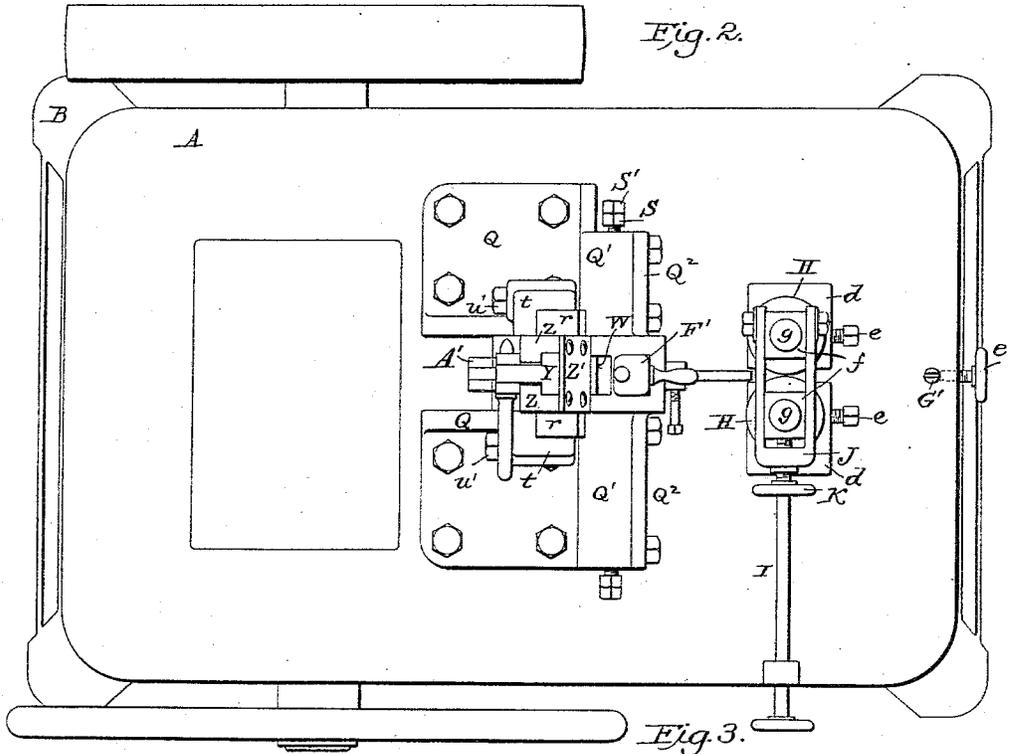
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G. M. HINKLEY.
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(No Model.)

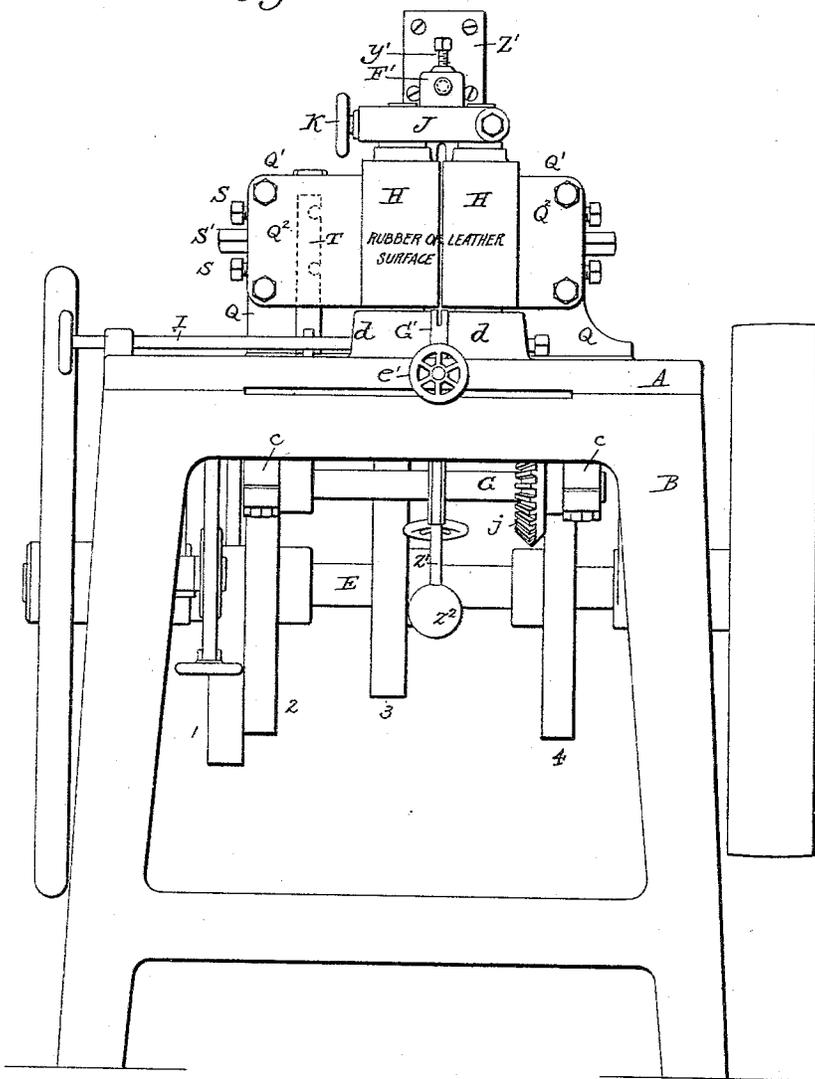
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Fig. 4.



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UNITED STATES PATENT OFFICE.

GEORGE M. HINKLEY, OF MILWAUKEE, WISCONSIN, ASSIGNOR OF ONE-HALF TO EDWARD P. ALLIS & CO., OF SAME PLACE.

SAW-SWAGING MACHINE.

SPECIFICATION forming part of Letters Patent No. 373,740, dated November 22, 1887.

Application filed June 29, 1887. Serial No. 212,856. (No model.)

To all whom it may concern:

Be it known that I, GEORGE M. HINKLEY, of Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented certain new and useful Improvements in Saw-Swaging Machines, of which the following is a specification.

My invention relates to machines for swaging the teeth of saws, and is designed more particularly for operating upon band saws, though not restricted thereto.

The machine consists, essentially, of a supporting-frame, feed-rolls for advancing the saw-blade one tooth at a time, clamps for grasping the saw when the tooth to be swaged is in proper position, a roller and a die which descend one in front and the other in rear of the tooth, the die acting upon the tooth, throwing its point slightly forward and sustaining it while the roller ascends and spreads the point laterally, and mechanism for imparting motion to the several parts in proper time and order, as hereinafter explained.

The elements and combinations which are deemed new will be pointed out in the claims. The construction of the machine is illustrated in the annexed drawings, in which—

Figure 1 is a side elevation of the complete machine; Fig. 2, a top plan view; Fig. 3, a horizontal section on a plane just below the bed or table of the machine; Fig. 4, an end view of the machine; Fig. 5, a perspective view of the head or upright portion of the frame containing the swaging-slide, its guides, and the saw-clamps; Fig. 6, a rear view of the same; Fig. 7, a view showing the construction of said clamps.

A indicates the bed or table of the machine, supported by legs or standards B, and provided on its under side with hangers C and D, the former having boxes *a* for a main driving-shaft, E, and the latter having boxes *b* for a shaft, F, and boxes *c* for a shaft, G, both hereinafter referred to.

Keyed or otherwise made fast upon shaft E are four cams, 1, 2, 3, and 4, which, through intermediate mechanism, produce all the movements of the various parts and determine the order and time of such movements.

Above the bed or table A, and supported thereby, are the feed-rollers, the clamping-

jaws, and the swaging devices. The feed-rollers H H are two vertical rolls, advisably covered with rubber, leather, or other suitable material, to take a firm hold upon the saw-blade and carry the next tooth forward against the swaging-roller, while at the same time avoiding injury or defacement of the blade.

The roller shafts or arbors are carried at their lower ends in adjustable boxes *d*, which are secured at any desired adjustment by set-screws *e*, one box being set toward the other by means of a screw, I, the stem of which extends out beyond the side of bed or table A, and is furnished with a hand-wheel, as shown in Fig. 2. The upper ends of said arbors are likewise provided with boxes or journal-blocks *f*, to one of which is hinged or pivoted a yoke, J, carrying a screw, K, provided at its outer end with a hand-wheel by which to turn it.

When it is desired to enter between the rollers a saw-blade which cannot be conveniently passed endwise between—as, for instance, a gang-saw blade provided with tabs for securing it in the sash, or a band-saw blade, which of course could only be entered transversely to its length—the screw K is turned back, and, if necessary, the screw I also, the yoke J is thrown up, the blade is passed down between the rollers, its toothed edge uppermost, and then the yoke is brought back to its normal position, and the screws are tightened to give the desired pressure of the rollers upon the saw-blade. It is necessary that the blade be advanced by a step-by-step movement, and that each advance be exactly equal to the distance between the points of successive teeth, so that each tooth may be brought to the exact position required for the proper operation of the swaging devices. To accomplish this the arbors *g g* of the rollers H H are provided with gear-wheels *h h*, of like size and number of teeth, and one of said arbors is further provided with a bevel-pinion, *i*, which meshes with and receives motion from a like pinion, *j*, carried by the shaft G.

Keyed or otherwise made fast upon shaft G is a ratchet-wheel, L, and swinging freely upon the outer end of said shaft is a yoke, M, having an arm, M', furnished with a dog or pawl, *l*, which alternately rides back over and en-

gages with the teeth of ratchet-wheel L as the yoke swings to and fro. The swinging or oscillating motion of the yoke is effected by cam 1, acting through the medium of a grooved block or runner, N, which clasps or straddles the edge of its irregular rim, a pitman or connecting rod, O, and a pendulous link or hanger, P, which latter maintains the block or runner and the end of the pitman attached thereto at the proper height.

In order to provide for varying the feed of the saw-blade, the yoke M is furnished with a sliding block, *m*, to which pitman O is attached, and said block is provided with a threaded hole, through which passes an adjusting-screw, *n*, swiveled in the yoke, and provided with a hand-wheel by which to turn it. By turning the screw the block may be raised or lowered, and the throw of the yoke and consequent movement of the ratchet-wheel and feed-rollers proportionately increased or diminished.

The cam 1 is of such form that the parts actuated by it perform their movements while the swaging devices are at rest, and that said parts remain at rest while the swaging devices are in action.

The mechanism for clamping the saw-blade preparatory to the acting of the swaging devices will be better understood upon referring to Figs. 1, 2, and 4. As shown in said figures, two standards, Q, are bolted to and rise from the bed or table A, said standards being formed with recessed or box-like portions Q', which extend inward toward each other from opposite sides of the vertical plane in which the saw-blade is held and moves.

Within the box-like portions Q', which are covered by plates or caps Q², are placed clamping-jaws R R', designed and arranged to clamp the saw-blade between them and to hold it firmly while undergoing the action of the swaging devices. The jaw R is pressed inward toward the plane in which the saw-blade moves by means of two set-screws, S S, and it is held against moving too far inward or is drawn back by means of an intermediate screw, S'. The other jaw, R', is required to advance and recede quickly after each advance of the saw-blade to clamp it for the action of the swaging devices and to release it for feeding forward after such action. To effect such movements I provide a vertically-moving bar, T, between which and the rear or outer end of jaw R, I place two links or bars, *o*, which are pivotally attached at their ends to the bar T and to the jaw, respectively, said links approaching more or less nearly to a horizontal position as bar T moves longitudinally. The rear or outer face of bar T bears against a block, U, adjusted like jaw R by means of screws S and S', said block being held rigidly in any position to which it may be adjusted. The vertical movement of bar or slide T is unvarying; hence it follows that upon the adjustment of block U will depend the distance between the jaws R and R' when the latter is forced inward by bar T and links *o*, and in this way the jaws may

be made to clamp blades of different thicknesses. The rising and falling motions of bar T are produced by means of cam 2 on shaft E, acting through the medium of a lever, V, pivoted at one end upon shaft F and furnished at its other end with a block or runner, *p*, which clasps or straddles the laterally-projecting rim of the cam, the lever V and bar T being connected by a link, *q*, Fig. 1.

The swaging mechanism consists, essentially, of two parts—a roller, W, which passes down in front of the tooth, and a die, X, which descends upon the back of the tooth, bends it forward, and sustains the tooth while the roller ascends to spread out and finish the tooth. The roller W is journaled in a slide, Y, preferably of U form in cross section, running in seats or grooves in standards or guides Z, in which it is retained by a covering-plate, Z'. The standards or guides Z are formed with downwardly-extending arms *r*, curved in an arc of a circle concentric with the roller W when the latter is in position to spread the point of the tooth, and these arms fit nicely within grooves *s*, of like curvature, formed in arms *t*, extending upward from the standards Q, as shown in Fig. 1. The arms *t* are pierced to receive clamping-bolts *u*, the inner ends of which are bent horizontally at a right angle to pass in front of the arms *r* and to bear against the inner faces thereof when the nuts *u'*, applied to the outer ends of the bolts, are turned up to draw the bolts tight. In this way the arms *r*; and consequently the standards Z, are held rigidly at any desired adjustment, the angle of inclination of the standards being varied by swinging the same forward or backward, as required.

Owing to the curvature of the arms *r* concentrically with the roller W when the latter is in its working position, it will be seen that the adjustment or variation of inclination of the arms and the standards Z will not affect or alter the central working position of said roller. The slide Y is formed with an outwardly-projecting lug or ear, to which is jointed a pitman, A', the lower end of which is made in the form of an open frame or yoke, in which is placed a sliding block, B', carrying a stud or pin, *w*, which enters a hole in one end of a lever, C', pivoted or hung at a point between its ends in hangers *y* and furnished at its other end with a block or runner, *x*, which fits upon or clasps the laterally-projecting rim or flange of cam 3. The block B' is tapped to receive an adjusting-screw, D', swiveled in the yoke or open frame of pitman A', as indicated in dotted lines, Figs. 1 and 6, so that by turning the screw the block may be raised or lowered, and thus the points to which the roller may rise and fall may be varied to suit the width of blade and the size of the teeth operated upon. The cam 3 is so formed and placed with reference to cams 1 and 2 that it lowers the slide Y before the feed or advance of the blade is entirely completed and while the clamping-jaws R R' are closing

upon the blade, the movement of the slide terminating when or just before the jaws begin to clasp the blade.

X indicates a die designed to act upon the back of the tooth at or near the point and to support the tooth while the swaging-roller travels upward over its front face and spreads and finishes the same. This die is carried by and is adjustably secured in a slotted or bifurcated slide or die-carrier, F', which is made in the form mentioned to permit it to straddle the saw-blade. Set-screws *y'* serve both to adjust and to clamp the die F' in place, and also permit it to be readily removed and replaced when necessary. The lower end of slide or die-carrier F' is connected by a link, *z*, with an arm, *a'*, projecting from a sleeve, *b'*, encircling shaft F, and provided with a long arm or lever, *c'*, furnished at or near its free end with a sliding block or runner, *d'*, which clasps or straddles the horizontally-projecting flange or rim of cam 4. The cams 1, 2, 3, and 4 being all secured upon one and the same shaft, and being made to give all requisite motions to the working parts, it follows that after the cams are once properly adjusted and made fast upon the shaft the motions of the parts will of necessity take place in unvarying order and time. To retain the link *z* in vertical position its lower end is provided with an arm, *z'*, which extends down below the point of attachment to arm *a'*, and is furnished with a ball or weight, *z''*.

G' indicates a post or stem, the upper end of which is slotted to receive, guide, and support the back edge of the saw-blade. This post is fitted in a hole or opening in the bed or table A, in which it may be raised and lowered, as required, and is clamped at any desired height by a set-screw, *e'*.

While passing through the machine and being acted upon by the swaging devices the saw-blade is supported by a bearing-block or anvil, *f'*, the under face of which is inclined longitudinally and rests upon the correspondingly-inclined face of a lower block, *g'*. Thus formed, the saw-support may be raised or lowered by moving the block *f'* longitudinally upon the block *g'*.

When a saw is too narrow to bring the teeth in proper working position by means of blocks *f'* and *g'*, block *g'* may be raised and a block of sufficient thickness, with parallel faces, be inserted between bed A and block *g'*, to bring the points of the teeth to the desired height.

Having thus described my invention, what I claim is—

1. A machine for swaging saws, consisting, essentially, of the following elements in combination: a supporting frame-work provided with standards and hangers for sustaining the moving parts of the machine, a rotary shaft mounted in said frame and provided with cams for giving motion to the various parts, feed-rollers adapted and arranged to bear against opposite faces of a saw-blade and to advance the same, movable jaws for clamping the blade

preparatory to the swaging action, a swaging-roller movable lengthwise and in front of the saw-teeth, a swaging-die movable to and from the rear face of the teeth, and connecting devices, substantially such as described and shown, for transmitting motion from the several cams to the feeding, clamping, and swaging devices.

2. In a saw-swaging machine, feeding mechanism consisting of a pair of rolls geared together, a beveled pinion secured upon the arbor of one of said rolls, a shaft provided with a bevel-gear to mesh with that of the roll, and provided, also, with a ratchet-wheel, a pawl-carrying arm or lever pivoted concentrically with said ratchet-wheel, a cam, a connecting-rod extending from the pawl-carrying lever to the cam, and provided with a block or runner fitting upon the rim of said cam, and a link suspended from the frame of the machine and serving to support the connecting-rod and the block or runner.

3. In combination with feed-rollers H H, connected by gearing-shaft G, connected by gearing with the arbor of one of said rollers, ratchet-wheel L, lever M M', provided with dog *l*, sliding block *m*, adjusting-screw *n*, pitman O, link or hanger P, block or runner N, and cam or eccentric I, for imparting motion to the rod O.

4. In combination with rollers H H and the journal-blocks *f* at their upper ends, a yoke, J, pivoted to one of said blocks, and a screw, K, passing through said yoke and adapted to bear against the other of said blocks, substantially as and for the purpose set forth.

5. In combination with rollers H H, and with mechanism, substantially such as shown, for imparting a step-by-step rotation thereto, journal-blocks applied to the upper and lower ends of said rollers, adjusting-screws bearing against the lower journal-blocks, a yoke pivoted to one of the upper journal-blocks, and an adjusting-screw passing through the yoke and bearing against the other of said journal-blocks.

6. In a saw-swaging machine, the combination of a supporting-frame, standards rising therefrom, clamping-jaws mounted in said standards, and links or toggles bearing at one end against one of the jaws and at the other end connected with a vertically-moving slide, whereby a vertical movement of the slide in one direction will cause the jaws to clasp the blade and a movement in the reverse direction will cause the jaws to release the blade, substantially as set forth.

7. The combination, in a saw-swaging machine, of supporting-standards, jaws mounted and arranged to slide therein, set-screws applied to one of said jaws and serving to adjust and hold said jaw, a vertically-moving slide in rear of the other jaw, links extending from said slide to the jaw, a bearing-block in rear of the slide, and adjusting-screws for moving and securing said bearing-block, whereby the distance to which the jaws shall be moved by

the action of the slide may be varied as desired.

8. The combination, in a saw-swaging machine, of supporting-standards, jaws mounted therein, a vertically-moving slide in rear of one of said jaws, links connecting the slide and said jaw, a lever pivoted to the frame-work of the machine, a link connecting the lever and the slide, a rotating cam or eccentric, and a block or runner carried by the lever and actuated by the cam or eccentric, whereby the jaws are caused to periodically clamp and release the saw-blade passing between them.

9. In a saw-swaging machine, the combination, with a supporting frame and standards, of clamping-jaws mounted in said standards, a slide moving in one of said standards at right angles to the movement of the jaws and connected with one of said jaws by links, a lever pivoted at one end to the frame of the machine and provided at its opposite end with a grooved block or runner, a cam having its rim extended into the groove of said block or runner and serving to give motion to the lever, and a link connecting said lever and the slide, whereby the rotation of the cam is caused to move the slide and actuate the clamping-jaw, substantially as set forth.

10. In a saw-swaging machine, the combination, with supporting-standards, of a vertically-moving forked or slotted slide adapted to straddle the saw-blade, mechanism, substantially such as shown, for imparting a longitudinal movement to said slide, and a die carried by the slide and adapted to strike the rear face of the saw-teeth, substantially as set forth.

11. In a saw-swaging machine, the combination, with saw-holding devices and with a swaging-die, of uprights or supports provided with arms having arc-shaped grooves, grooved guides or standards having arms curved to fit and seated in the grooves of the uprights or supports, clamps for securing said arms at any desired adjustment, a slide movable in the grooved standards or guides, and a roller carried by said slide and adapted to act upon the front face of a saw-tooth, substantially as and for the purpose set forth.

12. In a saw-swaging machine, the combination of saw-holding devices, a reciprocating slide, a swaging-roller carried by said slide and adapted to act upon the front faces of the saw-teeth successively, guides for said slide adjustable to different inclinations, and locking devices or clamps for holding the guides at any

inclination, whereby the movement of the slide and its roller may be made to correspond with the line of the front faces of the saw-teeth.

13. In combination with uprights or supports Q, having arms *t*, provided with curved grooves *s*, guides Z, provided with arms *r*, fitting and seated in said grooves, clamping devices bearing upon said curved arms, slide Y, movable longitudinally in said guides, and roller W, carried by the said slide, substantially as set forth.

14. In a saw-swaging machine, substantially as shown and described, the combination, with saw-supports, of a reciprocating slide, Y, a swaging-roller carried thereby, a lever pivoted at one end and provided at its opposite end with a grooved block, *x*, a cam, 3, having its rim or flange extending into the groove of the block, and a rod or pitman, A', connecting the slide and the lever, whereby the rotation of the cam is caused to produce a reciprocating motion of the slide Y and to carry the roller over the front faces of the teeth of the saw.

15. In combination with guides Z, slide Y, provided with roller W, lever C', pivoted at one end and provided at its opposite end with grooved block *x*, rotary cam 3, and pitman or rod A', connecting the slide and the lever.

16. In combination with slide Y, provided with roller W and with lever C' and its operating devices, connecting-rod or pitman A', having the open yoke or frame at one end, sliding block B', mounted in said open yoke, stud or pin *w*, extending from said block to the lever C', and an adjusting-screw, D', for raising and lowering said block and pin.

17. In a saw-swaging machine, the adjustable ways Z, in combination with the slide Y and the swaging-roller W, as and for the purpose specified.

18. In a saw-swaging machine, the combination of a die or anvil, X, to support the back of the saw-tooth, a slide provided with a swaging-roller to act upon the front of the tooth, adjustable guides for said slide, and clamps or locking devices for holding the guides at any desired inclination, whereby the roller is caused to move positively in contact with the front of the tooth from root to point.

In witness whereof I hereunto set my hand in the presence of two witnesses.

GEORGE M. HINKLEY.

Witnesses:

WM. W. ALLIS,
EDW. P. ALLIS, Jr.