

J. ARENZ.  
SAW SWAGE.  
APPLICATION FILED JUNE 24, 1912.

1,062,211.

Patented May 20, 1913.

2 SHEETS—SHEET 1.

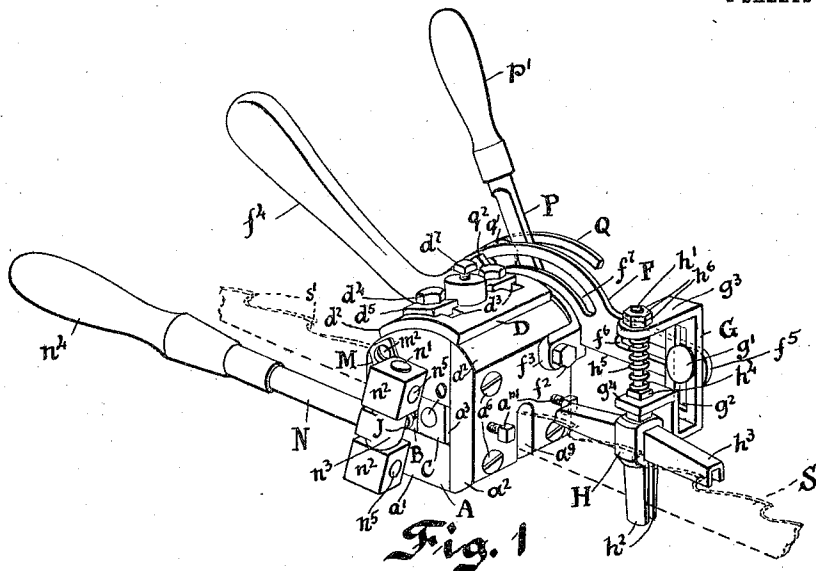


Fig. 1

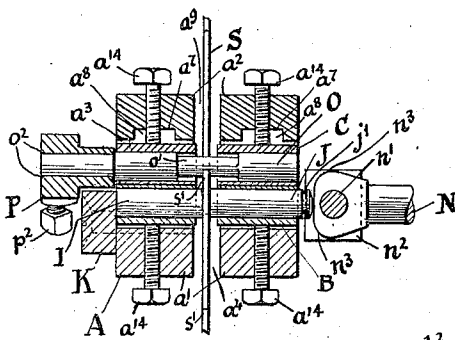


Fig. 6

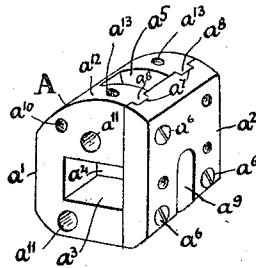


Fig. 7



Fig. 10

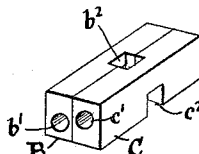


Fig. 8

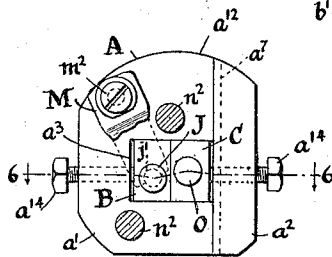


Fig. 9

Witnesses

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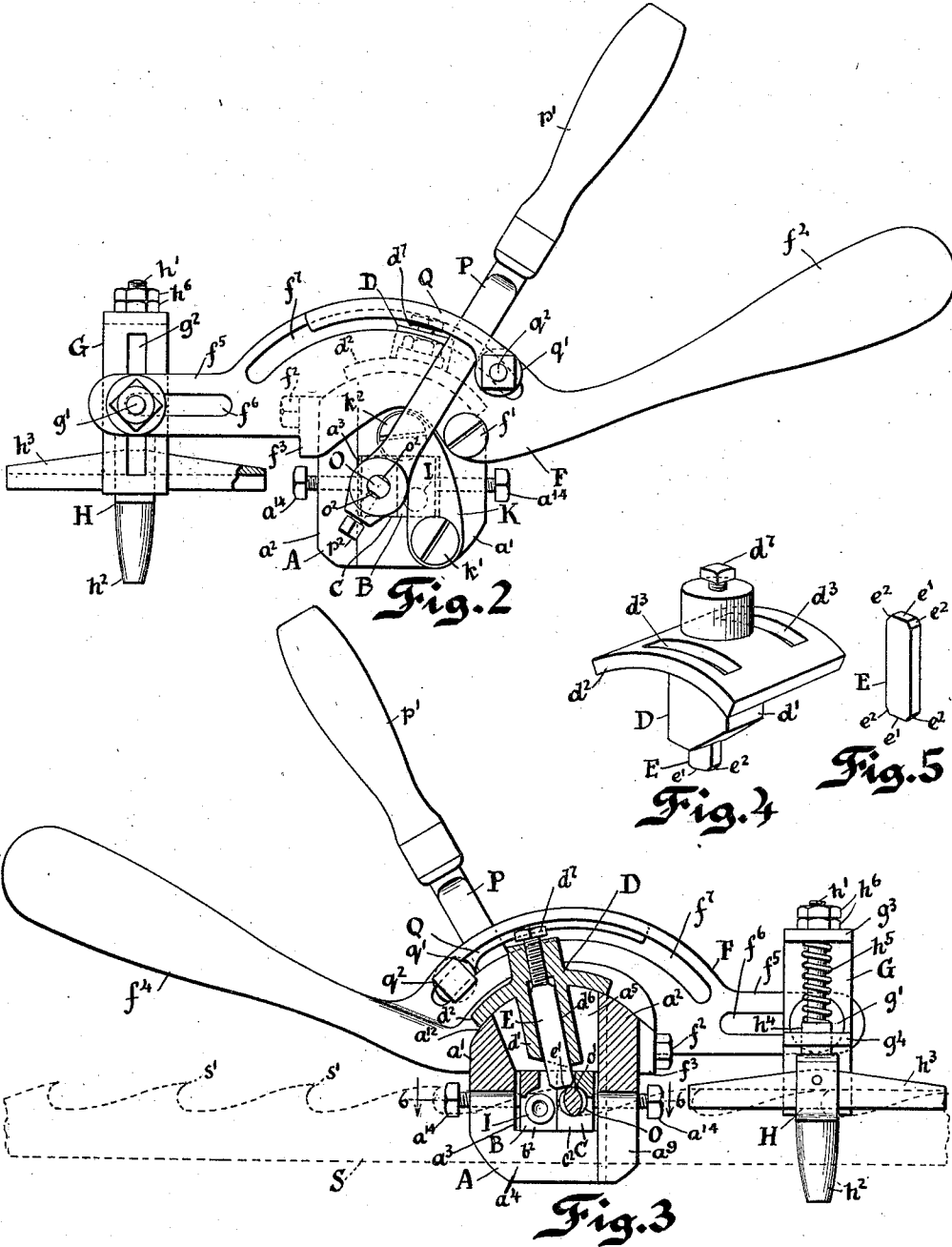
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2 SHEETS—SHEET 2.



Witnesses

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# UNITED STATES PATENT OFFICE.

JOSEPH ARENZ, OF MILWAUKEE, WISCONSIN.

SAW-SWAGE.

1,062,211.

Specification of Letters Patent.

Patented May 20, 1913.

Application filed June 24, 1912. Serial No. 705,389.

*To all whom it may concern:*

Be it known that I, JOSEPH ARENZ, of Milwaukee, Wisconsin, have invented a Saw-Swage, of which the following is a specification.

This invention relates to saw-swages, or in other words, to a device for setting or spreading the points or saw-teeth for the purpose of enabling the saw to cut with a clearance.

The object of my invention is to produce a design of saw-swage superior to any of those now in the market; and in particular, first to provide a new and improved clamping device which shall be much less subject to wear than the usual screw-clamp, and shall be reversible so as to provide a new surface when worn; secondly, to provide an adjustment for said clamp; thirdly, to provide an improved form of fixed swaging-die; fourthly, to provide an endwise shiftable movable swaging-die which shall permit of uniform wear over a considerable length of its surface; fifthly, to provide improved adjustment means for both dies whereby they can be moved so as to swage teeth having any form and angle of point; sixthly, to provide means for handling the swage separate from the swage-handle and independent thereof; and seventhly, to provide an improved form of die-block upon and in which the various parts are mounted.

The nature of my invention and the manner of accomplishing the above effects, together with other secondary effects not hereinabove mentioned, will become more apparent from a consideration of the following detailed description thereof taken in connection with the accompanying claims.

In the accompanying drawings, I have illustrated the most improved form of my invention without, however, intending to indicate thereby that all the features, forms, and combinations thereof are necessarily essential to the operation of my invention as such.

In these drawings, Figure 1 is a perspective view of a complete swage, with a portion of a saw, upon which it is shown as being placed in position for swaging a tooth thereof; Fig. 2 is a side-elevation from the rear side or opposite side from that from which Fig. 1 is viewed; Fig. 3 is a longitudinal central section of the swage taken in the plane of the saw and looking from the

front toward the back; Figs. 4 and 5 are perspective views respectively of the fixed die-block and of the fixed die separately; Fig. 6 is a plan view through the swaging-block, taken approximately on the plane indicated by the line 6—6 of Fig. 3; Fig. 7 is a perspective view of the swaging-block separately; Fig. 8 is a perspective view of the two movable bearing-blocks for the clamping-die and swaging-die; Fig. 9 is a front elevation of the swaging-block alone, showing the screws for the pivot of the clamping-die lever in section and the spring for the clamping-die partly broken away; and Fig. 10 is a perspective view of the retracting spring for the movable clamping-die.

The principal element of the apparatus is that portion herein termed the swaging-block and designated as a whole A; it being the main part on which the other parts are mounted. Said swaging-block may consist of a single piece, but for easier construction it is preferably composed of two pieces  $a^1$  and  $a^2$ , the former being channeled out to form a horizontal recess or slot  $a^3$  within which fit the two movable bearing-blocks B and C, shown separately in Fig. 8. Said piece  $a^1$  is further slotted out longitudinally in the center as shown at  $a^4$ , from the bottom up to the middle, to receive the saw S to be swaged; and it is further provided on its upper side with a wedge-shaped slot  $a^5$ , which receives the projecting end of the fixed die-block D, carrying the fixed swaging-die E. The piece  $a^2$  is united to the piece  $a^1$  on the open side of the slot  $a^3$ , and forms a closure for same; three screws  $a^6$  and a cap-screw  $f^2$  being used to secure the piece  $a^2$  to the piece  $a^1$ . The abutting faces are preferably provided with inter-engaging mortises  $a^7$  and tenons  $a^8$ . Said pieces  $a^2$  is furthermore slotted in its longitudinal center line from the bottom up to the middle as shown at  $a^9$ , the slot  $a^9$  being substantially continuous with the slot  $a^4$ .

Upon the rear face of the swaging-block A is mounted a member F, being secured thereto by a screw  $f^1$  at the back and a cap-screw  $f^2$  passing through an ear  $f^3$  which extends over the outer side-face of the piece  $a^2$ . Said member F carries at its left-hand end, Fig. 1, a handle  $f^4$ , which is adapted to be grasped by the left hand of the operator and to be used for raising and shifting the

apparatus from one saw-tooth to the next. On the opposite end, the member F has an extension  $f^5$ , slotted at  $f^6$  to receive the bolt  $g'$ , which serves to adjustably clamp an upright member G, having also a slot  $g^2$ , through which said bolt  $g'$  passes; this member G has two horizontally extending perforated ears  $g^3$  and  $g^4$  in which is movably supported the post or shank  $h'$  of the guiding-member H, whose lower end is forked to form two legs  $h^2$  which straddle the saw as shown in Fig. 1 and there is placed at the top of the fork a horizontal channeled guide  $h^3$ , which slides over the teeth of the saw S and helps to keep the swage in proper alignment therewith. The post  $h'$  is provided with a square base  $h^4$  which slides vertically in a hole of the same shape in the ear  $g^4$ , while the upper end of said post is made of smaller diameter than said square base to receive the spring  $h^5$ , which abuts at one end upon said square base and at the other end upon the lower face of the ear  $g^3$ . Said spring is kept under compression and the guide H is held in place by a pair of lock-nuts  $h^6$  at the top. It will be seen that the guide H can be shifted both vertically and horizontally along with its supporting member G by loosening the bolt  $g'$ .

The means whereby the device is clamped in place upon the saw preliminary to the swaging-operation, comprises two clamping dies, to wit, a fixed die I and a movable die J, both of which are adapted to shift longitudinally in the block B, which has a bore  $b'$  longitudinal thereof and transverse to the saw adapted to receive and fit said dies. The block B, as well as its companion C, which are disposed side by side within the recess  $a^3$  of the swaging-block A, across the longitudinal saw slot  $a^4$ ,  $a^9$ , are transversely slotted continuously with said saw-slot as shown at  $b^2$ ,  $c^2$ ; whereby the abutting ends of the clamping-dies I and J meet in the slot  $b^2$  or else abut against opposite faces of the saw S as clearly shown in Fig. 6. The die A is furnished with a rest consisting of a block K which is secured to the back of a block A by means of two screws  $k'$  and  $k^2$ ; as there is no substantial wear upon the end of this die, longitudinal adjustment will be unnecessary, and moreover, according to my invention, the exact distance of the saw from the two sides of the slots  $a^4$  is of no importance. The movable die J is long enough so that its front end extends outside of the bore  $b'$  and has an annular groove  $j'$  in which engages the semicircularly recessed free end  $m'$  of a plate-spring M, which is secured at one side of the block A by a screw  $m^2$ , passing through the hole  $m^3$  of said spring (Fig. 10) and into the threaded hole  $a^{10}$ , Fig. 7. By means of said spring M the movable die J is kept normally retracted, and it is forcibly impelled toward the fixed

die I by means of a clamping-lever N, which is pivoted upon a transverse pin  $n'$  mounted in two square-headed screw-posts  $n^2$ , which screw into holes  $a''$  in the block A on opposite sides of the recess  $a^3$ . The lever N has on either side of the pivot-pin  $n'$  an eccentric or cam-surface  $n^3$  which increases in distance from the pivot-pin  $n'$  in both directions from the point opposite the shank of the lever, which shank is provided with a handle  $n^4$ . Only one of the two cam-surfaces  $n^3$  is used at a time. It will be seen that in the position of Fig. 6 in which the lever N is extended parallel to the clamping-dies, the head of the die J rests against the face  $n^3$  and is in its most extended position. When the lever is turned upon its pivot to the position shown in Fig. 1, the cam-surface  $n^3$  forces the die J toward the die I so as to clamp the saw S between them; and when the handle is moved back to its position of Fig. 6, the spring M causes the die J to be retracted again; whereby a single motion serves to clamp and the reverse motion to unclamp the swage. This form of clamp, which is a part of my invention, is much superior to the old screw-form of clamp, because in the latter after considerable usage the threads of the screw become too loose to hold any longer; but when the wearing surfaces of my improved clamp are worn so as not to clamp the saw properly, the wear can be taken up by simply moving the pivot-pin  $n'$ , inward, by turning the screws  $n^2$  into their sockets one-quarter or more turns, as it will be seen that these screws have square heads provided each with two bores  $n^5$  at right angles to each other. Moreover when the cam-surface  $n^3$  on one side of the clamping-lever is worn too far to be effective, the clamping-lever is reversed in position so that the other surface comes into use; and furthermore, when the head of the die J becomes worn down too far, it is a simple matter to replace the die with a new one without in any way affecting the other parts, whereas in the screw-clamp form the wear was in the body of the swaging-block itself, which could not be economically replaced or repaired.

The swaging-apparatus comprises in like manner a fixed die and a movable die; the fixed die, commonly called the anvil-die, E, being mounted in the inwardly projecting end  $d'$  of the die-block D. It will be observed that the upper surface  $a^{12}$  of the block A is turned cylindrical about an axis substantially coincident with that of the swaging-die O or slightly above the same, and the die-block D has a cylindrically curved flange  $d^2$  adapted to rest on said surface  $a^{12}$ ; the body of said block passing through the center of said flange, and said flange having on each side thereof a longitudinal slot  $d^3$ . In the block A at each side of the slot  $a^5$  are

formed screw-holes  $a^{13}$  to receive clamping-screws  $d^4$ , each provided with a shouldered washer  $d^5$  extending into one of the slots  $d^3$  so that it can not be rotated; this arrangement enables the die-block to be shifted radially with respect to the swaging-die O, the active end of the die E retaining its place with respect to the end of the tooth to be swaged—so as to change its angle of application to accommodate different shapes of saw-teeth.

The form of the die E as used is a further improvement over those previously used, since said die E is of rectangular prismatic form with two base-planes  $e^1$  at right angles to the axis and chamfered edges  $e^2$  on the ends of the base-planes, and said die fits in a correspondingly shaped recess  $d^6$  in the die-block as shown in Fig. 3. Its upper end rests upon an abutment set-screw  $d^7$ , which is threaded into an aperture from the top end of the die-block in such manner as to permit of longitudinal adjustment of the die. Thus it will be seen that my form of die is of uniform cross-section for its entire length, giving it the greatest amount of resistance to lateral bending, and being symmetrical about longitudinal and transverse planes, is reversible both endwise and side-wise so that any of the bevel-planes  $e^2$  may be brought into action and as soon as one becomes worn down, change may be made to another. It will be observed that the slots  $b^2$ ,  $c^2$  in the blocks B and C extend around on the adjoining sides of these two pieces to the top thereof so as to permit the end of the die E to pass through.

The swaging-die O, which forms another important feature of my invention, is of cylindrical form fitting into the longitudinal bore  $c^1$  of the block C so as to turn easily therein, but having its central portion which passes across the slot  $c^2$  and for a little distance on each side thereof made in elliptical form, as shown in section at  $o'$  in Fig. 3. It will be seen that the bore  $c^1$  is near to and slightly above the bore  $b^1$ , whereby the clamping-dies seize the saw-teeth immediately back of and slightly below the point which is to be swaged. The movable swaging-die extends beyond the bore  $c^1$  at the rear of the block A and has secured thereto the manipulating-lever P, which has a handle  $p^1$  and is clamped in place by a set-screw  $p^2$  engaging one of two flats  $o^2$  on the end of the die O or may be otherwise suitably keyed thereto. Now, the elliptical or swaging middle portion of the die is sufficiently long so that so long as the die is kept in place against endwise movement, the circular portion can not come into contact with the edge of the swaging-die E; but if this is done accidentally then the swaging movement upsets or cracks the edge off the anvil-die and makes its action imperfect.

This fault is so far as I know common to those saw-swages hitherto constructed, but to prevent this I arrange a guard-finger Q which is at the outside or rear of the lever P, said guard-finger having a cylindrical base  $q^1$  through which passes a bolt  $q^2$ , and this bolt  $q^2$  is extended into an arcuate slot  $f^1$  formed on the member F concentric with the swaging-die O. It will be seen that the finger Q performs two important functions; because the base  $q^1$  thereof adjustably limits the turning movement of the lever P, and also the finger itself limits the rearward movement of the lever and the outward movement of the die O; so as, while permitting a limited longitudinal movement of the die and thus enabling different portions of the elliptical cross-section  $o'$  to come into action and thereby distribute the wear of the swaging operation, it prevents this longitudinal movement being sufficient to allow the edge of the circular cross-section to come against the edge of the die E and thereby upset or crack off the same. This is a further improvement which forms an important element of my invention.

As a further means of adjustment, I provide means for shifting laterally the swaging-die O, and along with it the block C in which it is journaled and the block B carrying the clamping-dies. It will be seen from Figs. 1, 2 and 3 that the recess  $a^3$  is of greater width than the combined width of the blocks B and C; and the latter are held adjustably in position therein by means of four adjusting screws  $a^{14}$ , by setting which said blocks may be shifted in said slot with respect to the die E, thereby adapting them to the particular shape of the teeth of any particular saw which it is desired to swage.

While I have hereinabove shown the most improved form of my invention, I wish it understood that not all of the features are essential thereto or necessarily made in the exact form shown, but various changes and modifications in the constructions as herein shown may be made without departing from the spirit of my invention, and I wish it understood that the latter is not otherwise limited than by the scope of my claims.

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

1. In a saw-swage, the combination with the swaging-block of the fixed die, a movable die journaled to rotate in bearings and having a flattened portion and an endwise play, of a manipulating handle mounted on said swaging-die and a guard-finger extending outside of said handle and adapted to limit the amount of endwise play of said die.

2. In a saw-swage, a clamp adapted to secure it to a saw-tooth comprising a fixed die adapted to abut on one face of the tooth, an

endwise movable die adapted to abut against the other face thereof and a clamping-lever having a cam-surface abutting against the outer end of said movable die and adapted to force it inward when said lever is turned on its pivot.

3. In a saw-swage, a clamp adapted to secure it to a saw-tooth comprising a fixed die adapted to abut on one face of the tooth, an endwise movable die adapted to abut against the other face thereof, a clamping-lever having a cam-surface abutting against the outer end of said movable die and adapted to force it inward when said lever is turned on its pivot, and a retracting spring engaging the outer end of said movable die and adapted to retract the same in the nonclamping position of said lever.

4. In a saw-swage, a swaging-block having a transverse horizontal slot, supporting-blocks for dies fitting in said slot and laterally shiftable therein, said slot having a width greater than the combined width of said blocks, and adjustment means for shifting said blocks laterally in said slot and securing them in the adjusted position therein.

5. In a saw-swage, a swaging-block having a transverse horizontal slot, supporting-blocks for dies fitting in said slot and laterally shiftable therein, said slot having a width greater than the combined width of said blocks, one or more adjusting screws turning in threaded holes on one side of said swaging-block and abutting against one side of one of said supporting blocks, and one or more adjusting screws turning in threaded holes in the opposite side of said swaging-block and abutting against the other supporting-block in opposition to the first adjusting screws.

6. In a saw-swage, a swaging-block in two pieces, one of which has a horizontal rectangular slot extending from front to back and open at one side, and a longitudinal slot extending from the bottom to the middle thereof to admit the saw, and a second piece secured to the side of the first so as to close the open side of said horizontal slot and having a slot therein continuous with the second slot in the first-named piece.

7. In a saw-swage, a swaging-block in two pieces, one of which has a horizontal rectangular slot extending from front to back and open at one side and a longitudinal slot extending from the bottom to the middle thereof to admit the saw, and a second piece secured to the side of the first so as to close the open side of said horizontal slot and having a slot therein continuous with the second slot in the first-named piece; said first piece having further a recess or slot in the top thereof extending from the top down to said first-named slot and open at the same side, and said second piece being interlocked with the first piece by a pair of

vertical tenons in one engaging in mortises of the other.

8. In a saw-swage, the combination with the swaging-block having a horizontal slot extending from front to back, a die-supporting-block in said slot, said block having a longitudinal bore and being cut away at the middle on its lower side, a pair of dies fitting in the bore at opposite ends of said supporting-block and coming together in said cut-away portion at the middle, and means for advancing and retracting one of said dies.

9. In a saw-swage, the combination with the swaging-block having a horizontal slot extending from front to back, a die-supporting block in said slot, said block having a longitudinal bore and being cut away at the middle on its lower side, a pair of dies fitting in the bore at opposite ends of said supporting-block and coming together in said cut-away portion at the middle, one of said dies being longitudinally movable, and a clamping-lever turnable about an axis at right angles to the movement of said die and having an engagement with said die whereby the turning movement of said lever forces said die inward or allows it to come out.

10. In a saw-swage, the combination with the swaging block having a horizontal slot extending from front to back, a die-supporting-block in said slot, said block having a longitudinal bore and being cut away at the middle on its lower side, a pair of dies fitting in the bore at opposite ends of said supporting-block and coming together in said cut-away portion at the middle, one of said dies being longitudinally movable, a clamping-lever turnable about an axis at right angles to the movement of said die and having an engagement with said die whereby the turning movement of said lever forces said die inward or allows it to come out; and a plate-spring engaging the headed end of said die and adapted to retract the same.

11. In a saw-swage, in combination with a longitudinally movable die, a clamping-lever having a transverse pivot opposite the head of said die, symmetrical cam-surfaces eccentric with said pivot on opposite sides thereof and having a handle-arm midway between said cam-surfaces; whereby said clamping-lever may be turned in either direction to act upon said die and may be reversed to wear the opposite cam-surface when one cam-surface is worn down by use.

12. In a saw-swage, the combination of a swaging-block, a clamping-die having an axial movement therein, a clamping-lever having a cam-surface adapted to act upon the head of said clamping-die, a pivot-pin for said clamping-lever extending transversely of said die, and a pair of capstan-

headed screws engaging in threaded holes in said swaging block and having transverse holes in the heads thereof forming bearings for the ends of said pivot-pin whereby the distance of said pivot-pin from said die may be adjustably regulated.

13. In a saw-swage, the combination of a fixed swaging die consisting of a rectangular prism, an adjustable die-block or holder having a longitudinal recess therein of rectangular prismatic form adapted to receive and fit said die, and a body-block adapted to receive said die-block or holder.

14. In a saw-swage, the combination of a swaging-block having a horizontal slot extending from front to back, a die-supporting-block fitting in said slot and having a longitudinal cylindrical bore, adjusting screws mounted in threaded sockets in said swaging-block on opposite sides of said die-supporting-block and adapted to shift the position of the same laterally, a movable swaging-die turnably mounted in said die-supporting-block, said swaging-block having a curved upper surface approximately coaxial with said swaging-die or an element thereof, and said swaging-block having further a recess extending from the top down into said first-named slot and a longitudinal slot extending from the bottom up to said first-named slot and transverse thereto, a fixed die-supporting-block having a curved flange resting on the curved upper surface of said swaging-block and having slots therein and a projecting socket-portion extending downwardly through the slot in said swaging-block, screws extending through the slots in said flange and adapted to clamp said fixed die-block in adjusted

angular position, and a fixed die adjustably mounted in the socket of said first die-block.

15. In a saw-swage, the combination of a swaging-block, a cylindrical swaging-die having a flattened middle portion rotatably mounted in said swaging-block and having one end projecting therefrom, a lever-arm mounted on the projecting end thereof and adapted to operate said die in its socket, a manipulating handle on said lever-arm, and a guard-finger mounted on said swaging-block and extending parallel thereto outside of said lever thereby limiting the endwise movement of said swaging-die.

16. In a saw-swage, the combination of a swaging-block, a cylindrical swaging-die having a flattened middle portion rotatably mounted in said swaging-block and having one end projecting therefrom, a lever-arm mounted on the projecting end thereof and adapted to operate said die in its socket, said swaging-block carrying thereon adjacent to said lever an upstanding flange having a curved slot substantially concentric with said swaging-die, a curved finger having a perforated base at right angles to it, and a bolt passing through said perforated base and said curved slot and adjustable in the slot, said curved finger extending outside said lever; whereby the endwise play of said swaging-die and also its rotative movement are limited.

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

JOSEPH ARENZ.

Witnesses:

P. J. HERBOLD,

OTTO PFEFFERKORN.