No. 653,824. Patented July 17, 1900.

E. G. SHORTRIDGE, S. J. MYERS & W. D. IRVIN.

SAW SWAGE.

(Application filed Jan. 20, 1900.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.

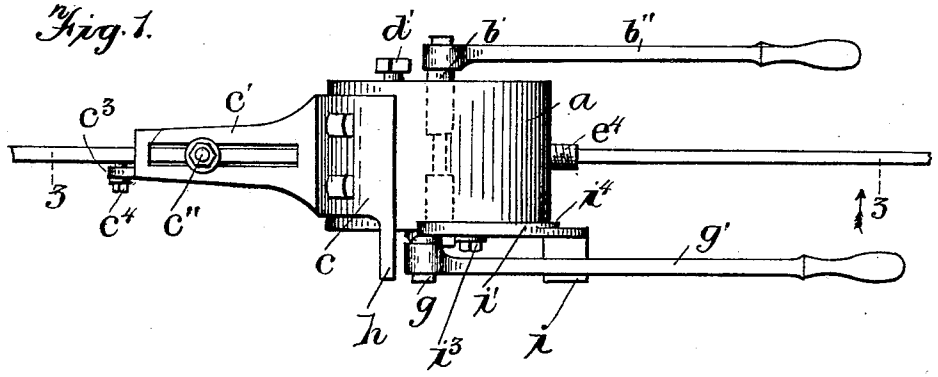


Fig. 2.

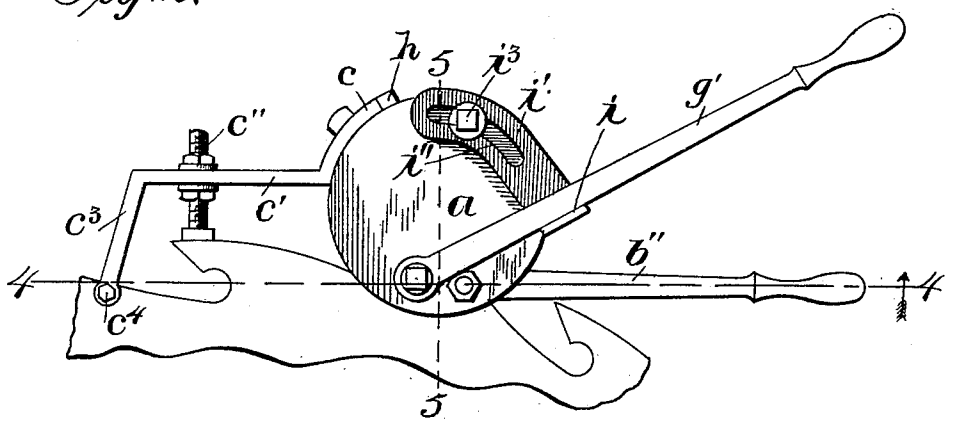


Fig. 3.

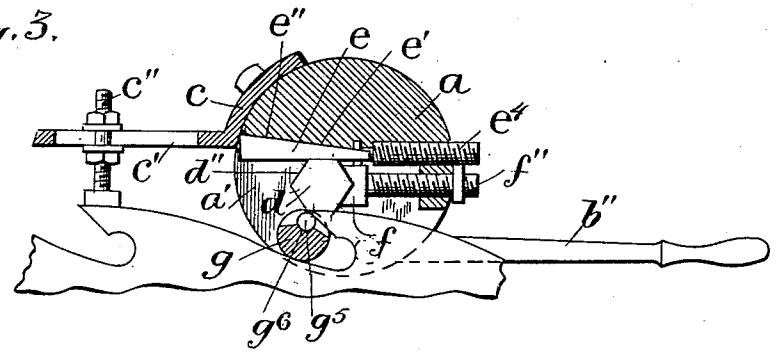
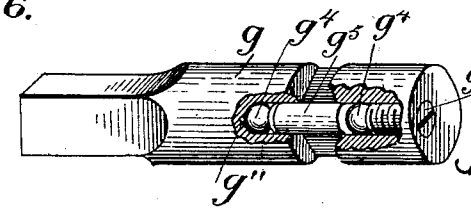


Fig. 6.



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(No Model.) 2 Sheets—Sheet 2.

Fig. 4.

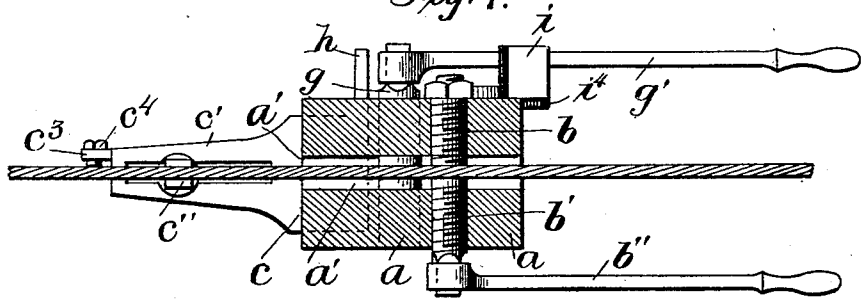


Fig. 5.

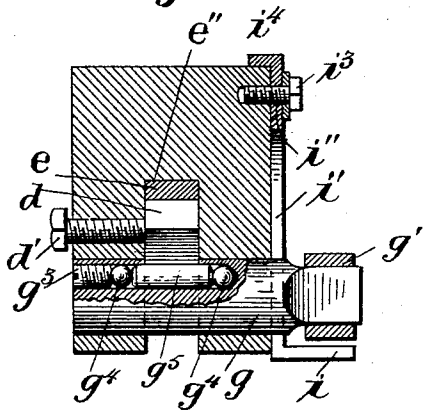


Fig. 8.

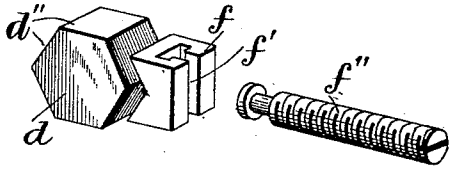
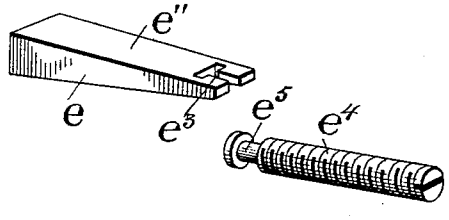


Fig. 7.



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UNITED STATES PATENT OFFICE.

EDWIN G. SHORTRIDGE, SAMUEL J. MYERS, AND WATSON D. IRVIN, OF KOKOMO, INDIANA.

SAW-SWAGE.

SPECIFICATION forming part of Letters Patent No. 653,824, dated July 17, 1900.

Application filed January 20, 1900. Serial No. 2,182. (No model.)

To all whom it may concern:

Be it known that we, EDWIN G. SHORTRIDGE, SAMUEL J. MYERS, and WATSON D. IRVIN, citizens of the United States, residing at Kokomo, in the county of Howard and State of Indiana, have invented certain new and useful Improvements in Saw-Swages; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to certain improvements in saw-swages; and the objects and nature of the invention will be obvious to those skilled in the art in the light of the following explanation, taken in connection with the accompanying drawings, illustrating an example for the purposes of explanation within the spirit and scope of our invention.

The invention consists in certain novel features in construction and in combinations and in arrangements of parts, as more fully and particularly pointed out and specified hereinafter.

Referring to the accompanying drawings, Figure 1 is a top plan view of the improved swage applied to a saw. Fig. 2 is a side elevation of the swage applied to a saw. Fig. 3 is a sectional view on the line 3 3, Fig. 1. Fig. 4 is a sectional view on the line 4 4, Fig. 2, looking up. Fig. 5 is a cross-sectional view on the line 5 5, Fig. 2. Fig. 6 is a detail perspective view of the rotary shaft carrying the freely-rotatable swaging-die, said shaft being partially broken away. Fig. 7 is a detail perspective view of the sliding wedge and its adjusting-screw. Fig. 8 is a detail view of the sliding anvil-block and its adjusting-screw.

In the drawings, *a* is the body of the swage, preferably, although not necessarily, composed of an integral metal block circular in form, with a slot *a'* formed therethrough from the lower portion of the circumference thereof to receive the saw-teeth, or, in other words, to permit the said block or body to straddle the saw-teeth and be clamped or locked thereto, as hereinafter specified. Said body is provided with suitable means whereby the implement is clamped to the saw-teeth in succession as the same are operated on. In the present instance we show such clamping means consisting of two clamping or locking screws *b b'*, arranged in opposition and adjustable transversely through the block and projected into the lower portion of said saw-receiving slot or opening. The screws are adjustable through suitable holes tapped in the said body. The screw *b* constitutes the gage-screw, whereby various saws of different gages can be held at the center of the saw-receiving slot of the body. Said screw is adjusted from the end of the block by a suitable implement and can be provided with locking means, such as a lock-nut, to hold the same at the desired adjustment. The screw *b'* extends into the saw-receiving slot from the opposite end of the body and is provided with a laterally-extending handle or lever *b''*, movable vertically, whereby the said screw can be rocked to clamp or release the tooth. These two clamping-screws are arranged to engage opposite sides of the tooth being or about to be operated on by the swaging elements and to clamp the implement thereto and release the same therefrom by vertical movement of said hand-lever *b''*.

The implement is provided with suitable means projecting forwardly from the body thereof and provided with adjusting devices for engagement with teeth in advance of the said body and determining the pitch of the swage. Said means is also provided with mechanism for holding said block in parallelism with the saw and also for straightening teeth which may be bent. For instance, we show a rigid plate *c* secured firmly to the upper portion of the block in any suitable manner and formed with the straight longitudinally-slotted portion *c'*, projecting forwardly from the body or block *a* in the plane of the saw and a distance above the same. *c''* is a vertically-adjustable stop or gage carried by and adjustable longitudinally of said portion *c'* of said plate and arranged, preferably, to rest on the back of the tooth immediately in advance of the tooth on which the implement is locked for swaging. The implement can be tilted by adjusting said stop or gage to determine the pitch of the swage to suit different kinds or sizes of teeth. Said stop or gage *c''* can consist of a screw passing vertically through the longitudinal slot of said

portion c' and locked thereto at the desired point and in the desired vertical position by suitable means, such as several nuts thereon, and clamping against said plate about as shown. The front end of said portion c' is formed with a rigid arm c^3, depending to one side of the vertical plane of the saw, with its lower end beside a portion of the saw in advance of the tooth or portion engaged by screw-gage c''. The lower end of said arm has a screw-threaded hole tapped transversely therethrough receiving the screw c^4, adjustable transversely therethrough into engagement with the side face of the saw. This screw is adjustable to bear against saws of various thicknesses and a lock-nut can be provided to hold said screw against loosening. Said rigid depending arm and its bottom adjustable stop or gage c^4, arranged transversely thereof, hold said block or body a parallel with the saw and prevent twisting of the block on the saw and danger of bending the tooth being swaged. Material advantages are attained by providing means whereby the forwardly-extending plate or arm from the body is always held firmly against the side face of the saw, as thereby the implement is held true during its swaging operation and also teeth bent out of line will be forced into line and straightened by the swaging operation thereon.

d is the anvil, located at the top of the slot of the body a and intermediate of the ends of said saw-receiving slot. The implement is placed on a saw so that the back of a tooth-point rests against the under face of said anvil. The anvil is of such thickness as to fit snugly in the saw-receiving slot, as shown clearly in Fig. 5, and the anvil is clamped or locked firmly in position by a clamp-screw d', adjustable in a threaded hole tapped in the body from one end thereof and opening into the said saw-receiving slot. The screw d' abuts against a side face of the anvil and has a head or other means at the exterior of said end of the body, so that the screw can be tightened or loosened. The screw forces the anvil against the opposite side wall of the saw-receiving slot, and thus rigidly holds the anvil in position by friction. When the screw is loosened, the anvil can be removed or moved or otherwise adjusted, as the anvil is merely held in the block by friction and is removable therefrom and adjustable therein. The anvil is provided with any suitable number of working faces d'', preferably so arranged as to present angles greater than right angles. In other words, the faces d'' form obtuse angles with each other and all of the angles are equal, for the reasons hereinafter set forth. We have found it advantageous to form the anvil hexagonal in shape as falling within the above-mentioned requirements. Suitable means are provided to adjust the anvil vertically—that is, toward and from the saw-tooth—and it has also been found advantageous to provide suitable means for adjusting the anvil horizontally—that is, longitudinally of the length of the saw-tooth. For instance, we show a sliding wedge e above the anvil and interposed between the same and the top wall of the saw-receiving slot, so that the anvil abuts against the flat level or horizontal under surface of said wedge. The wedge occupies the full width of the slot and is arranged and movable longitudinally along said top wall, which is inclined, as shown at e', against which incline e' the wedge-shaped or oppositely-inclined top face e'' lies and abuts. It is obvious that when said wedge is moved longitudinally its lower face will move vertically, and thereby move the anvil vertically when the anvil-clamping screw hereinbefore mentioned is loosened to permit such adjustment. The said inclined faces of the wedge and body a are in the example shown in the drawings so arranged that when the wedge is moved rearwardly it will be correspondingly moved downwardly without throwing its lower face from the horizontal or its level position, and when the wedge is moved in the opposite direction its lower horizontal face will be raised, and thereby permit elevation of the anvil. Suitable means are provided to thus adjust the wedge and to lock the same in the desired position with respect to the anvil. For instance, we show the small rear end of the wedge formed with a T-shaped slot e^3, opening through the rear end thereof and through the upper and lower faces thereof. A screw e^4 passes through a portion of the body a, depending at the rear end of the saw-receiving slot, a screw-threaded hole being tapped in said portion through which said screw is adjustable to move the wedge longitudinally by means of a head e^5 on the end of the screw loosely confined in the transverse portion of said T-slot of the wedge and a neck in the longitudinal portion of said slot and connecting the head to the body of the screw. It will thus be observed that the wedge can move vertically independently of the screw and yet the wedge is moved longitudinally by the screw and held in the desired position. The wedge is held in its proper position and against dropping down by the anvil.

As a means for moving the anvil longitudinally of the wedge and the tooth and independently of both we show an anvil socket or block f arranged at the rear of and fitting the anvil and located immediately below the wedge aforesaid. This block is fitted snugly in the saw-receiving slot of the body and is preferably the same width as the anvil and is provided with the front concave face, formed as an obtuse angle, the same as the angle formed by two working faces of the anvil. The said two rear angular faces of the anvil fit in said concaved face of the block, so that the lower working face of the anvil will be properly presented to the back of the saw-tooth on which the implement is located and so that the said block will be held against dropping down. Suitable means are provided

for adjusting said block f longitudinally of the saw-receiving slot of the body a to adjust the horizontal or longitudinal position of the anvil. For this purpose we can employ a T-slot f' at the rear of the block f and opening through the upper and lower ends and rear face of the block f and receiving loosely the head of a screw f'', adjustable through a tapped hole in the portion of the body a in rear of the saw-receiving slot and parallel with screw e^4 and operative in the same way for moving said block f longitudinally and holding the same in the desired position and yet permitting vertical movement thereof with the anvil and independently of said two screws.

Usually, although not necessarily, the inclined upper face of the wedge is arranged at an angle of about fifteen degrees with the lower or flat face against which the flat top face of the anvil rests flatly and in parallelism, whereby the wedge forms a solid base or backing for the anvil and prevents rocking thereof, and thereby prevents the tooth being swaged with a ragged irregular point or edge. The wedge affords means for a sensitive, quick, and accurate adjustment of the anvil and no opportunity is afforded for the wedge becoming loose or yielding, as is the case where a screw bearing against an anvil is depended on for adjustment. This adjustment for the anvil also serves to preserve the anvil against undue wear and injury, as notching or chipping of the anvil and the breaking of points of set-screws are avoided by thus holding the anvil and affording a solid flat bearing surface or backing therefor.

The block fitted to the rear side or face of the anvil and interposed between the same and the adjusting-screw is designed to hold the anvil firmly and prevent it from moving back under the pressure of the swaging-roller hereinafter described, and thereby prevent the adjusting-screw from being broken and defacing of the anvil, as is often the result when the adjusting-screw comes in direct contact with the rear of the anvil.

g is the shaft or mandrel, mounted to turn in the block a and passing through the same and transversely across the saw-receiving slot thereof. The said swaging-mandrel is arranged below the plane of the anvil and in advance of the screws hereinbefore described, which clamp the implement to the tooth being operated upon. An operating-lever or handle g' is rigidly secured in any suitable manner to a projecting end of this mandrel and extends rearwardly therefrom and is usually arranged at the opposite end of the body or block a from the handle b'', controlling the clamping-screw. The swaging-mandrel is thus rocked by swinging said lever g' vertically, and the parts are so arranged, as hereinafter set forth, that the swaging operation is performed by swinging or forcing said lever upwardly to the stop h, which can be formed by a rigid arm projecting laterally from the top of the body a into the path of said lever. We prefer to form said stop h integral with the gage-plate c, hereinbefore described. The normal position of said lever is shown in Fig. 2, wherein the lever is shown upheld by and resting on the rest or stop i, formed by a lateral lug or projection from the lower end of the sliding adjustable quadrant or plate i', fitting the end of the body a and formed with a segmental slot i'', through which a clamping-screw i^3 passes into the end of the body a to lock the said adjustable quadrant, with its said rest, in the desired vertical position to afford the desired range of movement to the swaging-lever before described. The outer edge of this quadrant or plate is formed with a lateral flange i^4, projecting over and fitting the circumferential face of the body a and conforming thereto in curvature. This flange constitutes a guide and prevents any movement of the quadrant other than in the arc of a circle conforming to the circumference of the body a. This guiding-flange also assists the single clamping-screw in holding the quadrant clamped and secured in the desired position when the stop or rest thereof has been located at the proper point. This adjustable side gage or quadrant provided with a lever stop or rest determines the throw of the lever, and thereby regulates the bite of the swaging-roller on the tooth and the length or portion of the tooth operated on. By thus forming the stop or rest rigid with or as an integral part of the sliding plate or quadrant and forming the plate or quadrant substantially as hereinbefore set up the operator can, by releasing or loosening a single screw or clamp, quickly adjust the stop to the point desired and as quickly lock the same by tightening the screw, and hence easily control the distance the swaging-roller operates on each tooth.

A hole is bored longitudinally of the mandrel g to one side of and parallel with the axis of said mandrel and entering the opposite end of the mandrel from the handle or lever thereof. The inner end g'' of this hole tapers to a point to form a cone-bearing, approximately as shown. The outer portion of this hole is tapped or screw-threaded to receive the adjusting or bearing screw g^3, with its head arranged at the end of the mandrel, so that said head is accessible for the purpose of turning the screw, and hence adjusting the same longitudinally. A ball g^4 is located at said conical inner end of said hole, and another ball g^4 is located against the inner end of said screw g^3, and the swaging-roller g^5 is interposed between said balls and abuts against and turns on the same. This swaging-roller crosses the saw-receiving slot of the body, and the mandrel is partially cut away to expose the swaging-roller and permit entrance of the tooth into the opening or recess thus formed in said mandrel. The ends of the swaging-roller project into the said hole at the sides of said recess, while the inner

portion of the said roller rests longitudinally in a concave seat g^6 in the line of said hole formed longitudinally in the mandrel and across said recess of the mandrel. The said balls and roller are held in place by the screw g^3, by means of which wear can be taken up to prevent endwise play or movement of said roller, while the roller is rendered freely rotatable when subjected to the great lateral pressure and strain incident to the swaging operation. We attain material advantages and new and improved results by so mounting our swaging-roller as to hold the same against longitudinal or endwise play, and yet provide a freely and easily rotatable roller, whereby the tooth is rolled out by the swaging operation. In the swaging-tools now in general use the swaging-rollers when directly engaged by the adjusting-screw, so as to prevent endwise movement, will not rotate during the swaging operation, and hence the tooth operated on is not properly shaped, is split, has a corner broken off, or is not evenly spread. In fact, the metal of the tooth is not rolled out in such old tools. If such old tools have their rollers so loose as to permit end play, the resulting swaging operation spreads the teeth unevenly—that is, more in one direction than in another. By providing a freely-rotatable roller our tool operates on the saw-teeth in a different manner from said old implements and evenly rolls out and spreads the metal of the teeth without splitting or breaking the same.

In swaging implements of this character now in general use the non-freely-rotatable swaging-rollers have acted in conjunction with anvils formed with four faces arranged at right angles to each other. The anvil is thus formed with sharp corners, which are easily notched, chipped, or dented by the action of the non-rotary roller in swaging the teeth. When an edge of the anvil is thus damaged, it becomes useless, as it will cause the saw-teeth to be swaged with ragged uneven edges. We avoid these disadvantages by employing an anvil having its working faces forming obtuse angles, so that the edges or corners between the said faces are sufficiently sharp or abrupt to accomplish the purposes desired in a superior manner and yet are not easily notched or dented, and we also attain peculiar advantages by employing such an anvil in connection or in combination with a freely-rotatable swaging-roller held against endwise movement. Also by employing an anvil having its working faces forming obtuse angles to each other we obtain an anvil capable of long use by reason of its multiplicity of working faces, and the durability of the anvil is not only enhanced, but its working life is greatly increased by reason of the number of faces which can be presented as other faces wear. For instance, the anvil is removable and adjustable and in the specific form shown is provided with six working faces, so that the anvil can be turned over and will present six corners in succession, and the anvil can then be reversed (turned end for end) and used as before, giving six additional or unworn corners, making twelve corners in all adapted for coöperation with the roller in performing the swaging operation.

Various features of our invention are not limited to employment with certain other features, and it is evident that various changes might be made and modifications resorted to without departing from the spirit and scope of our invention, and hence we do not wish to limit ourselves to the specific constructions and arrangements set up, but consider ourselves entitled to all such changes and modifications as fall within the spirit and scope of our invention.

Having thus fully described our invention, what we claim as new, and desire to secure by Letters Patent of the United States, is—

1. In a saw-swage, the combination of a body slotted to receive the saw-tooth operated on, an anvil, and swaging-die within the body, the bracket rigid with the body and extending laterally therefrom, an adjustable vertical gage, carried by said bracket to rest on a saw-tooth adjacent to the tooth being operated on, said bracket having the arm extending downwardly from its outer end and the horizontal adjustable stop arranged transversely of the arm to bear against the side of the saw, substantially as and for the purpose described.

2. In a saw-swage, the combination of the body slotted to receive the saw, an anvil and a rotary swaging-die carried by the body, a horizontal bracket rigid with the body and extending laterally therefrom and provided with the rigid arm depending beside the saw, a set-screw adjustable horizontally through said arm to bear against the side face of the saw at a distance from said body, for the purpose substantially as described.

3. In a saw-swage, the combination of a body formed to receive the saw-tooth, an anvil therein, a rotary die provided with the swinging lever arranged at one end of said body, the bracket secured to the body and extending horizontally therefrom and provided with a projection h, extending beyond the end of the body and forming a stop for said lever, the outer end of said bracket provided with a depending arm arranged to extend down beside the saw, a set-screw adjustable through said arm to engage the side face of the saw, and a gage carried by the bracket and arranged to rest on a tooth adjacent to the body, substantially as described.

4. In a saw-swage, the combination of a block or body having a rounded top face and a slot to receive the saw, an anvil in the body, a rotary die therein provided with an operating-lever arranged at one end of the body, a stop limiting the upward swing of said lever, an adjustable plate arranged flat against said end of the body and having a projection at its lower end limiting the downward swing of

the lever, said plate having the segmental slot therethrough and the lateral top flange fitting over the top face of the body and conforming thereto in curvature, and the clamping-bolt passing through said slot into the end of the body, substantially as described.

5. In a saw-swage, the combination of a block having a slot to receive the saw, said block formed with an inclined face at the top wall of the slot and a depending rigid portion at one end of the slot, the elongated wedge longitudinally movable in said slot having the inclined top side resting against said inclined face of the block, and the approximately-horizontal flat under face, an adjusting-screw passing through said depending portion of the block for moving said wedge to move the same longitudinally in either direction, the reversible anvil having the plurality of flat working faces arranged with a flat upper face bearing against and longitudinally movable along said under face of the wedge, means to adjust said anvil longitudinally of said wedge, a clamping-screw passing through the end of the block into engagement with a side face of the anvil to hold the same in the slot, and a swaging-die coöperating with the bottom face of said anvil, substantially as described.

6. In a saw-swage, the combination of a body-block having a slot to receive the saw, the body at the top of the slot, formed with an incline longitudinal of the slot, the longitudinally-movable wedge seated against said incline and having the flat under face parallel with the line of longitudinal movement of the wedge, an adjusting-screw for adjusting the wedge, a reversible anvil seated against said flat under face of the wedge and provided with means for moving the same longitudinally of said under face of the wedge, and a coöperating die, substantially as described.

7. In a saw-swage, the combination of a body-block having a saw-receiving slot, a longitudinally-movable wedge seated against the block at the top of the slot, an adjusting-screw for moving said wedge longitudinally, a reversible anvil having the plurality of flat working faces, said anvil seated against and adjustable longitudinally along said wedge, a longitudinally and vertically movable holding-block fitting the rear portion of the edge of the anvil, a screw for moving said block and the anvil longitudinally of said wedge, and a screw for clamping the anvil in the body-block, substantially as described.

8. In a saw-swage, the combination of a body having a saw-receiving slot, an adjustable removable anvil seated in said slot and provided with clamping means, a longitudinally-adjustable screw passing through said body from the rear into said slot, a backing for said anvil loosely confined to said screw and moved longitudinally by the same and provided with an incline, whereby longitudinal movement of said backing determines the vertical position of said anvil, a block fitting and vertically and longitudinally movable with the anvil, and an adjusting-screw for moving said block and anvil longitudinally, substantially as described.

9. In a saw-swage, the combination of the body having a saw-receiving slot and saw-tooth-swaging means comprising an adjustable anvil, a block behind and removably fitting said anvil, and movable vertically and longitudinally therewith, an adjustable screw in the body for moving said block to adjust the anvil longitudinally of the saw-tooth, and means to adjust the anvil and block vertically, substantially as described.

10. In a saw-swage, the combination of a body formed to straddle a saw and provided with clamping means and saw-tooth-swaging devices comprising a reversible adjustable anvil, a movable block abutting against the same, said anvil having angularly-arranged working faces and said block having an angular depression to receive the anvil, and formed with a rear T-shaped slot, and the adjusting-screw having a head working loosely in said slot, substantially as described.

11. In a saw-swage, the combination of the body-block having the slot to receive the saw, the adjustable reversible flat anvil therein having the plurality of similar flat edge working faces forming obtuse angles with each other, as described, a clamping-screw passing through an end of the body-block into engagement with a side face of said anvil, a wedge and screw for adjusting the anvil vertically, a holding-block fitting an angle of the anvil, a screw for adjusting said block and anvil longitudinally in the slot, and a rotary die coöperating with the anvil, substantially as described.

12. In a saw-swage of the character described, the combination of an anvil, a rotary mandrel having a longitudinal hole and a slot opening into said hole, the freely-rotating swaging-roller in said hole and spanning said slot to coöperate with the anvil, the balls g^4, g^4, located at the ends of the roller and holding the same against endwise play and receiving the end thrust, and permitting free rotation thereof, adjusting-screw g^3, and the mandrel-operating lever, substantially as described.

In testimony whereof we affix our signatures in presence of witnesses.

EDWIN G. SHORTRIDGE.
SAMUEL J. MYERS.
WATSON D. IRVIN.

Witnesses to signature of Edwin G. Shortridge:

PERKINS G. MCCORD,
STEVE DARK.

Witnesses to signatures of Samuel J. Myers and Watson D. Irvin:

WM. IRVIN,
FRANK SIMMON.