

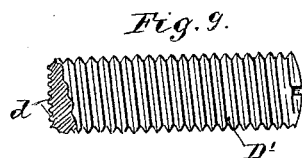
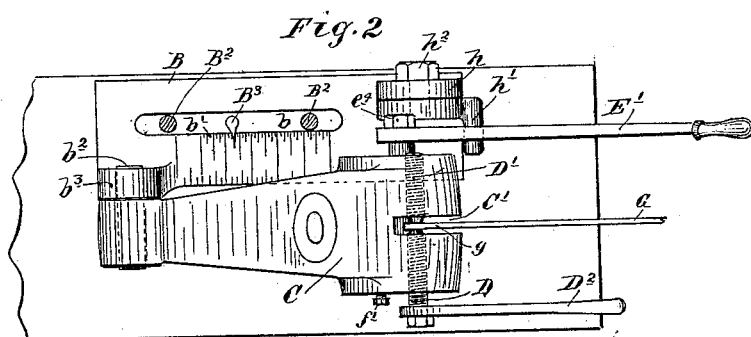
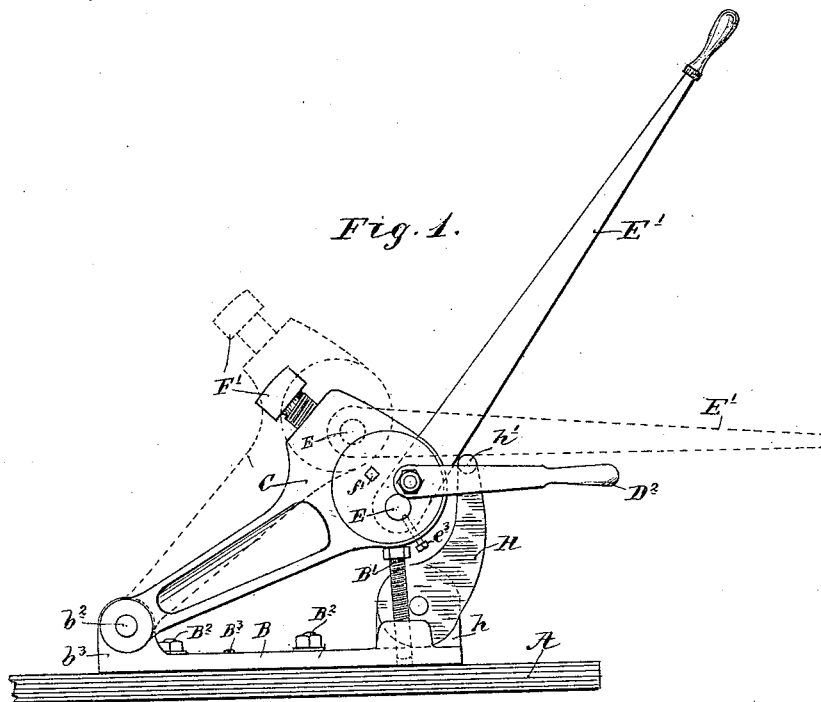
(No Model.)

2 Sheets—Sheet 1.

S. U. LOCKWOOD.  
SAW SWAGE.

No. 493,435

Patented Mar. 14, 1893.



Witnesses.  
Emma F. Elmore,  
A. R. Opsahl.

Inventor.  
Samuel H. Lockwood  
By his Attorney.  
Jas. F. Williamson

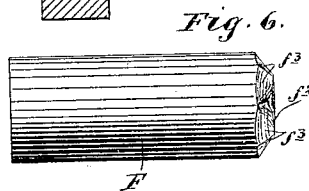
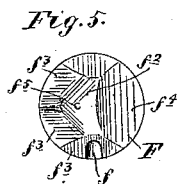
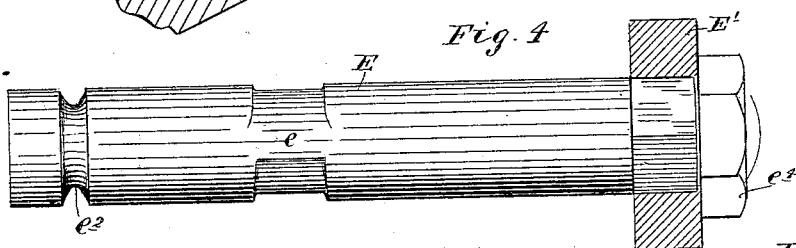
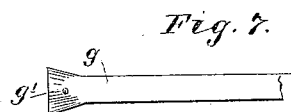
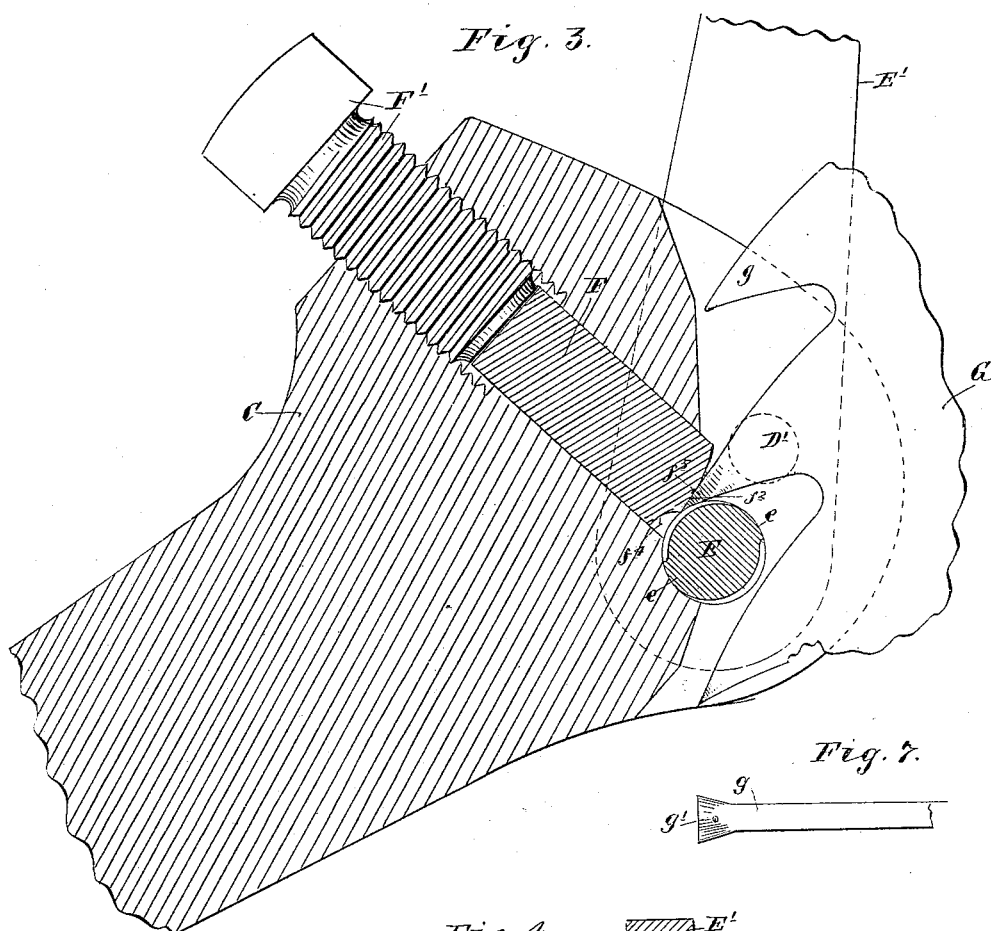
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A. H. Opsahl.

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Jas. F. Williamson

# UNITED STATES PATENT OFFICE.

SAMUEL U. LOCKWOOD, OF MINNEAPOLIS, MINNESOTA.

## SAW-SWAGE.

SPECIFICATION forming part of Letters Patent No. 493,435, dated March 14, 1893.

Application filed July 22, 1892. Serial No. 440,962. (No model.)

*To all whom it may concern:*

Be it known that I, SAMUEL U. LOCKWOOD, a citizen of the United States, residing at Minneapolis, in the county of Hennepin and State of Minnesota, have invented certain new and useful Improvements in Saw-Swages; and I 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.

My invention relates to saw-swages and has for its object to provide an improved construction for the purpose.

To this end, the invention consists in certain novel features and arrangement of the parts which will be hereinafter fully described and be particularly defined in the claims.

A saw-swage constructed in accordance with my invention is illustrated in the accompanying drawings, therein like letters referring to like parts throughout,—Figure 1 is a right side elevation and Fig. 2 a plan view of the machine, positions being taken from an observer standing in front of the machine and facing the edge of the saw. Fig. 3 is a vertical longitudinal section through the head-block or vise, some parts being broken away, showing the dies in working position. Fig. 4 is a plan view of the rotary die detached. Fig. 5 is an end view of the resistance die; and Fig. 6 a plan view of the same. Fig. 7 is a plan view of one of the saw-teeth after it has been swaged by this machine. Fig. 8 is an inner end view of the inner member of the clamping screw, and Fig. 9 is a sectional elevation of the same.

A represents the bench, table, or other support, on which the machine is mounted.

B is the bed-plate provided with a longitudinal slot, as shown at *b*, a graduated scale as shown at *b'*, and a pivot-stud *b<sup>2</sup>*, fixed to a raised lug *b<sup>3</sup>*, at the outer corner of the bed-plate.

C is the head-block or vise pivoted at its outer and lower end on the stud *b<sup>2</sup>*, slotted at its inner end, as shown at *C'*, and provided with seats for the dies and the clamping-screws. The slot *C'* forms the mouth and its opposite wall, forms the jaws of the vise, be-

tween which the saw is held in the swaging action, by the clamping-screws D and D', both of which work in screw-threaded seats, one right and the other left, in the vise-jaws. Of these clamping-screws, D' is the inner member and D the outer member. The inner member is provided on its clamping face or end with a series of concentric ridges *d*, as shown in Figs. 8 and 9, for the purpose of giving such a bite on the saw in the clamping action, as will render the same effective to hold the saw in position. The outer member D is provided with a hand-lever D<sup>2</sup>, for operating the same in the clamping and releasing action. The inner or free end of the head-block or vise rests normally on an adjustable support B', which, as shown, is a screw-threaded bolt working in a corresponding screw-threaded seat in the bed-plate.

E is the rotary member of the swaging dies, working in a horizontal seat, through the jaws of the vise. This rotary die is provided with a pair of eccentric swaging surfaces, *e* at diametrically opposite points, for interchangeable use when necessary. These eccentric drawing surfaces are formed by cutting away the body of the otherwise circular shaft. By this construction, the die is afforded a large bearing surface in its seat and may be inserted and removed like an ordinary bolt. At its outer or face end, the rotary die is provided with an annular groove *e<sup>2</sup>* with which engages, when the die is in position, the end of a set-screw *e<sup>3</sup>* seated in the outer jaw. This construction holds the rotary die from longitudinal displacement. At its inner end, the rotary die is provided with an operating hand-lever E', which is removably secured thereto, as shown, by a nut *e<sup>4</sup>*. The handle end of the rotary die is reduced and made square in cross section, and works through a corresponding square passage in the lever. Hence, by removing the handle and revolving the die, either one of the eccentric drawing surfaces *e* may be brought into position for use in the swaging action, when the hand-lever is operated.

F is the resistance or anvil-die loosely seated in the head-block, at right angles to the rotary die E, and held to its work, by a

screw-threaded jam-bolt  $F'$  engaging with the screw-threaded upper section of the seat for the resistance die. The resistance die has a longitudinal slot  $f$  on its periphery with which engages the inner end of a set-screw  $f'$ , working through the outer jaw of the vise, which construction prevents the die from turning in its seat and guides it into its proper position. The rotary die works on the underside or hook of the tooth of the saw. The resistance die is provided on its lower end with a raised flat surface bearing against the top surface or crown of the tooth, which is of triangular shape with the apex of the triangle at the beginning of the draw, and the base line at the finish of the same. This active surface or triangular face is shown at  $f^2$ . Beyond the triangular raised surface  $f^2$  the end of the die is cut away in every direction, so as to give clearance for the action of the raised surface  $f^2$ , as shown at  $f^3$  and  $f^4$ . The two dies are so seated, with respect to each other, that the center of the rotary die  $E$  is offset outward with respect to the center of the resistance die  $F$ . This relation together with the reduction on the end of the resistance die, at the back of the same, as shown at  $f^4$ , is for the purpose of permitting the eccentric or drawing surface  $e$  on the rotary die to pass the finish line of the raised or active surface  $f^2$  on the resistance die. It has been just stated that the centers of the two dies are seated out of line with each other, in order to permit this result; and they are so shown. But the vital point is that the center of the rotary die should be so located, with reference to the finish line of the raised surface on the resistance die, as to permit this result. At or near the apex of the triangular raised surface  $f^2$  on the resistance die, is located a depression or pit  $f^5$ , for producing a centering mark on the crown of the saw-tooth, by which the eye can readily judge as to the evenness of the spread on the point of the tooth.

$G$  represents the saw-blade and  $g$  one of the saw-teeth.

$g'$  represents the raised projection or centering mark produced on the crown of the tooth, by the pit  $f^5$  on the active surface of the resistance die.

$H$  is an adjustable stop and fulcrum-block, secured to an ear-lug  $h$ , at the inner end of the bed-plate  $B$ . The fulcrum-block  $H$  is provided at its upper end with an inwardly projecting arm  $h'$  underlying the hand-lever  $E'$  of the rotary die, when the said lever is in its idle position, whereby with the said lever, working over the said arm  $h'$  as a fulcrum, the free end of the head-block may be lifted out of engagement with the finished tooth and allowed to drop back into engagement with the next tooth to be swaged. The fulcrum-block  $H$  is held to the lug  $h$  on the bed-plate by a clamping nut and a screw-threaded bolt  $h^2$ ; which permits the block to be adjusted to

any desired angular position, so as to raise or lower the fulcrum as may be desired for the work.

The machine is held in its proper working position, on the bench or support  $A$ , by bolts  $B^2$  working through the slot  $b$  in the bed-plate into screw-threaded seats in the table or support  $A$ . This slot and bolt connection permits the machine to be adjusted at will, in a radial line toward and from the center of the saw and be secured in any desired position.

In order to accurately determine the proper position for the machine, a fixed pointer  $B^3$  projects from the table through the center of the slot and works over the graduated scale  $b$ , marked on the plate.

The different parts of the machine have now been specified.

The operation is as follows: The parts having been adjusted to their proper positions, the saw tooth is clamped between the ends of the clamping-screws  $D D'$ , by operating the handle  $D^2$  carried by the outer clamp-screw. The point of the tooth will then be between the dies  $E$  and  $F$ . The hand-lever  $E'$  is then operated to rotate the die  $E$  outward, bringing the eccentric or drawing surface  $e$  of the die  $E$  into action against the lower surface or hook part of the tooth against the resistance of the raised or active surface  $f^2$ , on the resistance die, bearing against the top or crown of the tooth. In virtue of the shape of this resistance surface  $f^2$  and the true eccentric surface of the rotary die  $E$ , and the relative location of the die centers, the tooth will be spread or swaged with a short and positive draw, bringing the same to a sharp edge, without requiring the tooth to be filed on its crown or upper surface, and leaving the point short and thick at the shank. In other words, the swage is effected and the tooth sharpened, with a minimum waste of the stock, and the swage part of the tooth is left with sufficient body to give it the requisite strength. The centering mark  $g'$  impressed by the pit  $f^5$  on the resistance die, enables the operator to see at a glance whether the spread is alike at both sides of the center. After a given tooth has been swaged, it is released from the vise, by operating the clamp screw handle  $D^2$ . The free end of the vise or head block is then lifted by the hand-lever  $E'$  over the fulcrum-block  $H$ , raising the saw one tooth, and the vise is again dropped into position for action on the new tooth. The operator stands in front of the outer end of the machine; and operates the hand-lever  $E'$  for the swaging action and the engagement of a new tooth by his left hand, leaving his right hand free to operate the clamp-screw lever  $D^2$ . The adjustable rest  $B'$  enables the head of the vise to be set at any desired angle for the proper engagement of the dies with the point of the tooth. The longitudinal adjustment afforded by the slot and bolt connection

with the bench or support and the adjustment of the resistance die F, with reference to the rotary die E, by means of the screw-threaded follower F', enables any desired bite to be obtained on the tooth for the swaging action. The three adjustments combined adapt the machine for action on any kind of a tooth regardless of the shape of the gum, or the size of the jaw. The free end of the vice or head-block is made relatively heavy. The clamping face or inner end of the outer clamp-screw D is smooth, and the clamping face of the inner clamp screw D' is provided with the concentric ridges *d*, as hitherto stated. This detail is important, for rendering the clamping action effective to hold the saw. For swaging the teeth of lumber saws, a large die must be used to avoid cutting deep into the tooth to produce the proper swage, and in order to carry the material from a point farther down or nearer to the base of the tooth. To resist this pull of the swaging die, a powerful clamp is required. Otherwise, the tooth will slip back, away from the die. The concentric ridges on the clamping face of the clamp-screw D', under the clamping action of the outer screw D and hand-lever D<sup>2</sup>, will cut into the face of the tooth and positively hold the same, so that the tooth cannot slip under the swaging action. Square cut projections or spirally arranged projections on the face of the clamp-screw will not effect such a result, as I have demonstrated by actual experience. The great point of this machine, however, is its adaptation to produce a short strong swage on the tooth, without requiring top filing, and without waste of stock.

What I claim, and desire to secure by Letters Patent, is as follows:

1. In a saw-swage, the combination with a pivoted head-block or vise carrying the swaging dies at its free end, of a hand-lever secured to the rotary member of the said dies, and a combined stop and fulcrum-block independent of the said head-block, located in the path of said hand-lever, whereby the lever may be used both to operate the rotary die in the swaging action, and to lift the head-block or vise over the said fulcrum, for engaging with a new tooth of the saw.

2. In a saw-swage, the combination with a pivoted head-block or vise carrying the swaging dies at its free end, of the hand-lever secured to the rotary member of the said dies and an adjustable fulcrum block for said lever supported independent of the vise or head-block over which the said hand-lever may be operated to lift the free end of the vise, substantially as described.

3. In a saw-swage, the combination with the rotary die acting on the undersurface or hook of the saw-tooth, of a resistance or anvil die having a raised flat surface, bearing against the crown of the tooth, of triangular shape with the apex at the beginning and the base

line at the finish of the draw, substantially as and for the purpose set forth.

4. In a saw-swage, the combination with the head-block or vise, of the rotary die seated in said block, having an eccentric drawing surface acting on the under surface or hook of the saw tooth, and a resistance or anvil die seated in said head-block, having a raised flat surface bearing against the crown of the tooth with the apex at the beginning and the base at the finish of the draw, and the said dies being so seated, that the center of the rotary die is offset outward with respect to the finish line of the said raised surface on the resistance die, substantially as and for the purpose set forth.

5. In a saw-swage, the combination with the head-block or vise, of the rotary die seated in said block, having one or more eccentric drawing surfaces acting on the under surface or hook of the saw-tooth, and the resistance die seated in said block, having a raised flat surface bearing against the crown of the tooth, of triangular shape, with the apex at the beginning and the base line at the finish of the draw and reduced or cut away outward from the said finish line of the draw, and the said dies being so seated in the head-block with respect to each other that the center of the rotary die is offset outward, with respect to the finish line of said raised surface, substantially as and for the purposes set forth.

6. In a saw-swage, the combination with the swaging dies of the pivoted head-block or vise carrying the said dies at its free end, a bed-plate to which the said head-block is pivoted, adjustable on its supporting bench or table and provided with a graduated scale and a pointer fixed to said table and overhanging the said scale, for accurately positioning the machine with respect to the saw, substantially as described.

7. In a saw-swage, the combination with the head-block or vise, of the rotary die seated in said block, provided with an eccentric surface for action on the under surface or hook of the saw-tooth, and the resistance or anvil die provided with a raised surface bearing against the crown of the tooth, and provided with a pit or depression, for leaving a centering mark on the crown of the tooth, substantially as and for the purpose set forth.

8. In a saw-swage, the combination with the head-block or vise provided with a seat for the resistance or anvil die, of the anvil or resistance die loosely mounted in said seat and provided with a longitudinal groove on its periphery, and a set-screw seated in the head-block and having its inner end projecting into the said seat and engaging the groove in the said resistance die, for holding the same from turning in its seat.

9. In a saw-swage, the combination with the head-block or vise, of the resistance or anvil die F, having the groove *f*, loosely seated in the said head-block, the set-screw *f'* seated

in said head-block having its inner end engaging the said groove *f* on the die, and the screw-threaded follower or jam-bolt *F'* engaging the screw-threaded outer end of the  
5 seat in which said die is mounted, and bearing against the die, for holding the same in position, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

SAMUEL U. LOCKWOOD.

Witnesses:

JAS. F. WILLIAMSON,  
EMMA F. ELMORE.