

(No Model.)

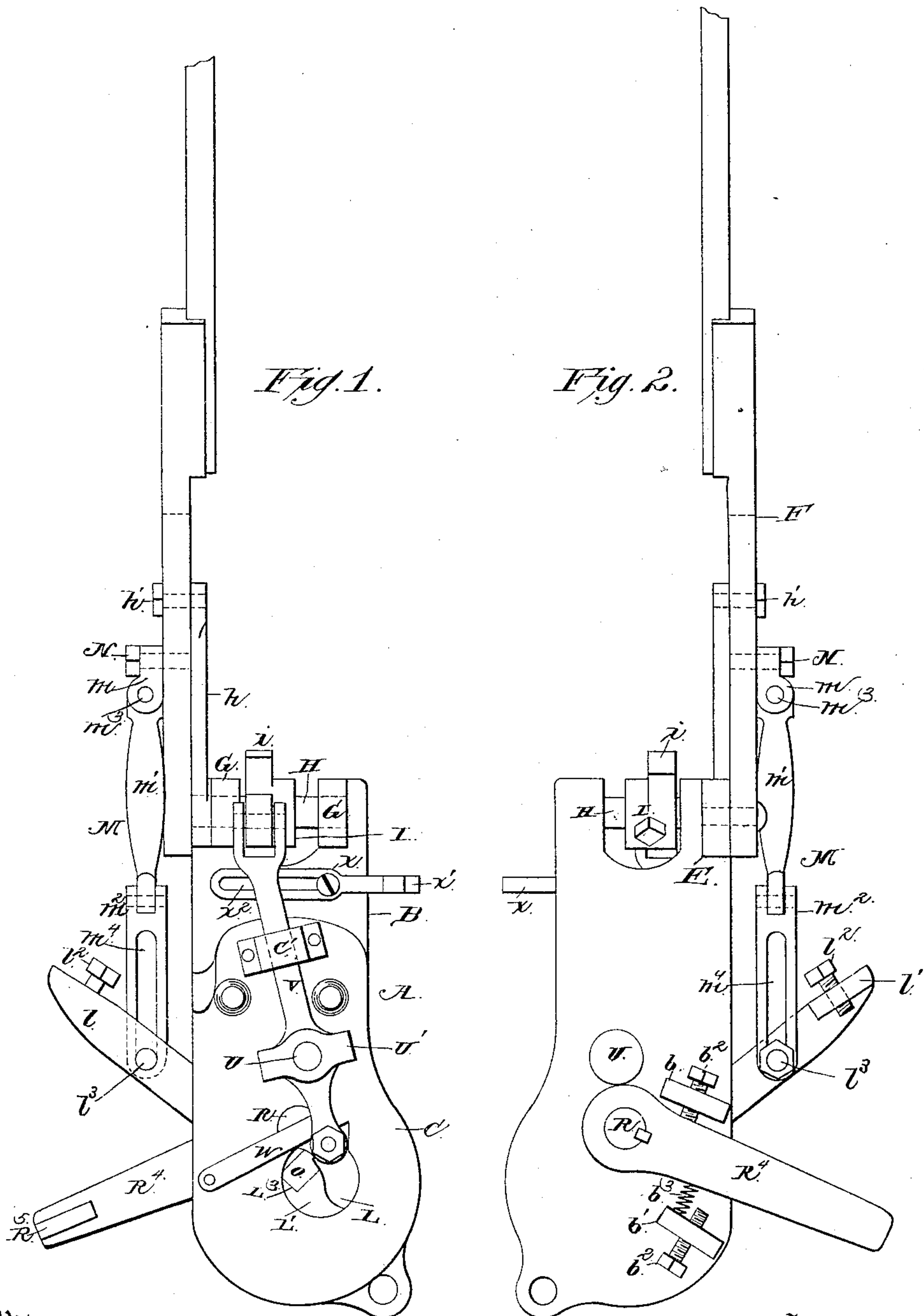
2 Sheets—Sheet 1.

P. R. WARD.

SAW SWAGING DEVICE.

No. 350,853.

Patented Oct. 12, 1886.



Witnesses  
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# UNITED STATES PATENT OFFICE.

PHILIP R. WARD, OF QUINCY, ILLINOIS.

## SAW-SWAGING DEVICE.

SPECIFICATION forming part of Letters Patent No. 350,853, dated October 12, 1886.

Application filed March 3, 1886. Serial No. 193,893. (No model.)

*To all whom it may concern:*

Be it known that I, PHILIP R. WARD, a citizen of the United States, residing at Quincy, in the county of Adams and State of Illinois, have invented a new and useful Improvement in Saw-Swaging Machines, of which the following is a specification, reference being had to the accompanying drawings.

My invention relates to an improvement in saw-swaging machines; and it consists in the peculiar construction and combination of parts, that will be more fully set forth hereinafter, and particularly pointed out in the claims.

In the drawings, Figure 1 is a side elevation of my invention. Fig. 2 is a similar view of the opposite side. Fig. 3 is a vertical sectional view. Fig. 4 is a front elevation. Fig. 5 is a detailed elevation, partly in section, showing the mandrel and the die in another position than that shown in Fig. 3.

A represents the frame of the machine, which consists of the vertical side or plate B and the plate C, which is secured at its upper end to a flange, D, that projects from one side of the plate B. From the front upper corner of the plate B projects the horizontal arm E, which extends at a right angle from the rear side of the said plate, and to the outer end of this arm is pivoted a hand-lever, F, which lever is provided at a suitable distance from its fulcrum with a slot,  $f$ . Ears G project from the front side of the plate B, at the upper end thereof, and in the said ears is journaled a horizontal shaft, H, which carries a cam-wheel, I, having a concentric face,  $i$ , and to the said shaft is secured a rocking arm,  $h$ , which is connected to the hand-lever F by means of a bolt,  $h'$ , that extends through the outer end of the said rocking arm and enters the slot  $f$ . Near the lower ends of the plates B and C, on the opposing faces thereof, are formed annular recesses K, in which is journaled the circular head of a cam-lever, L. An arm,  $l$ , projects from the front side of the circular head, and extends out between the plates B and C, and is provided at its outer end and its rear side with a projecting ear,  $l'$ , which extends at right angles to the said arm, and through which ear passes an adjusting tappet-screw,  $l^2$ .

M represents a connecting-rod, which is

formed of three sections,  $m$ ,  $m'$ , and  $m^2$ . The sections  $m$  and  $m'$  are pivoted together, as at  $m^3$ , and the said section  $m$  is connected to the hand-lever by a pivotal bolt, N. The lower section,  $m^2$ , is pivoted to the lower end of the section  $m'$ , and the said section  $m^2$  is provided with a slot,  $m^4$ . A pivotal bolt,  $l^3$ , extends from the rear side of the arm  $l$  and enters the slot  $m^4$ , and thereby connects the lower end of the connecting-rod M with the arm  $l$  of the cam-lever. The circular head of the cam-lever is formed, preferably, of a single piece of metal having its central portion cut away to form the circular side plates,  $L'$ , in the upper sides of which are made concentric aligned openings  $L^2$ . In the centres of the said plates, and communicating with the central portion of the openings  $L^2$ , are made rectangular openings  $L^3$ , in which is inserted a rectangular die, O, which extends across the center of the circular head. The face or operating portion of the die is made rounding or convex on its front side, as at  $o$ , and the rear side of the face of the die is made plain, as at  $o'$ , and forms a suitable angle. The rear side of the convex portion of the die is slightly higher than the front side of the plain portion thereof, thereby forming the shoulder  $o^2$ . The under side of the die, at the central portion thereof, is cut away, as at  $o^3$ , for the purpose which will be hereinafter set forth.

R represents a rock-shaft, which is journaled transversely in the side plates, B C, and passes through the concentric opening  $L^2$  in the circular die-head. An arm,  $R'$ , extends from the upper side of that portion of the rock-shaft which is between the plates B and C, and through the center of the rock-shaft is made a circular opening,  $R^2$ , in which is inserted a movable mandrel, S. A wedge-shaped key,  $R^3$ , passes transversely through an opening which is made in the upper end of the arm  $R'$ , and the said key bears on the upper end of the movable mandrel. By moving the key in or out the mandrel may be adjusted in or out from the shaft R, so as to cause the face of the said mandrel to be adjusted with relation to the said shaft. From the inner end of the shaft R extends a lever,  $R^4$ , which is keyed to the shaft at right angles thereto and bears against the rear side of the plate B. The outer



end of this lever is provided with an ear,  $R^5$ , which extends from its front side and against which the tappet-screw  $l^2$  strikes when the arm  $l$  is lowered.

5 From the rear side of the plate B project brackets  $b$  and  $b'$ , which are arranged, respectively, one above and the other below the lever  $R^4$ , and through the said brackets extend set-screws  $b^2$ , which limit the movement of the  
10 said lever  $R^4$ . A coiled extensile spring,  $b^3$ , bears between the lower side of the lever  $R^4$  and the upper side of the bracket  $b'$ , so as to raise the lever  $R^4$  normally to the position shown in solid lines in Figs. 2 and 4.

15 From the inner side of the plate B, near the lower end thereof, projects a horizontal stud,  $T$ , which extends through one of the openings  $L^2$  in the circular die-head, and has its inner end roughened or corrugated, as at  $t$ .

20  $U$  represents a horizontal bolt, which extends transversely through the plates B and C, above the circular heads of the die-lever, and on the front end of this bolt, which projects beyond the front side of the plate C, is  
25 secured a yoke,  $U'$ , made substantially in the shape of the letter  $U$ , and having parallel arms which approach the plate C. The ends of these arms are concaved or hollowed, as at  $U^2$ .

$V$  represents a lever, which is provided near  
30 one end with an opening,  $V'$ , through which the front end of the bolt  $U$  passes, and the said lever has laterally-projecting trunnions  $V^2$ , which bear in the concaved ends of the arms of the yoke and form the fulcrum for the lever.

35 The upper end of the lever  $V$  passes through and works in a guide-keeper,  $C'$ , which projects from the upper end of the plate C, and the said lever also carries an anti-friction roller,  $V^3$ , which bears against the cam  $I$ . To the  
40 lower end of the lever  $V$  is secured a horizontally-projecting stud,  $T'$ , which aligns with the stud  $T$  and passes through one of the openings  $L^2$  of the circular die-head, and is also provided on its outer end with the corrugated or  
45 roughened surface.

$W$  represents a flat spring, which has one end secured to the plate C, and the other end of which bears against the lower end of the lever  $V$ , so as to normally hold the said lever  
50 in the position shown in Fig. 4, and move the stud  $T'$  from the stud  $T$ .

$X$  represents an arm, which is provided at one end with an extension,  $X'$ , which projects at right angles from the arm, and the latter  
55 is also provided with the longitudinal slot  $X^2$ . A set-screw,  $Z$ , passes through the slot and enters the plate B on the front side thereof, near its upper right-hand corner, and thus secures the arm  $X$  to the said plate, and enables  
60 the arm to be clamped thereto at any desired adjustment.

$a$  represents a stop-plate, which is provided with a longitudinal slot,  $a'$ . This stop-plate is secured to the circular die-head, between  
65 the plates  $L'$  thereof, by means of a set-screw,  $a^2$ , and the rear side of the said plate extends

toward the converging or approaching portions of the mandrel and the die. By means of the set-screw and the slot previously described the plate may be adjusted, as will be  
70 readily understood.

The operation of my invention is as follows: The machine is secured in a vertical position to a post or work-bench or other suitable support. The hand-lever  $F$  is normally raised  
75 to the position shown in Fig. 4. The saw to be swaged has its teeth inserted between the opposing studs  $T$  and  $T'$ , and one of the teeth thereof rests between the die and the mandrel, and the point thereof bears against the rear  
80 side of the stop-plate  $a$ . The arm  $X$  bears against the toothed edge of the saw and assists in maintaining the saw in position. The hand-lever  $F$  is then depressed by the left hand of the operator, who holds and maintains the  
85 saw in position with his right hand. The initial movement of the hand-lever causes the arm  $h$  to partly rotate the rock-shaft  $H$ , and thereby move the cam  $I$ , which causes the roller  $V^3$  of the lever  $V$  to move outwardly  
90 onto the concentric face of the cam  $I$ , and thereby move the lever, so as to cause the stud  $T'$  to move toward the stud  $T$  and clamp the saw rigidly between the said studs and hold the saw firmly in position while being swaged.  
95 Continued movement of the lever  $F$  in its descent causes the lower section of the connecting-rod  $M$ , by reason of its slot  $m^4$ , to move down on the bolt  $l^2$  until the upper end of the said slot bears against the said bolt, which de-  
100 presses the arm  $l$ , and causes the circular die-head to partly rotate. The convex portion  $o$  of the die, which bears against the face of the saw-tooth, which is inserted between it and the mandrel by this movement, concaves the  
105 said face of the tooth, until the convex portion of the die passes beyond the front of the tooth, and thereby broadens or swages the point of the tooth, and as the die-head continues to move during the continued opera-  
110 tion or movement of the hand-lever the point of the saw-tooth bears behind the shoulder  $o^2$ , and the plain surface  $o'$  of the die comes in contact with the face of the tooth. By this time the arm  $l$  in its descent causes the tappet-  
115 screw  $l^2$  to strike against the upper side of the ear  $R^2$  of the mandrel-lever  $R^4$ , which thereby causes the said lever to partly rotate the rock-shaft  $R$  and cause the mandrel to bear against the upper side of the saw-tooth and subject  
120 it to pressure between the mandrel and the plane face of the die, and thereby straighten out the saw-tooth and remove the concave or depression which is made in the face thereof by the convex portion of the die in its initial  
125 movement. The hand-lever  $F$  is then raised, which causes the clamping-studs  $T$  and  $T'$  to disengage the saw-tooth and permit the next succeeding tooth to be inserted between the die and the mandrel, when the operation is  
130 proceeded with as before. The central portion of the die is cut away, as hereinbefore



described, in order to permit it to clear the front of the saw-tooth when the die-head is partly turned.

Having thus described my invention, I claim—

1. The combination, in a saw-swaging machine, of the revoluble die-head carrying the die and the rock-shaft R, having the mandrel, substantially as described.

2. The combination, in a saw-swaging machine, of the die and the rock-shaft R, having the adjustable mandrel, substantially as described.

3. The combination, in a saw-swaging machine, of the die, the rock-shaft having the adjustable mandrel, and the key for moving the mandrel in or out from the rock-shaft, substantially as described.

4. The combination, in a saw-swaging machine, of the mandrel, the revoluble die-head carrying the die, and having the stop *a*, for the purpose set forth, substantially as described.

5. The combination, in a saw-swaging machine, of the mandrel, the revoluble die-head having the die, and the adjustable stop-plate *a*, substantially as described.

6. The combination, in a saw-swaging machine, of the mandrel, the revoluble die-head carrying the die, the slotted adjustable stop-plate *a*, and the set-screw passing through the said slotted stop-plate to secure the latter to the die-head, substantially as described.

7. The combination, in a saw-swaging machine, of the rock-shaft R, carrying the mandrel, and the revoluble die-head carrying the die, the latter being provided with the convex portion *o* and the plain portion *o'*, substantially as described.

8. The combination, in a saw-swaging machine, of the rock-shaft R, having the mandrel and the lever *R<sup>1</sup>*, and the revoluble die-head

having the die, and the arm or lever *l*, substantially as described.

9. The combination, in a saw-swaging machine, of the rock-shaft R, having the mandrel and the lever *R<sup>1</sup>*, and the revoluble die-head having the die and the arm or lever *l*, the said arm having the tappet for striking the lever *R<sup>1</sup>*, to cause the said lever *R<sup>1</sup>* and the lever *l* to move simultaneously during a portion of the movement of the lever *l*, substantially as described.

10. The combination, in a saw-swaging machine, of the die, the rock-shaft having the mandrel, the clamp-studs *T* and *T'*, for securing the saw-tooth in place between the die and the mandrel, and means for operating the said clamping-studs and the die and the mandrel, substantially as described.

11. The combination, in a saw-swaging machine, of the revoluble die-head having the die and the tappet-arm *l*, the rock-shaft R, having the mandrel and the arm *R<sup>1</sup>*, the stud *T*, secured to the frame, the hand-lever *F*, the slotted connecting-rod connecting the said hand-lever with the arm *l*, the rock-shaft *H*, having the arm *h* connected to the hand-lever and the cam *I*, and the pivoted lever *V*, bearing on the said cam, and having the stud *T'* opposing the stud *T*, whereby when the hand-lever is moved the studs *T* and *T'* first clamp the saw in place, and the die and mandrel are then operated on the tooth to swage the latter, substantially as described.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in presence of two witnesses.

PHILIP R. WARD.

Witnesses:

CHAS. L. HOFFMAN,  
JOHN M. FULTZ.