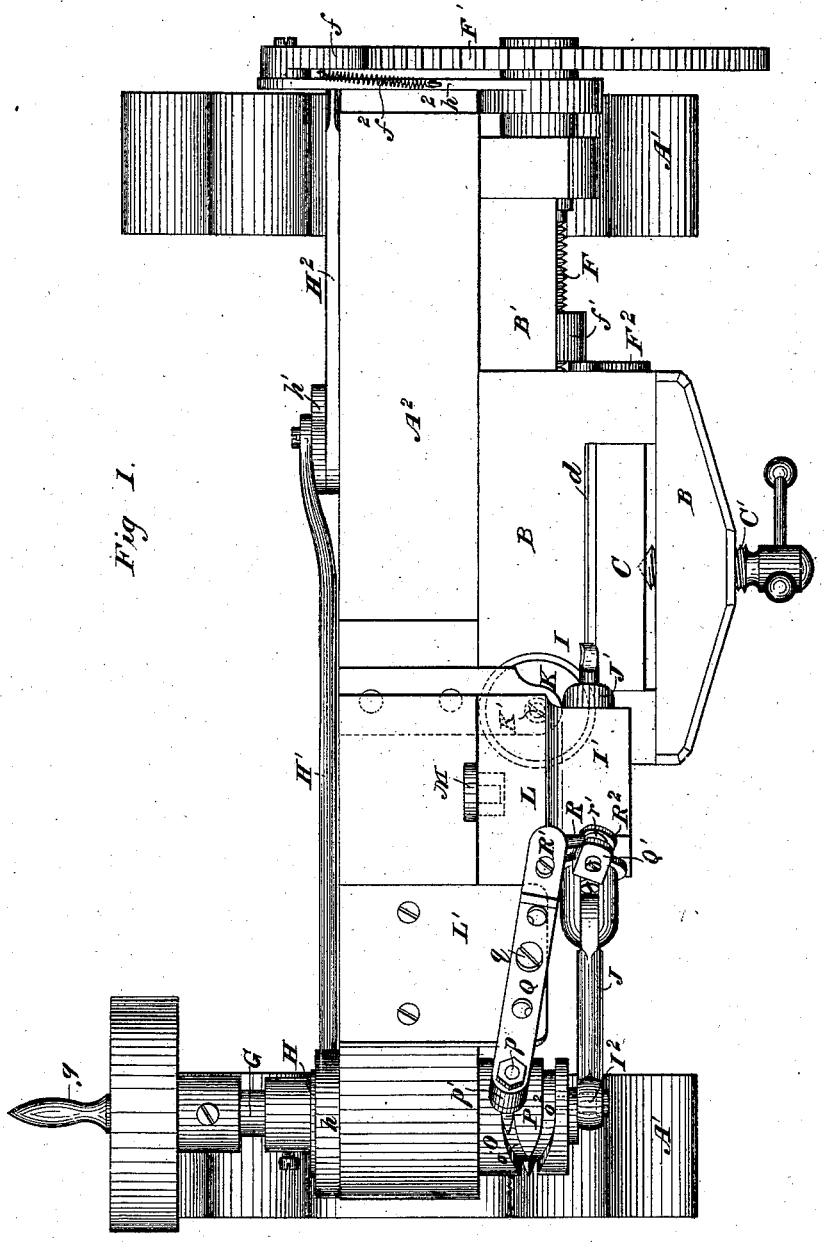
5 Sheets—Sheet 1.

# J. A. HOUSE.

## ART OF MANUFACTURING SAW-BLADES.

No. 190,142. Patented May 1, 1877.

Fig 1.



WITNESSES.

Wm. A. Skinkle.
F. Smith

INVENTOR.

James A. House.

By his Attorneys.

Baldwin, Hopkins, & Peyton.

5 Sheets—Sheet 2.

# J. A. HOUSE.

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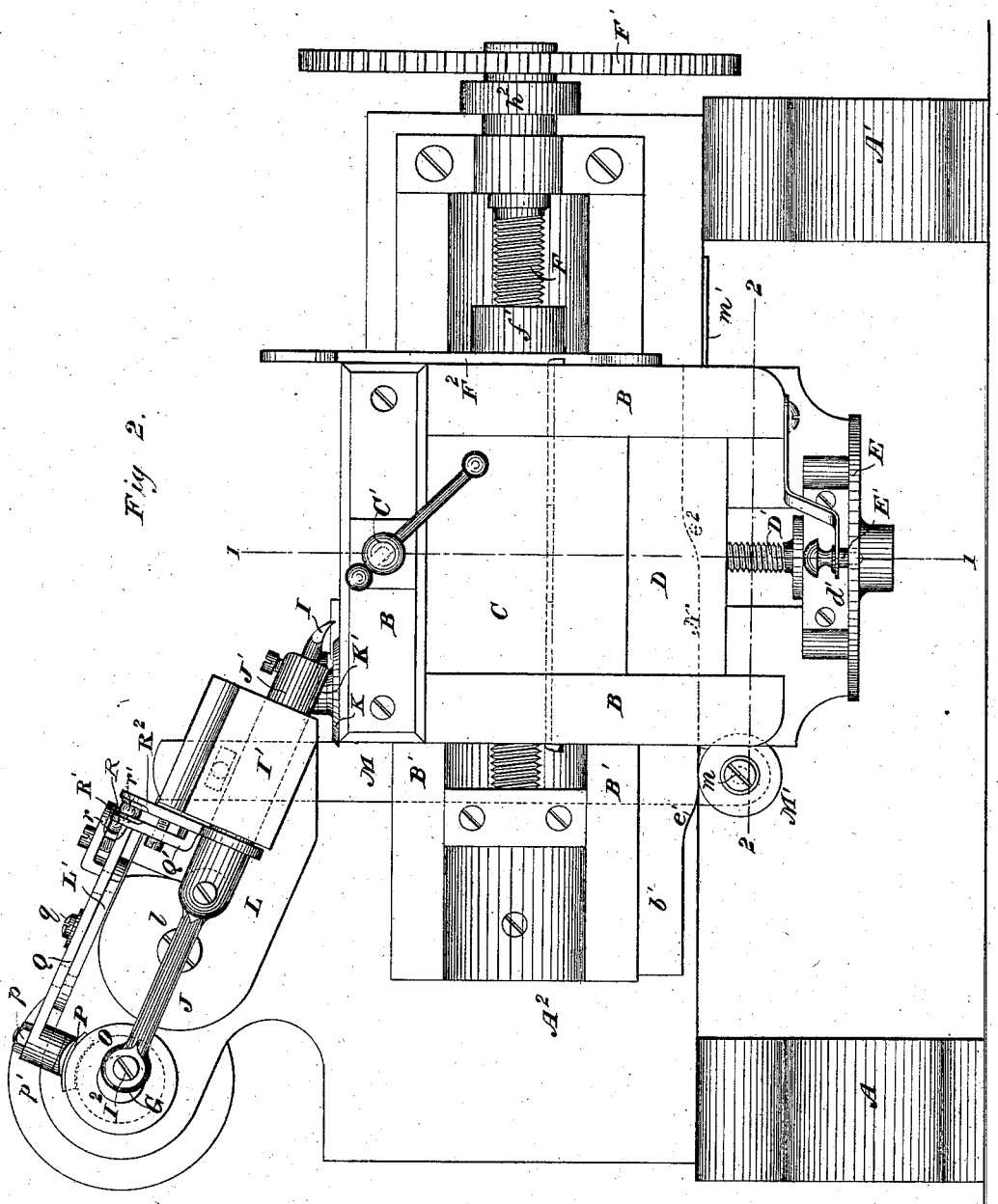
Fig 2.




WITNESSES

Wm. A. Skinkle

F. Smith

INVENTOR

James A House.

By his Attorneys,

Baldwin, Hopkins & Peyton.

5 Sheets—Sheet 3.

# J. A. HOUSE.

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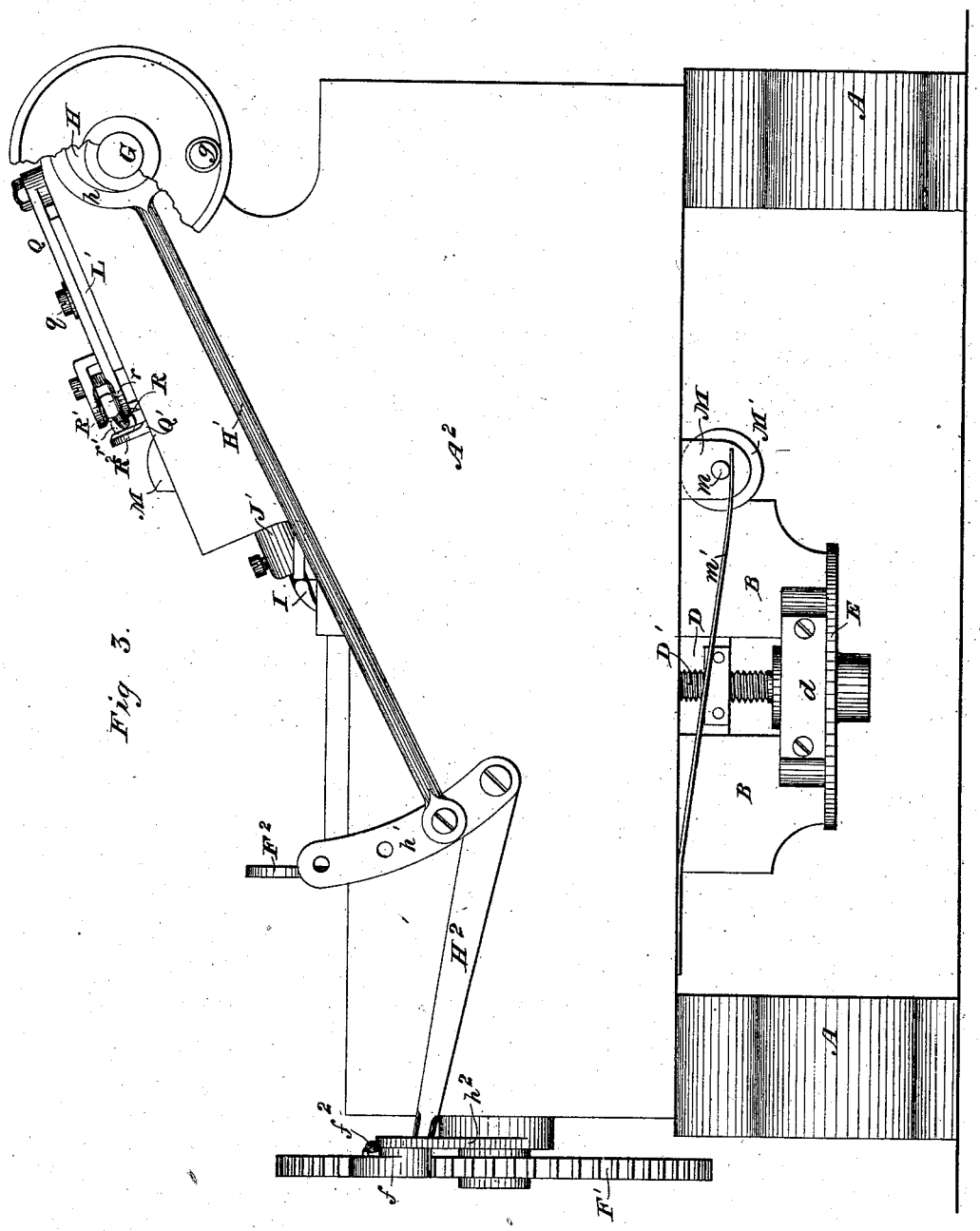


Fig 3.

WITNESSES

Wm. A. Skinkle

F. Stich

INVENTOR

James A. House.

By his Attorneys.

Baldwin, Hopkins & Peyton.

5 Sheets—Sheet 4.

# J. A. HOUSE.

## ART OF MANUFACTURING SAW-BLADES.

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Fig. 5.

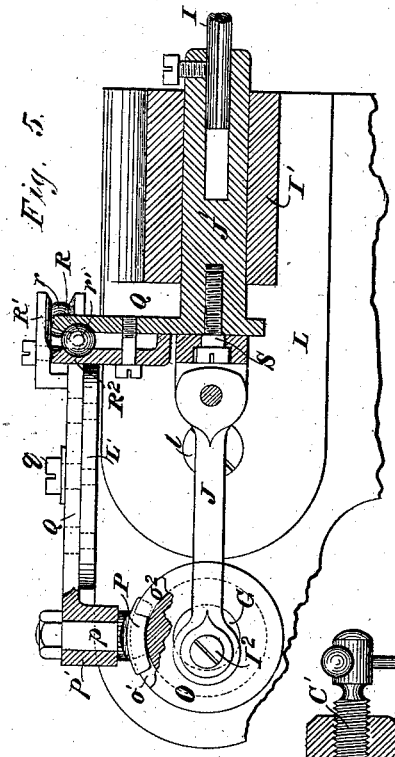


Fig. 6.

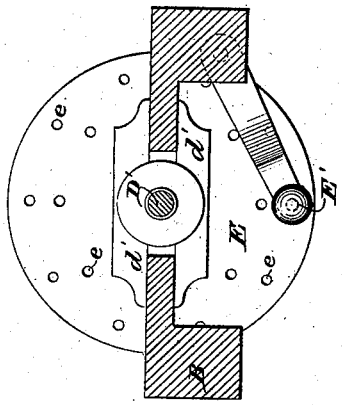
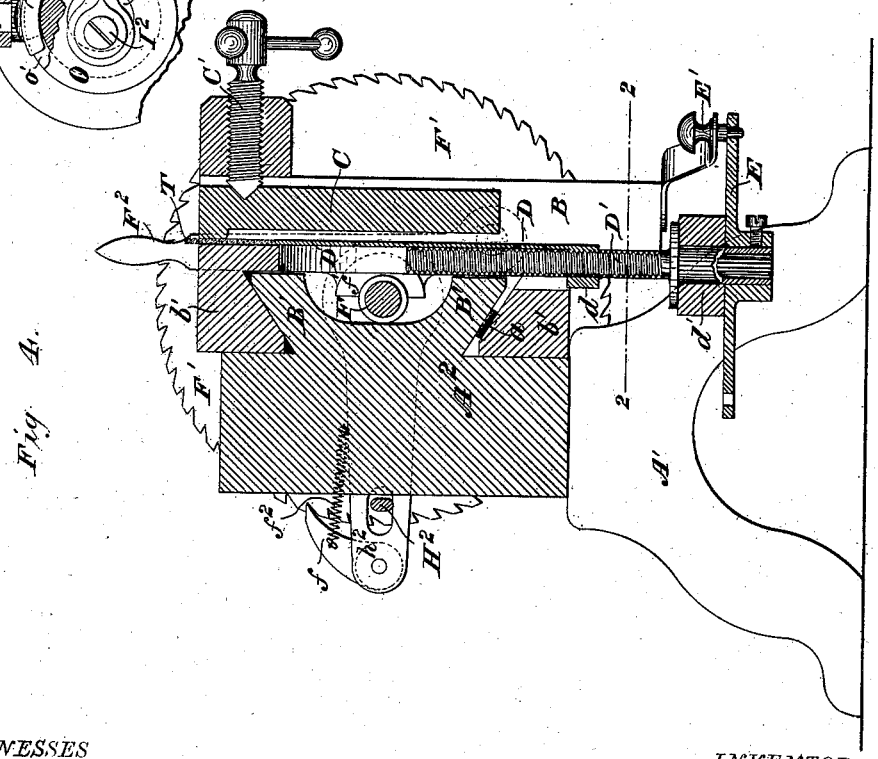


Fig. 4.



WITNESSES

Wm. A. Skinkle.
F. Stich

INVENTOR

James A. House.

By his Attorneys.

Baldwin, Hopkins & Peyton.

5 Sheets—Sheet 5.

J. A. HOUSE.

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Fig 7

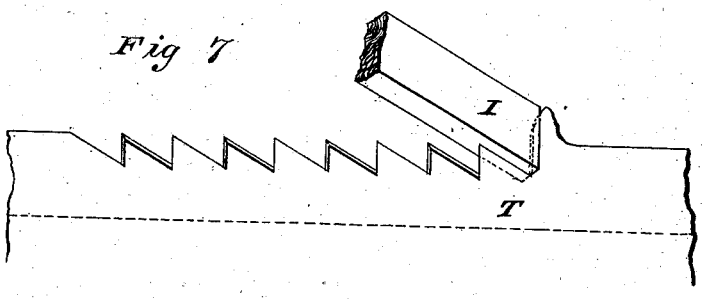


Fig 8.

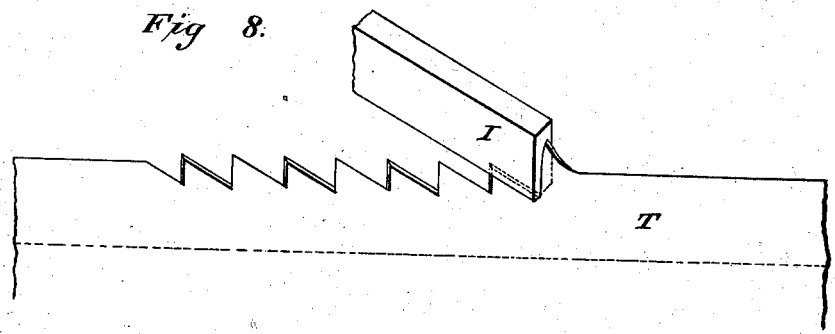


Fig 9.

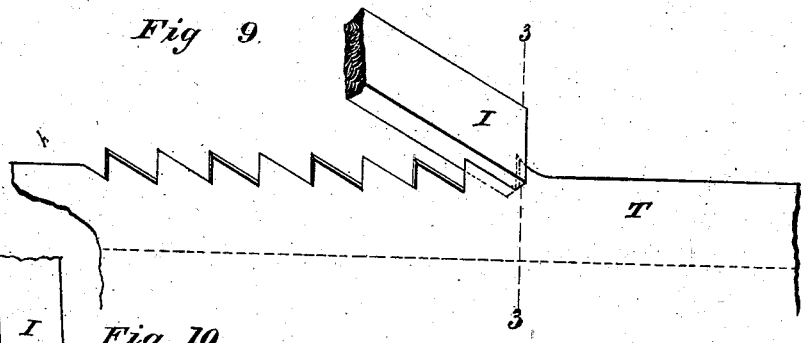


Fig 10.

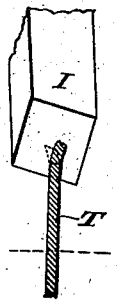


Fig 11

WITNESSES

Wm. A. Skinkle.

J. Fitch

INVENTOR

James A. House.

By his Attorneys.

Baldwin, Hopkins & Peyton

# UNITED STATES PATENT OFFICE.

JAMES A. HOUSE, OF BRIDGEPORT, CONNECTICUT.

## IMPROVEMENT IN THE ART OF MANUFACTURING SAW-BLADES.

Specification forming part of Letters Patent No. **190,142**, dated May 1, 1877; application filed April 11, 1877.

*To all whom it may concern:*

Be it known that I, JAMES ALFORD HOUSE, of Bridgeport, in the county of Fairfield and State of Connecticut, have invented certain new and useful Improvements in the Art of Manufacturing Saw-Blades, and in apparatus therefor, of which the following is a specification:

My invention chiefly relates to the forming of teeth upon fret or scroll saw blades. My object mainly is to both cut and set or completely form the teeth of a saw-blade at a single operation. To this end my improvement consists in forming the teeth upon the blade as it is fed forward by successive cuts of a chisel or cutter reciprocated at an angle to the edge of the saw-blade, operating in, or substantially in, the plane of the blade, and presented to the blank with its point or edge inclined alternately in opposite directions, whereby the teeth are pressed or forced slightly sidewise, to the right and left alternately, as the cuts are made from the edge of the blank toward its center or back.

Another object of my invention is to cut the teeth by a chisel operating upon a saw-blade edgewise thereof and at an acute angle thereto. To this end my improvement consists in forming the teeth upon a saw-blade by means of a reciprocating chisel moving in the plane of the saw-blade, and operating by successive cuts upon the edge of the blade as it is moved in a path intersecting that of the chisel.

My object, further, is to form a number of saws from a blank by automatically cutting it up into widths to form the blades at the same time the teeth are being cut; to which end my improvement consists in traversing the blank so as to present the saw-blade edge to the chisel for cutting the teeth, as before described, and moving the blank past and in contact with a cutter, to gradually cut the blank, and finally sever the toothed blade therefrom.

My invention also consists in certain novel constructions of mechanisms and combinations of devices, which will hereinafter specifically be designated.

The mechanism employed by me in carrying out my invention resembles in some respects that shown and described in another application for Letters Patent of the United States filed by me simultaneously herewith, and entitled "improvements in machinery for manufacturing saws."

The accompanying drawings represent a suitable organization of mechanism for carrying out my invention, all my improvements being illustrated thereby. Some of my improvements obviously, however, may be used without the others, and the invention in part carried out by mechanism differing somewhat in details of construction from that therein shown and herein described.

Figure 1 is a plan or top view; Fig. 2, a side elevation; Fig. 3, an elevation of the side opposite that shown by Fig. 2. Fig. 4 is a view, partly in elevation and partly in transverse section, on the line 1 1 of Fig. 2, representing the blank holding and feeding apparatus. Fig. 5 is a view in elevation, partly in section, of the chisel supporting and operating mechanism on an enlarged scale; Fig. 6, a section on the lines 2 2 of Figs. 2 and 4, showing the devices for adjusting the blank and regulating the width of the strips or saw-blades cut therefrom. Figs. 7, 8, 9, and 10 are diagrams illustrating my improved method of forming the teeth; Fig. 11, a plan or edge view of a portion of a saw-blade with the teeth formed thereon, in the manner represented by the diagrams. Figs. 7 to 11, both inclusive, are on an enlarged scale, to more clearly show the invention.

The mechanism is supported by a suitable base or standards, A $A^1$, and a strong frame or supporting-beam, $A^2$, mounted at its ends upon these standards. A saw-blank carrier or holder, B, is moved endwise of this frame, automatically to present the edge of the blank to a chisel or cutter, operating as will hereinafter be explained.

The carrier or blank-feeder is represented by the drawings as composed of a body portion or frame centrally recessed and provided with inclined flanges *b b'* at its back, which fit so as to be capable of sliding endwise of the longitudinal supporting-ledge B'. (See Fig. 4.) A plate-spring, *a*, resting at its ends in notches in the upper surface of the under bearing of the blank-frame and pressing against the under surface of the lower part of the ledge of

the main frame, compensates wear and keeps the upper flange *b* in proper contact with the ledge. Any other suitable well-known guideway for the carrier obviously may be substituted for that described. A movable or pivoted clamping-jaw or vise, C, operated by a screw, C′, serves to hold the blank in a recess between the jaw and inner face of the back of the carrier-frame. (See Figs. 1 and 4.) A soft-steel plate or blank of a size sufficient to form a number of saws rests at its lower end or edge upon a follower, D, in the carrier. This follower is adjusted to regulate the width of the piece to be projected above the carrier-frame or vise to have the teeth formed thereon, by means of a screw, D′, working in a nut, *d*, on the follower. The elevating-screw is suitably supported in a cross-piece, *d*′, at the lower end of the carrier-frame, or in other convenient way.

An indicator and adjusting-wheel, E, secured to the lower end of the screw D′, and a spring stop-pin, E′, taking into the holes *e* of the wheel, enables the operator to regulate the screw, and, consequently, the upward feed of the blank, as desired, in a way well understood. Inclined ways or cams $e^1$ $e^2$, (see full and dotted lines, Fig. 2,) near the ends of and upon the under surface of the lower guide-flange or support *b*′ of the carrier, are provided, for a purpose hereinafter to be explained. The blank-carrier is fed forward step by step by a screw, F, operated by a pawl, *f*, and a ratchet-wheel, $F^1$, to which the screw is connected at one end of the supporting-frame. The feeding-screw turns in suitable bearings in a hollow between the upper and lower portions of the longitudinal projection or ledge B′ at the side of the frame upon which the carrier moves. A half-nut or sectional female screw, $f^1$, carried by a lever, $F^2$, pivoted upon the carrier, engages with the blank traversing feeding-screw.

When the movement of the carrier is to be reversed by hand, or it is desired to stop the feed for any purpose, the nut is disengaged by rocking the lever outward. Motion is imparted to the mechanism from a driving-shaft, G, driven by power in any suitable manner, a crank, *g*, for turning the shaft being shown in the drawings, for the sake of illustration only. An eccentric, H, on the main shaft, encircled by a strap or ring, *h*, in a well-known way communicates motion to the ratchet-wheel $F^1$ by means of a rod, $H^1$, connected at one end to the ring, and at the other to the short arm $h^1$ of a crank-lever pivoted at the juncture of its arms to the frame. The long arm $H^2$ of this lever works in a slot near the outer end of a vibrating lever, $h^2$, turning loosely on the hub of the ratchet-wheel. The pawl *f* is pivoted to this vibrating lever, and is held up to its work, when in operation, by spring, $f^2$, secured at its opposite ends, respectively, to the lever and pawl. The feed of the screw F may be regulated by adjusting the connecting-rod $H^1$ in any desired one of the holes in the short arm of the rocking crank-lever.

A cutter or chisel, I, is reciprocated in a guideway or socket, $I^1$, the longitudinal axis of the chisel being in, or substantially in, the vertical plane of the blank to be operated upon, and the chisel reciprocating above and at an angle to the edge of the blank corresponding to the inclination of the teeth. The reciprocating movement is imparted to the chisel by a crank, $1^2$, on the end of the driving-shaft, and a pitman, J, connected with the chisel stock or holder $J^1$. The chisel is detachably secured in its holder, so that it may be readily removed.

By an inspection of the drawings it will be seen that as the blank (the top edge of which projects above vise or carrier) is fed forward the proper distance for forming a tooth, the chisel descends at an acute angle to the blank and cuts into its edge, and that as the chisel retracts the blank is fed forward another step to be again operated upon by the chisel on its advance stroke to form a tooth. The mechanism is timed in its movements, so as to operate connectedly and cut a series of teeth to form the saw. The metal to form the teeth is forced or pressed up from the edge of the blade, as will be understood by an inspection of the drawings.

To sever the saw-blades from the blank gradually and during the time the teeth are being cut, a cutter, K, (shown as of a circular form,) mounted upon and turning with a stud supported in an arm, $K^1$, crosses the path of travel of the blank, and severs a strip of the width of a saw from the blank as it is fed forward.

The edge of the cutter, it will be observed, is beveled, so as to cut with but little resistance and slight strain upon the vise.

To leave toothless spaces at the ends of the saw-blade, the chisel is held out of operation during the time the blank is at and near the beginning and end of its traverse lengthwise of the frame and past the chisel. The cutter for severing the saw-blades from the blank, however, continues in operation from the time the blank first comes in contact with its edge at one end until it passes and clears it at the other.

To leave the blanks at the the ends of the blades, the chisel guideway or socket $I^1$ is formed with or securely attached to a pivoted frame, L, rocked or vibrated on a pivot, *l*, by which it is secured to the projecting top portion of the main frame. A plate, L′, serves as a stop to limit the upward movement of the pivoted socket-frame, a shoulder or projection on the top of this frame abutting against the edge of the plate, when the frame is moved upward. A long plate or flat bar, M, movable endwise in a vertical recess or slot in the main frame, projects downward beneath the frame at its lower end, and carries a roller, M′, mounted and turning upon a shaft, *m*, which projects through the bar. A spring, *m*′,

secured at one end to the under side of the frame, acts upon the bar with a tendency to throw it upward, the free end of the spring bearing upon the shaft *m*. The inclines $e^1$ $e^2$ (hereinbefore described) of the blank frame or carrier, and those parts of the flange *b'* from these inclines to the ends of the frame, allow the roller to remain in its elevated position, as held by the spring during part of the traverse of the blank, but when the deepened central or downwardly-projecting portion N of the flange strikes the roller and moves in contact with it, the bar is drawn down and the chisel-frame depressed so as to assume its operative position. A pin-and-slot connection (see dotted lines, Fig. 2,) prevents binding or cramping between the bar and chisel-frame, as will be well understood.

So far I have only described mechanism suitable for cutting the teeth, feeding the blank, and severing the saw-blades; but, in order to set or project the teeth laterally alternately to the right and left as they are cut, I impart to the chisel an axial oscillating or rocking motion in its guideway or holder, so as to present the chisel to the edge of the blade in such manner that as one cut is made it presses the metal, forming the tooth out in one direction, and the next cut forces the metal of the succeeding tooth in the opposite direction.

A double-pathed or two-way cam, O, is secured upon the main shaft and operates upon the rounded or doubly-inclined sides of a head, P, pointed at both ends, so as readily to pass from one to the other of the cam-tracks $o^1$ $o^2$ on either side of the central flange of the cam. The stud *p*, to which the head P is fastened, or with which it is formed, is mounted so as to turn freely in a sleeve or bearing, *p'*, in one end of a pivoted lever or vibrating arm, Q, supported on the frame by a pivot, *q*, shown as secured in the plate L'. The opposite end of this arm is connected, by means of a universal joint, with a lever secured to the chisel-holder J'. This joint is shown as consisting of the arm R, having balls *r r'*, one at each end, and sectional sockets or bearings $R^1$ $R^2$, one at the end of the arm Q and the other at the outer end of the lever Q', fastened to the reciprocating chisel-stock. To admit of the required oscillating movement of the chisel, its holder is connected with the pitman J by means of a swiveling coupling, S. (See Fig. 5.) The pivot *q* may be changed from one to another of the holes in the arm Q and its corresponding hole in the plate L', to rock the cutter more or less, according to the "set" it is desired to give the teeth.

From the foregoing description it will be obvious that, as the blank or saw-blade T, Figs. 4, 7, 8, 9, and 10, is moved forward in a straight line beneath the chisel, the teeth will be cut and formed, as shown, (see Fig. 11,) with the teeth set and properly beveled. Fig. 7 represents a deep cut as being made, the surplus metal displaced at one cut being removed by the succeeding cut. Fig. 8 shows but a slight amount of metal removed; and Fig. 9 represents a light cut where no metal is removed. This latter method of forming the teeth I deem preferable. At each retraction of the chisel it is rocked to properly present it to the blank; and at the same time the blank is fed forward the required distance for the next cut.

By my improvements it will be seen that a single chisel is made to form a saw-blade complete from a blank, and ready to be tempered, thus dispensing with setting and sharpening separately. It is also apparent that both time and labor are saved by the employment of a blank large enough to make a number of saws, and automatically severed into blades.

Obviously modifications may be made in my improvements without departing from the spirit of my invention. For instance, the mechanism may be arranged horizontally, or at an inclination, instead of vertically, as shown; the saw-blank carrier might automatically be returned to the starting-point after forming a series of teeth on and severing a saw from the blank; different-sized cams might be employed for increasing or lessening the throw or amount of endwise movement of the chisel; the feed of the blank upward in the vise might be accomplished automatically after the cutting of each blade therefrom, ready for the operation of the chisel upon the next; and various changes may be made in the details of the mechanism, such, for instance, as the substitution of the chisel elevating and depressing cam shown in my hereinbefore referred to application for the elevating and depressing devices described herein, and by using feed-rollers, as in that application, instead of the vise and carrier; or the carrier might be traversed by a long rocking arm. The blades would thus be severed on a slightly-curved line.

I claim as my invention—

1. The hereinbefore-described improvement in the art of manufacturing saw-blades, which consists in forming the teeth successively by cutting the saw-blade from the edge inward toward the center or back at an acute angle, and pressing out the teeth sidewise alternately to the right and left, substantially in the manner set forth, to cut and set the teeth simultaneously.

2. The hereinbefore-described improvement in the art of manufacturing saw-blades by machinery, which consists in cutting the teeth upon the blank by successive cuts of a chisel operating in the plane of the blank, reciprocating in a path at an acute angle to that traversed by the blank, and acting upon its edge to displace or force up the metal thereof to form the teeth, substantially in the manner described.

3. The combination, substantially as hereinbefore set forth, of a saw-blank carrier traversed step by step in a fixed path, and a chisel

reciprocating at an acute angle to and in the plane of the blank, whereby the teeth are formed by forcing up or displacing the metal at the edge of the blank by cutting from the edge inward, as set forth.

4. The combination, substantially as hereinbefore set forth, of a traversing saw-blank carrier, a reciprocating chisel, and the blank-severing cutter, whereby a strip to form a saw-blade is gradually severed from the blank as the teeth are being cut on its edge by the chisel.

5. The combination, substantially as hereinbefore set forth, of a traversing saw-blank carrier, a reciprocating chisel acting upon the edge of the blank to cut the teeth, and the adjustable chisel-carrying frame automatically elevated and depressed to throw the chisel out of operation at the ends of the blank, and hold it in working position to cut the teeth centrally upon the blank.

6. The combination, substantially as hereinbefore set forth, of the supporting-frame, the blank-carrier traversing endwise thereof, and in which carrier the blank is clamped and adjusted, the chisel for cutting the teeth, and the cutter for shearing the blades from the blank above the carrier.

7. The combination, substantially as hereinbefore set forth, of the blank-carrier, the reciprocating chisel, and mechanism, substantially such as described, for axially oscillating the chisel in its guideway, to alternately press the teeth in opposite directions as they are cut in the edge of the blank, as set forth.

8. The combination, substantially as hereinbefore set forth, of the pivoted chisel-carrying frame, the chisel reciprocating therein, the pitman connected with the chisel-holder by a swiveling joint, the vibrating arm actuated by a cam on the driving-shaft, and the universal-joint connection between said arm and an arm on the chisel-holder, whereby the chisel is reciprocated and rocked axially, and its frame left free to be elevated and depressed to throw the chisel out of and into operation.

In testimony whereof I have hereunto subscribed my name.

JAMES ALFORD HOUSE.

Witnesses:

CHARLES H. DIMOND,

FREDK. L. HEARSON.