(No Model.) 2 Sheets—Sheet 1.

E. N. HIGLEY.

MACHINE FOR SAWING AND DRILLING RAILWAY RAILS.

No. 389,149. Patented Sept. 4, 1888.

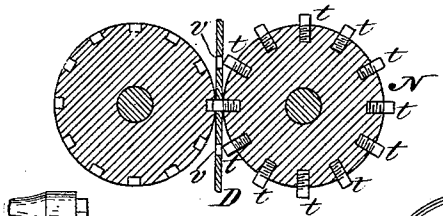

Fig. 7.

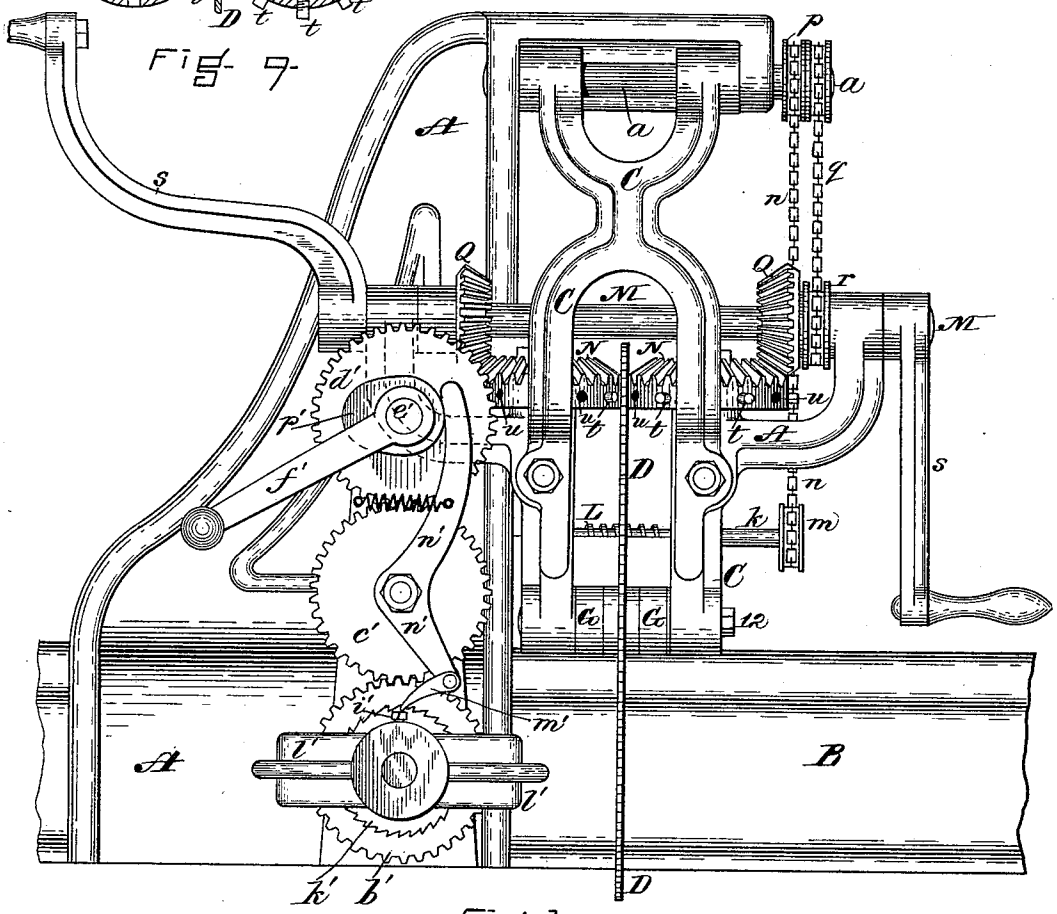

Fig. 1.

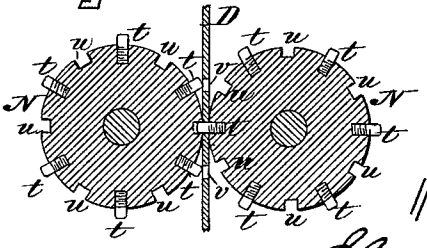

Fig. 2.

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(No Model.) 2 Sheets—Sheet 2.

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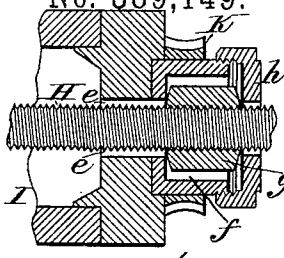

Fig. 6.

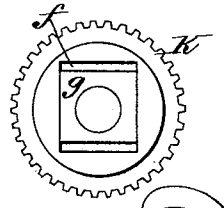

Fig. 7.

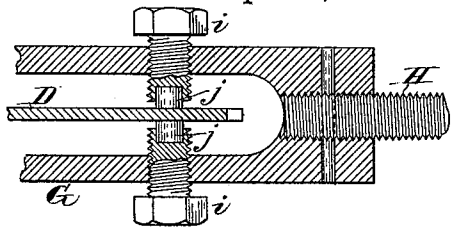

Fig. 8.

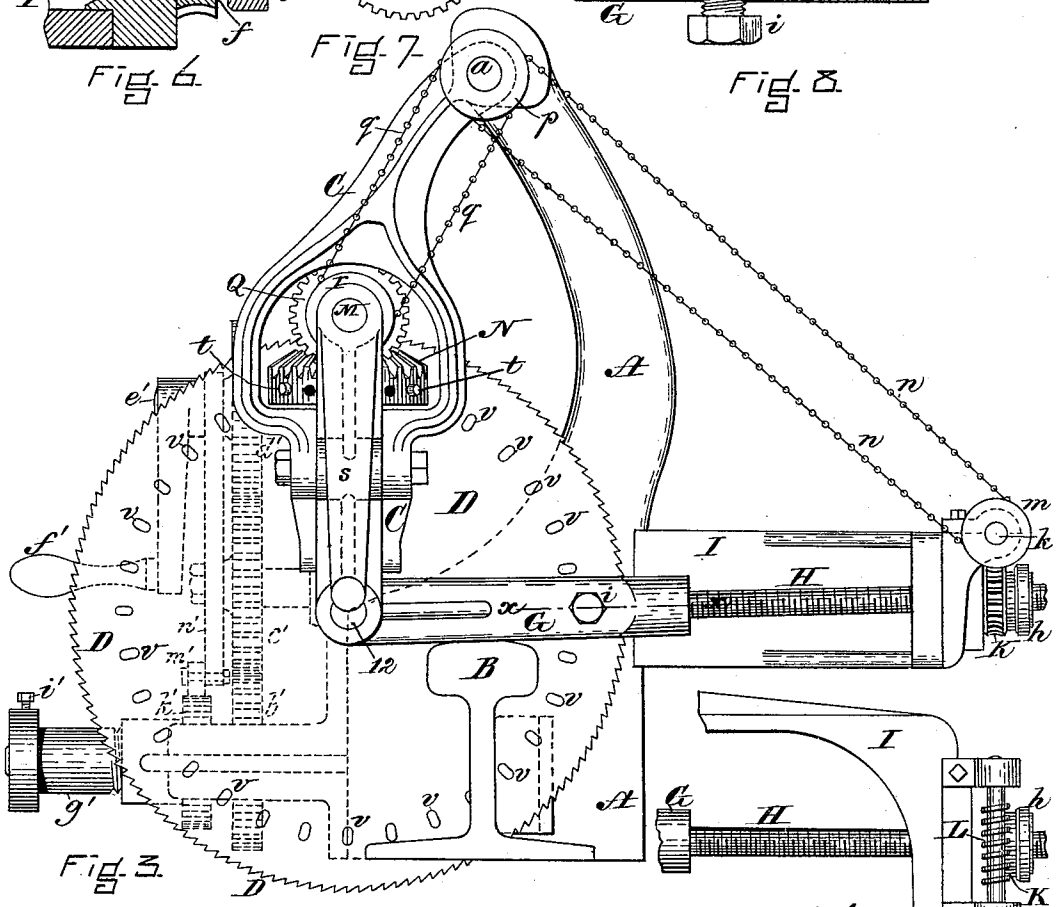

Fig. 3.

Fig. 4.

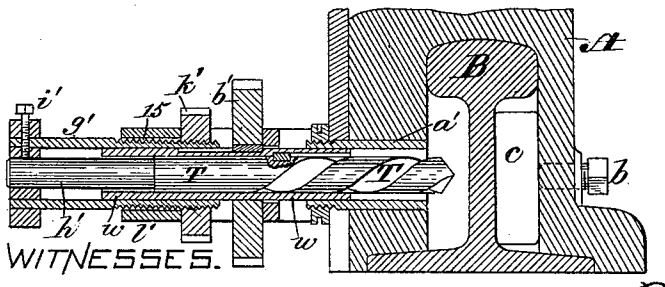

Fig. 5.

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UNITED STATES PATENT OFFICE.

EBEN N. HIGLEY, OF SOMERSWORTH, NEW HAMPSHIRE.

MACHINE FOR SAWING AND DRILLING RAILWAY-RAILS.

SPECIFICATION forming part of Letters Patent No. 389,149, dated September 4, 1888.

Application filed March 24, 1888. Serial No. 268,386. (No model.)

To all whom it may concern:

Be it known that I, EBEN N. HIGLEY, of Somersworth, in the county of Strafford and State of New Hampshire, have invented certain Improvements in Machines for Sawing and Drilling Railway-Rails, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, making part of this specification, in which—

Figure 1 is a front elevation of a machine for sawing and drilling railway-rails constructed in accordance with my invention. Fig. 2 is a horizontal section through a portion of the saw or milling-tool and its driving-wheels. Fig. 3 is a side elevation of my improved machine. Fig. 4 is a detail representing a portion of the saw-feeding mechanism. Fig. 5 is a vertical section representing the drill or boring-tool and parts immediately connected therewith. Fig. 6 is an enlarged sectional detail of a portion of the saw-feeding mechanism. Fig. 7 is an end view of the same. Fig. 8 is a horizontal section on the line *x x* of Fig. 3. Fig. 9 is a modification, to be referred to.

My invention relates to certain improvements in machines for sawing and drilling railway-rails, and has for its object to apply the power to the circular saw or milling-tool in a more effective and economical manner than heretofore, whereby a more steady and uniform motion of the cutting-tool is insured and the power required to drive it reduced to a minimum; and to this end my invention consists in certain combinations of mechanical devices and details of construction, as hereinafter fully set forth, and specifically pointed out in the claims.

In the said drawings, A represents the frame-work of the machine, the lower portion of which is bifurcated to enable it to be placed over the rail B to be sawed, to which it is firmly secured by a set-screw, *b*, bearing against a block, *c*, which is clamped by said screw firmly against the web of the rail, as seen in Fig. 5. To the upper portion of the frame A is pivoted, by means of a suitable bolt, *a*, a swinging frame, C, of the form seen in Figs. 1 and 3, and in this frame is mounted a circular saw or milling-tool, D, preferably of greater thickness at the periphery than at the center to avoid liability of binding as it passes through the rail. To the lower end of the swinging frame C is jointed at 12 a yoke, G, which embraces the saw, as seen in Fig. 8, and extends out at or nearly at a right angle from the lower end of the frame C. To the outer end of this yoke G is immovably secured the feed-screw H, the outer end of which passes through an aperture, *e*, Fig. 6, in the end of an arm, I, projecting from the frame-work A. The aperture *e* is of greater diameter than that of the feed-screw H to allow the latter to pass freely through it, as it is inclined more or less in accordance with the movement of the swinging frame C, with which it is connected.

Within a recess in the outer end of the arm I is fitted a hub projecting from the inner end of a worm-gear, K, the interior of which is made hollow, forming a rectangular box or recess, *f*, within which is placed a feed-nut, *g*, through which the feed-screw H passes, and by means of which the latter is moved in the direction of its length as the nut is rotated by the worm-gear. The nut *g* is of the same width as the recess *f*, whereby it is caused to be rotated by the worm-gear K; but the size of the recess *f* is such that a space is left above and below the nut, as seen in Figs. 6 and 7, whereby the latter is allowed to move vertically within the box or recess *f*, within which it is confined by a screw-cap, *h*, screwed to the outside of the hub of the worm-gear K. The inner and outer ends of the nut *g* are made convex, in order to allow it to adjust itself within the box *f* to the varying inclination of the feed-screw H as the latter moves with the frame C. The worm-gear K is rotated by a worm, L, Figs. 1 and 4, on the end of a shaft, *k*, which is supported in bearings in the outer end of the arm I, and is provided at its outer end with a chain-wheel, *m*, connected by a chain, *n*, with a double chain-wheel, *p*, secured to and revolving upon the end of the bolt *a* at the upper end of the frame A. The chain-wheel *p* is connected by a chain, *q*, with a chain-wheel, *r*, on the main driving or crank shaft M, which is supported in suitable bearings in the frame-work A, and has attached to each of its opposite ends a crank, *s*, and thus through the connections described, as the crank-shaft M is rotated, the feed mechanism

will be operated and the saw or milling-tool fed forward as required to cause it to cut through the rail.

The saw or milling-tool D is supported near its periphery and prevented from springing or chattering, and also held firmly in its central position on the commencement of the cut by means of two guides, consisting of screws *i i*, passing through the opposite sides of the yoke G, and having inserted within their ends blocks *j*, of wood or other suitable material, which are brought by means of the screws *i* firmly in contact with the opposite sides of the saw, as seen in Fig. 8.

I will now proceed to describe the manner in which the power is applied to the saw or milling-tool D, for the purpose of slowly rotating the same to caused it to cut the rail.

N N are a pair of horizontal bevel-gears, which are arranged on opposite sides of the saw D and in contact therewith upon vertical studs projecting from the frame-work A and mesh with bevel-gears Q Q upon the crank-shaft M, as seen Fig. 1. These bevel-gears N N are provided on their peripheries with pins or projections *t* and recesses *u*, alternating with each other, the pins *t* passing through apertures *v*, formed in the side of the saw or milling-tool D near its periphery, whereby as the gears or driving-wheels N N are revolved a positive rotary motion will be communicated therefrom to the saw or milling-tool. The arrangement of the driving-wheels N N upon opposite sides of the saw is such that each of the pins *t*, after it passes through an aperture *v* in the saw, will enter one of the recesses *u* in the opposite wheel, thus insuring a better and firmer hold upon the saw than would be the case if the pins merely passed through the saw and did not enter recesses in the opposite wheel.

Instead of two driving-wheels, N N, arranged as shown, a single driving-wheel provided with pins may be placed upon one side of the saw or milling-tool and a plain supporting roll or wheel, preferably provided with recesses to receive the ends of the pins of the driving-wheel, be placed opposite thereto on the other side of the saw, as seen in Fig. 9. I prefer, however, to employ two driving-wheels, as first described. The advantage of driving the saw or milling-tool by applying the power near the periphery is that it gives a steady and uniform motion to the tool and requires much less power to rotate it than where the force is applied to its arbor or shaft, as heretofore.

T, Fig. 5, is a drill, which is connected with the lower portion of the frame A, and is adapted to drill holes in the web of the rail B at suitable distances from its end. This drill T slides with a spline within a sleeve, *w*, by which it is rotated, the front end of the sleeve sliding within a bushing, *a'*, fitted within a horizontal aperture in the side of the frame A. The sleeve *w* is rotated by a gear, *b'*, which meshes with an intermediate gear, *c'*, which in turn meshes with a gear, *d'*, on a crank-shaft, *e'*, provided with a crank, *f'*, and thus as the shaft *e'* is rotated its motion is communicated to the drill T. The sleeve *w* slides through the gear *b'*, and is provided with a spline-key, which permits the sleeve to pass through the gear and be rotated thereby, the gear *b'* being prevented from moving laterally by portions of the frame between which it is placed. The drill T is also provided with a spline-key, which slides in a groove on the interior of the sleeve *w*, whereby the drill can be withdrawn when required. Over the rear end of the sleeve *w* is fitted another sliding sleeve, *g'*, provided on the inside with a pin or plug, *h'*, which projects into the sleeve *w* and bears against the rear end of the drill T, the pin *h'* being made adjustable within the end of the sleeve *g'* by means of a set-screw, *i'*. The inner end of the sleeve *g'* is provided with an external screw-thread, 15, over which fits an internally-threaded ratchet-wheel, *k'*, the outer side of which bears against the end of a supporting-frame, *l'*, and thus, as the ratchet-wheel *k'* is rotated by mechanism to be presently described, the sleeve *g'* is advanced or propelled in the direction of its length, causing the pin *h'* to press against the rear end of the drill T and feed it forward as required. The ratchet-wheel *k'* is actuated by a pawl, *m'*, pivoted to the lower end of a lever, *n'*, the upper arm of which is acted upon by a cam, *p'*, on the crank-shaft *e'*, and thus, as the latter is rotated to revolve the drill, the ratchet-wheel is moved as required, the amount of feed being varied by means of a suitable stop, (not shown,) which can be adjusted to limit the backward motion of the lever after it has been moved forward by the cam.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In a rail-sawing machine, a circular saw mounted in a suitable frame or holder and provided with apertures in its side near its periphery, in combination with a driving-wheel having pins or projections adapted to enter said apertures, whereby the saw is rotated positively by the driving-wheel, substantially as set forth.

2. In a rail-sawing machine, the combination, with the main frame and a movable or swinging frame attached thereto, of a circular saw mounted in said movable frame and provided with side apertures near its periphery, a pair of driving-wheels applied to the said saw on opposite sides of the same and having pins or projections adapted to enter said apertures, and the mechanism for feeding the saw, all operating substantially in the manner and for the purpose described.

3. In a rail-sawing machine, the combination, with a saw, D, provided with side apertures, *v*, near its periphery, of a pair of driving-wheels, N N, arranged upon opposite sides of the saw and each provided with pins *t* and recesses *u*, alternating with each other, the driv-

ing-wheels being so arranged with respect to each other that the pins of each wheel, after passing through the apertures in the saw, will engage the recesses in the opposite wheel, substantially as set forth.

4. In a rail-sawing machine, the combination of the main frame adapted to be secured to the rail, a swinging frame, C, pivoted thereto, a circular saw, D, mounted in said movable frame and having apertures *v* in its side near the periphery, a pair of horizontal driving-wheels, N N, connected with and driven by the main shaft and provided with pins or projections *t*, adapted to enter the apertures *v* in the saw and positively rotate the same, and a device for feeding the saw, all operating substantially as described.

5. In a rail-sawing machine, the combination of the main frame, a swinging frame, C, pivoted thereto, a circular saw, D, mounted in said movable frame and having apertures *v* in its side near the periphery, the horizontal driving-wheels N N, provided with pins or projections *t*, adapted to enter said apertures *v*, and the feeding device for the saw, consisting of the yoke G, jointed to the frame C and carrying the feed-screw H, the worm-gear K, and feed-nut *g*, carried thereby, the pulleys or chain-wheels *m p r*, chains *n q*, and the driving-shaft M, all operating substantially in the manner and for the purpose set forth.

6. In a rail-sawing machine, the combination, with the saw D, its pivoted supporting-frame C, and the yoke G, of the feed-screw H, worm-gear K, with its box or recess *f* and cap *h*, and the feed-nut *g*, placed within said recess *f* and made convex at its opposite ends, whereby it is permitted to adjust itself within said recess to the varying inclination of the feed-screw produced by the movement of the swinging frame, substantially as described.

7. The combination, with the frame A, of the rotating sleeve *w*, the crank-shaft *e'*, a train of gearing between the crank-shaft *e'* and the sleeve *w*, whereby the latter is operated, the drill T, sliding with a spline or key within the sleeve *w* and rotated thereby, a sleeve, *g'*, provided with an external screw-thread and sliding upon the rear end of the sleeve *w* and having a pin or plug, *h'*, fitting within the sleeve *w* and bearing against the rear end of the drill to feed the same, the ratchet-wheel *k'*, having an internal thread fitting over the thread of the sleeve *g'*, whereby the latter is moved in the direction of its length to feed the drill, and the pawl *m'* and its actuating-lever *n'*, all operating substantially in the manner and for the purpose set forth.

8. The combination, with the drill T and its operating mechanism, substantially as described, of the sleeve *g'*, having an external screw-thread and provided with a pin or plug, *h'*, bearing against the rear end of the drill, and the screw-threaded ratchet-wheel *k'*, fitting over and adapted to propel the sleeve *g'*, the pawl *m'*, lever *n'*, and cam *p'* on the crank-shaft *e'*, all operating substantially as and for the purpose set forth.

Witness my hand this 21st day of March, A. D. 1888.

EBEN N. HIGLEY.

In presence of—
P. E. TESCHEMACHER,
HARRY W. AIKEN.