May 14, 1940. E. A. EVERETT 2,201,032

RAILWAY RAIL DRILLING MACHINE

Original Filed April 12, 1933 3 Sheets-Sheet 1

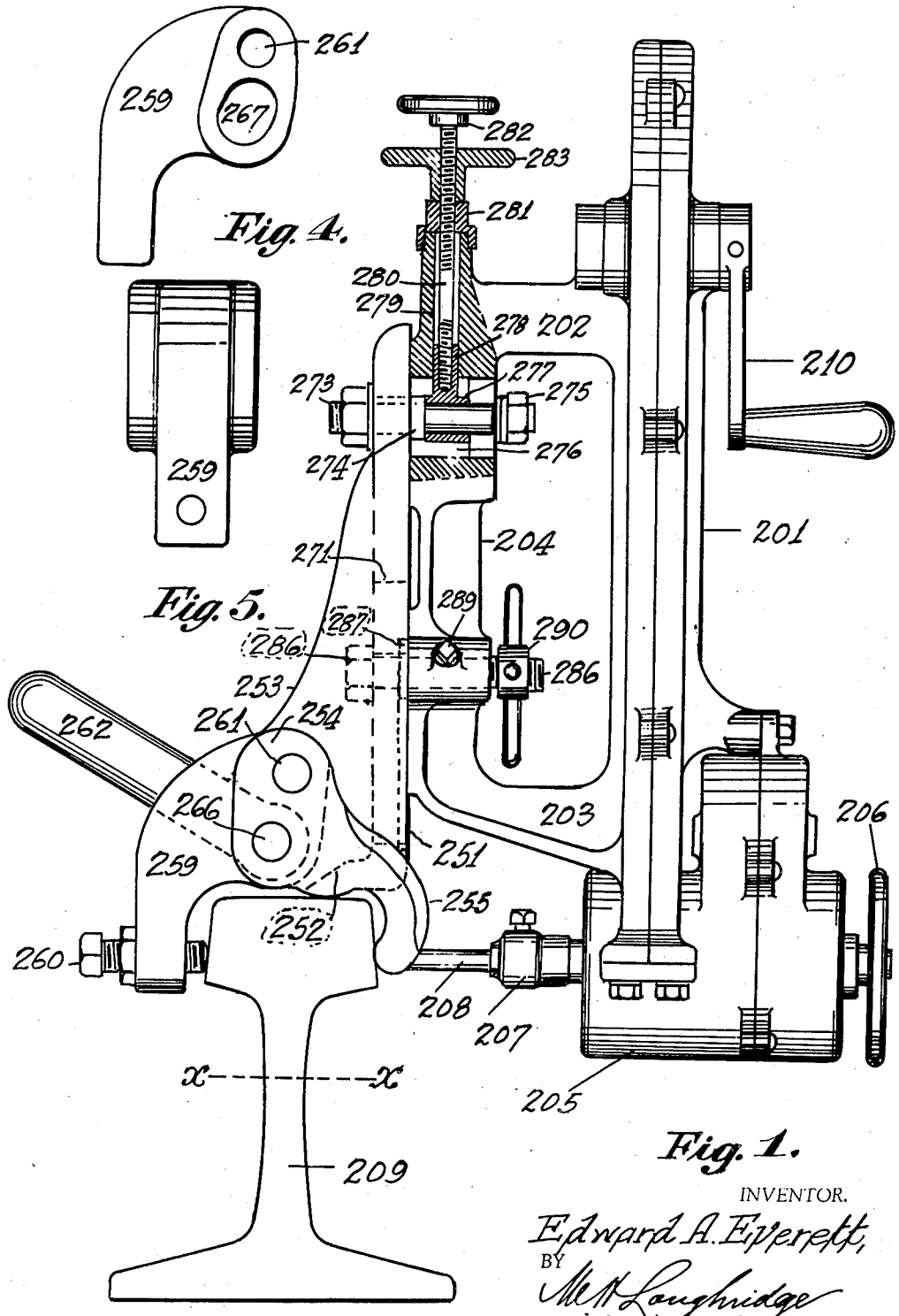

Fig. 4.

Fig. 5.

Fig. 1.

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Original Filed April 12, 1933 3 Sheets-Sheet 2

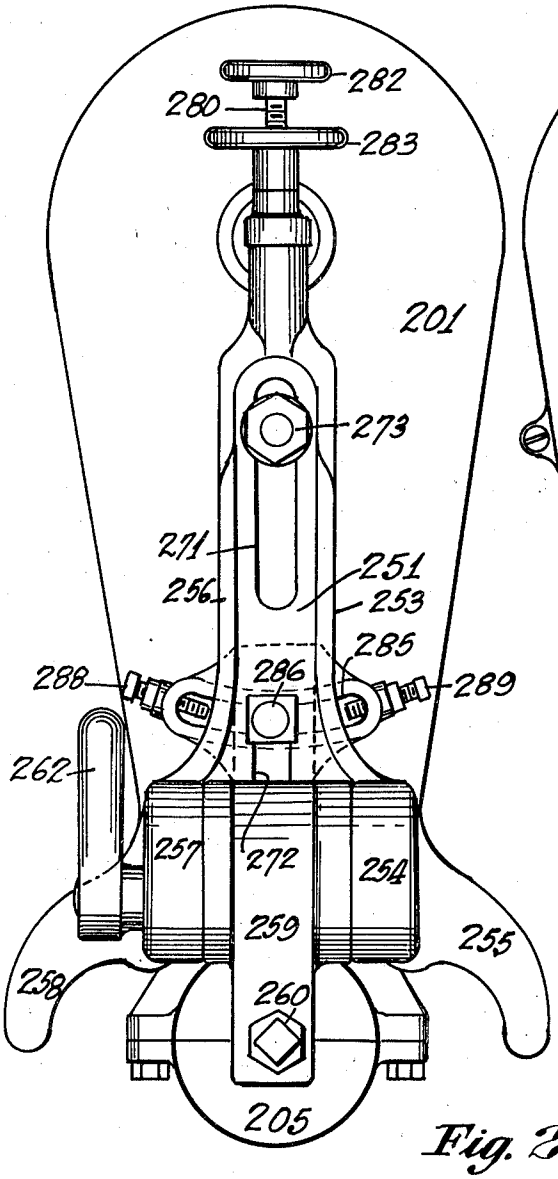

Fig. 2.

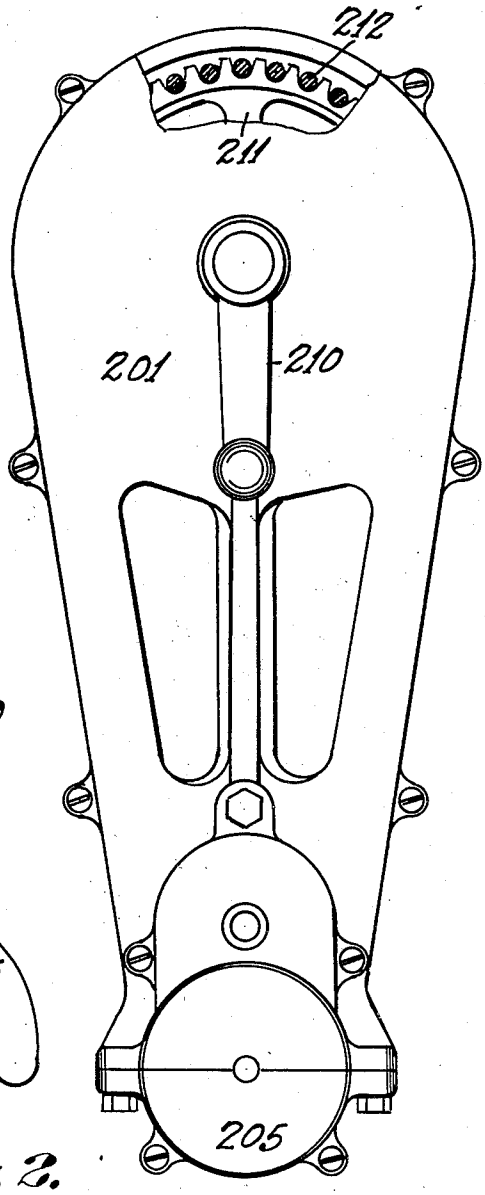

Fig. 3.

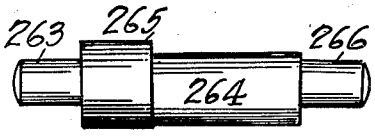

Fig. 6.

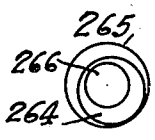

Fig. 7.

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RAILWAY RAIL DRILLING MACHINE

Original Filed April 12, 1933 3 Sheets-Sheet 3

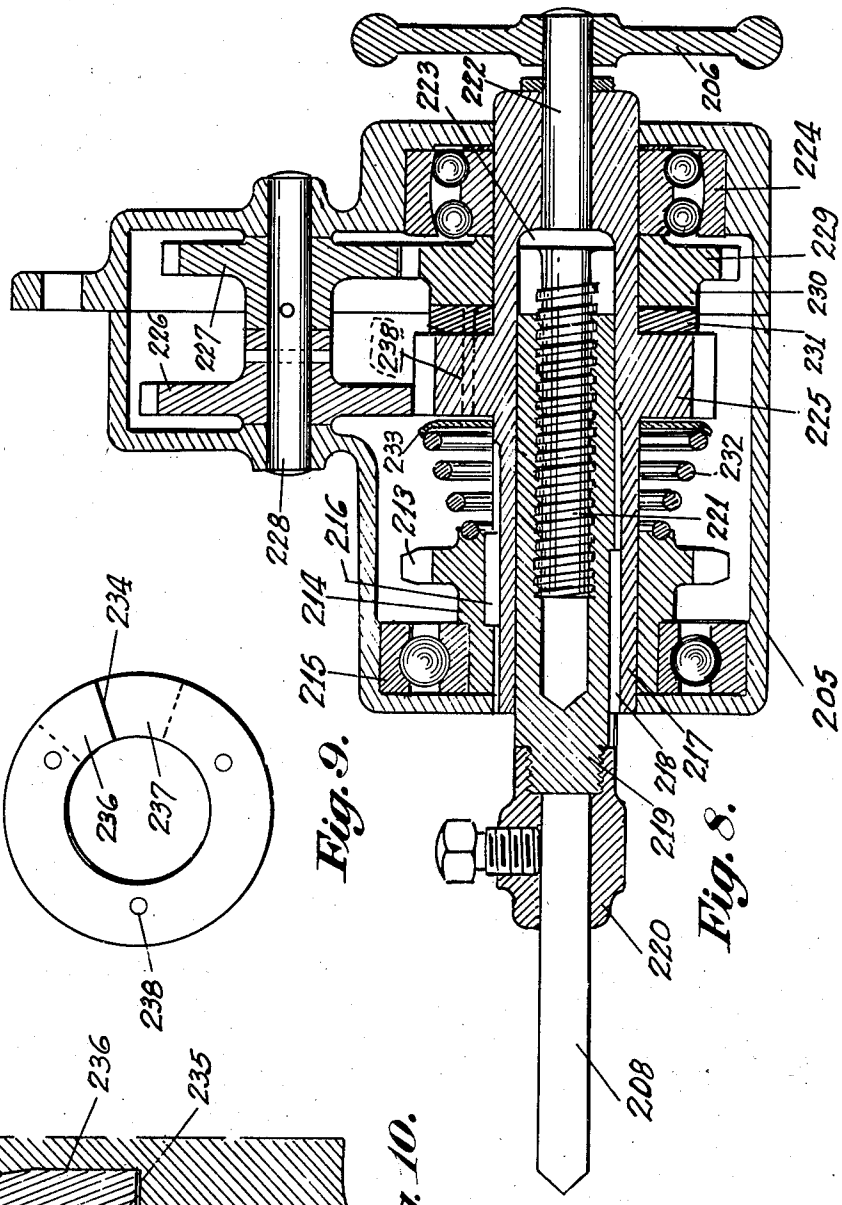

Fig. 9.

Fig. 8.

Fig. 10.

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Patented May 14, 1940 2,201,032

UNITED STATES PATENT OFFICE

2,201,032

RAILWAY RAIL DRILLING MACHINE

Edward A. Everett, Long Island City, N. Y.; Gustave A. Nelson and William R. Loughridge, executors of said Edward A. Everett, deceased, assignors to Matthew H. Loughridge, Bogota, N. J.

Original application April 12, 1933, Serial No. 665,737. Divided and this application June 12, 1937, Serial No. 148,986

7 Claims. (Cl. 77—8)

This invention relates to machines for working on the rails of a railway track and is shown applied to a drilling machine for drilling the rail for attaching electric bonds at the rail joints. These bonds are sometimes applied to the head of the rail and sometimes to the web of the rail and it is desirable that a machine for this purpose should be adaptable for drilling either location of the rail. In addition to this it is desirable to be able to drill a pair of holes spaced at predetermined distance apart by moving the drilling mechanism on its support which is rigidly clamped to the rail. The present invention is directed to the method of securing the drilling machine to the rail for the purpose above referred to. This comprises a vertical member having a head, formed in a jaw which rests upon the top of the rail and has a pair of spaced depending arms which engage the side of the rail. Opposed to these arms is the clamping member mounted in the jaw and secured to the rail by a cam action. The vertical member is located to project over the rail head and is provided with a vertical slot by means of which the frame of the drilling machine is secured to drill the head or to drill the web of the rail. The frame of the drilling machine is pivotally secured to the vertical member and is provided with a transverse slot whereby it may swing on the pivot to adjust the position of the drill horizontally and as limited by the transverse slot. These and other objects of the invention will be more particularly understood from the following specification and the accompanying drawings, in which Fig. 1 is a side elevation, partly sectioned, of a rail with the drilling machine attached thereto; Fig. 2 is a back elevation of the machine complete; Fig. 3 is an elevation from the front opposite to Fig. 2 with part of the cover removed to show the mechanism; Fig. 4 is a side elevation and Fig. 5 is an end view of the clamping member, mounted in the jaw of the head; Fig. 6 is the camshaft of the clamping member and Fig. 7 is an end view of the camshaft; Fig. 8 is a sectional elevation of the gear box and spindle that may be used for the drill mechanism; Fig. 9 is a front view of a step cam that may be used for feeding the drill and Fig. 10 is an enlarged section of the feeding cam.

This application is a division from my copending application, Serial No. 665,737, filed April 12, 1933, now Patent 2,112,694, March 29, 1938.

Drilling rails for bond connections requires a special type of drilling machine, one which is readily portable, easily attached to and removed from the rail and one which has a self-feeding mechanism for the drill. Machines of this type are in common use but in order to apply bond wire terminals to the head of the rail it is necessary to limit the drilling to a predetermined depth. It is also necessary to be able to space the drilling in the end of each rail with considerable accuracy to suit the short bonds that are used at this location. In addition to this, it is desirable that the machines be easily adjustable to drill either the ball of the rail or the web of the rail. The drilling machine illustrated in Figs. 1 to 10 inclusive embodies these features and as shown may be hand operated or may be operated by a suitable motor.

In the drawings, 201 indicates a gear case enclosing a chain gear between the hand operated mechanism and the gear box. By the arms 202 and 203, the gear case connects to the frame 204 and the gear box 205 is connected to the lower end of the gear case and is provided with the hand wheel 206 for adjusting the drill 208 carried by the chuck 207 against the ball of the rail 209.

The handle 210 connects with the chain gear 211 and the chain 212 drives the gear 213, Fig. 8. This gear is splined at 216 upon the hollow stem 217 and has the hub 214 mounted in the ball bearing 215. The hollow stem 217 is splined at 218 to the drill spindle 219 which carries the chuck 220 and the drill 208. From this construction it will be noted that the rotating gear 213 rotates the stem 217 and the drill spindle 219 but each of these parts are free to move longitudinally with respect to each other.

The adjusting screw 221 engages the hollow interior of the drill spindle 219 and is provided with a collar 223 which abuts on the shoulder of the hollow stem 217 so that when the hand wheel 206 is rotated the shaft 222 rotates the screw 221 and moves the drill 208 forwards or backwards as may be required to position the drill against the rail or to position the drill at a predetermined starting point. As the stem 217 and the drill spindle 219 rotate together at the same speed, the adjustment thus made by the wheel 206 remains until changed by this wheel. The right hand stem of 217 is mounted in the ball bearing 224.

The wide faced spur gear 225 is formed integral with stem 217 and engages spur gear 226 which is fixedly mounted on shaft 228 with spur gear 227. The gear 227 engages spur gear 229 loosely mounted on the stem 217 and having a cam 230 formed on its face. A collar 231 secured

by suitable pins at 238 to rotate with gear 225 engages the cam 230. This collar is formed in a cam with a step at 234, Figs. 9 and 10, which engages a corresponding step 235 on cam 230. As these cam surfaces are rotated relative to each other they gradually separate on the inclined faces of the cam until a complete revolution is made when the steps are in register as in Fig. 10 and the mechanism is in position for another operation. The spur gear 229 engages the bearing 224 and is held against the lateral movement by the gear case. This results in a separating action between cams 230 and 231 forcing the spur gear 225, Fig. 8, to the left and through the collar 223, screw 221 and drill spindle 219 the drill is forced to the left to the extent of the step in the cam.

As the gear 225 is forced to the left, the spring 232, engaged by plate 233, is gradually compressed until the step is reached when this spring automatically restores the drill to the starting position. In Figs. 9 and 10 it will be noted that approaching the step of the cams there is a flat portion 236 on one side and a flat portion 237 on the opposite side in which there is no rise in the cams. This is to provide for a sufficient number of rotations of the drill to cut itself free of cam pressure before withdrawing it from the rail hole and which can readily be detected, also the depth of the hole does not change due to wear of the feeding surfaces of the cams.

The depth with which the hole is drilled is determined by the rise of the cams and the rate of feed of the drill relative to its rotation is determined by the differential in the gear ratio between gear 225 and 229. If this difference is, for example, one in forty, the cams will have made one revolution relative to each other for forty revolutions of the drill.

The drilling machine is secured in position by an upstanding bracket which is designed to clamp to the head of the rail. This bracket 251 has a foot 252 which rests on top of the rail and is provided with a flange 253 which develops into the bearing 254 and the clamping arm 255 on one side and the flange 256 which develops into the bearing 257 and the clamping arm 258 on the opposite side. The clamping arm 259 is pivotally connected at 261 to the bearings 254 and 257 and is provided with the slot 267, Fig. 4, which engages the eccentric portion 264, Fig. 6, of a shaft connected at 263 with the handle 262 and having the bearings 265 and 266 working in 257 and 254. The clamping arm 259 is provided with an adjusting screw 260 and opposes the arm 255 and 258 as it is tightened on the rail by the movement of handle 262. The end of screw 260 may be provided with a suitable cap where it seats between the rail ends.

The upstanding bracket 251 is provided with a slot 271 at the top and a lower slot 272. The pivot bolt 273 is rigidly secured in the upper slot against the collar 274 and forms a pivot around which the entire machine swings, the frame being secured to this pivot bolt by the nut 275. An eye 277 is mounted on bolt 273 and has a projecting leg 278 extending into a slot 279 in the upper portion of the frame. This leg is threaded to receive the adjusting bolt 280 which is threaded in the nut 281, is rotated by the hand wheel 282 and is locked in position by the wheel 283. The bolt 280 is provided with a right and left hand thread engaging 278 and 281 whereby the eye 277 is raised or lowered in the slot 276 of the frame to secure a comparatively rapid and accurate adjustment of the position of the drill relative to the rail. Frequent adjustments may be necessary when working on the ball of the rail.

As a pair of holes must be drilled for each rail bond and as the bonds are comparatively short and limited in length, it is desirable that these holes be spaced with considerable accuracy an equal distance from the end of each rail. For this purpose the machine is clamped to the track with the center clamp at the abutting ends of the rails and the clamp is retained in this position while both holes are drilled, the machine being swung about the pivot bolt 273 an equal distance in both directions from the center. For this purpose the frame 204 is provided with an arcuate slot 285, having its centre approximately on the pivot bolt 273. A bolt 286 is clamped to the frame by means of the collar 287 and extends through this slot to engage the hand wheel 290. The frame is free to swing about the bolt 273 to the extent of slot 285 and this swing is adjusted in one direction by the stud 288 and in the opposite direction by the stud 289. The machine is first moved in one direction to the limit of stop 288 and is clamped in this position by 290 for drilling the first hole. When this is completed the clamp 290 is released and the machine is swung in the opposite direction to the limit of stop 289 when it is again clamped in position for the drilling of the second hole.

When it is desired to drill the web of the rail instead of the ball of the rail the bracket 251 is clamped to the head of the rail as described, but the bolt 273 and the bolt 280 are each released and lowered in the slots 271 and 272 respectively until the drill 208 aligns with the position in the web of the rail to be drilled as indicated by line x—x. In this position the machine may be arranged to drill one hole or it may be arranged to drill a pair of spaced holes in the manner described.

This machine is comparatively light, can be carried around by the operator and is mounted on anti-friction bearings so that it can be operated by one man.

In the construction described it will be observed that the upstanding member 253 has a head 252 which rests upon the top of the rail and terminates in the members 254 and 257 forming a jaw constituting the bearings for the clamping member 259 operated by the handle 262. The vertical face 251 of the member 253 projects beyond the plane of the rail head so that the frame 204 is free to slide vertically against 251 to locate the drill in the position desired. At the same time the transverse slot 285 in the frame 204 provides for a limited swinging movement of the drilling mechanism about the pivot bolt 273, thus enabling a pair of holes to be drilled, spaced at a predetermined distance apart for one location of the vertical member. The eye 277, pivotally engaging the bolt 273 is located above the center of gravity of the drilling mechanism so that this mechanism swings like a pendulum. The screws 288, 289 and 280 provide for a micrometer adjustment of the position of the drill and the wheel 290 provides a lock whereby, when in the drilling position, the machine is rigidly locked to the member secured to the track. It will be noted that with this rail attachment the frame of the drilling machine is pivoted at the top and the drilling mechanism swings like a pendulum parallel with the rail. Normally, the machine centres itself

by gravity on the support opposite the rail joint and it swings an equal distance in each direction from the centre as determined by the stop screws 288, 289, to drill a hole in each rail which holes are equally spaced from the rail ends and are in the same horizontal plane.

The securing mechanism shown herein is adaptable for use on different types of machines for working on the rail.

Having thus described my invention, I claim:

1. A support for securing a machine tool to a railway rail, comprising a vertical member having a base resting upon the railhead and its vertical face projecting beyond the plane of the railhead, a pair of spaced depending arms from said base arranged to engage one side of the rail, a clamping member pivoted to said base to engage the opposite side of the rail between said depending arms, a cam pivoted to said base engaging said clamping member to engage or disengage the clamp and means for pivotally securing the machine tool to the top of said vertical member to hang vertically and to swing parallel to the rail for locating the tool in spaced positions from the vertical to operate on the side of the rail.

2. Means for securing a machine tool to a railway rail comprising a vertical member resting upon the rail and clamped thereto and having its vertical face projecting outside the plane of the railhead, there being a pair of vertical slots, one above the other, in said vertical member, a bolt adjustably located in each slot, a machine tool pivotally mounted on the bolt in the top slot to swing parallel to the rail and means on the machine tool engaging the bolt in the lower slot to limit the extent of the swing of the machine to locate the tool for operating on the rail.

3. In means for securing a machine tool having a frame to a railway rail, the combination, a vertical member resting upon the rail and rigidly clamped thereto and having a vertical slot with a bolt adjustably located therein, an eye in the frame of said machine, means for vertically adjusting said eye relative to said frame, said eye being pivotally mounted on said bolt to enable the tool to swing parallel to the rail and means for clamping said frame to the vertical member.

4. Means for securing a drilling machine with a drill spindle to a railway rail comprising a vertical member resting upon the rail and rigidly clamped thereto, and having a vertical slot therein and a pivot bolt adjustably located in said slot, the drilling machine having an eye vertically adjustable thereon mounted on said pivot bolt whereby the machine is free to swing parallel to the rail and is vertically adjustable to drill the head of the rail or to drill the web of the rail and means for rigidly clamping the drilling machine to the vertical member when the machine is in operation.

5. Means for securing a drilling machine having a frame with a drill spindle to a railway rail comprising a vertical member resting upon the rail and clamped thereto, a pivot bolt at right angles to the rail adjustably mounted in a vertical slot in said member, a clamping bolt in said member, there being a transverse slot in said frame receiving said clamping bolt, adjustable means in said frame engaging said bolt and means pivotally securing said frame to said pivot bolt to swing parallel to the rail whereby the drill spindle is vertically and horizontally adjustable relative to the rail.

6. Means for securing a drilling machine having a frame and a drill spindle to a railway rail, comprising a vertical member resting upon the rail and clamped thereto and having a vertical slot therein, a pivot bolt at right angles to the rail adjustably positioned in said slot, an eye in said frame pivotally mounted on said bolt, said pivot bolt being adjustable vertically for locating the drill spindle to drill the head of the rail and to drill the web of the rail and means providing for a limited swing of said frame parallel with the rail on the pivot bolt to locate the drill spindle for drilling a plurality of holes in predetermined positions in a horizontal row in each location.

7. Means for securing a drilling machine with a drill spindle to drill the ends of abutting rails at a joint, comprising a vertical member secured to the rails at the joint and having a pivot at its top at right angles to the rail and located perpendicular to the joint, and a drilling mechanism mounted on said pivot with the drill spindle free to swing parallel with the rail for a limited distance on each side of the joint and means for independently adjusting the swing of the machine from the perpendicular in each direction.

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