May 29, 1928.

E. A. EVERETT

POWER RAIL DRILLING MACHINE

Filed Aug. 11, 1924

6 Sheets–Sheet 1

Fig. 1

Inventor
Edward A. Everett
By M. Laughridge, Attorney
May 29, 1928.

E. A. EVERETT

POWER RAIL DRILLING MACHINE

Filed Aug. 11, 1924

Inventor,
Edward A. Everett

By McLaughlin, Attorney

Fig. 2
This invention relates to a rail drilling machine operated by power for drilling the rails of a railway track and has for an object to provide a machine of this class which will drill large holes in the web of the rail, which will drill the hole accurately in a marked centre, which will drill holes close to the ends of a single rail, which can be readily rolled along the rail, which is easily positioned for drilling and which can be quickly removed from the track. These and other objects of the invention will be more fully understood from the following specification and the accompanying drawings, in which, Fig. 1 is a plan view of the machine and Fig. 2 is an elevation. Fig. 3 shows the method of securing the machine in position on the rail when drilling, Fig. 4 is an elevation of the transmission mechanism from the motor shaft to the drill spindle with the casing shown in section, Fig. 5 is an elevation of the gear case, Fig. 6 is a detail, partly in section, showing the mechanism for operating the drill feed, Fig. 7 is a detail of the handle operating the feed mechanism, Fig. 8 illustrates the method of adjusting the supporting shoe, Figs. 9 and 10 are details of the eccentric bearings for the rollers, Fig. 11 is a side elevation of the complete machine, Fig. 12 is a part elevation from the motor end and Figs. 13 and 14 are details.

Modern railroads designed for heavy traffic are laid with rails weighing from 100 to 115 lbs. to the yard and have a web of approximately \( \frac{7}{8} \)" in thickness. It is found that these rails wear more rapidly at the ends where the wheels pass from one rail to the other than elsewhere and this has led to a process of cropping rail in order to extend its life. Cropping consists in cutting off a portion of the end of the rail where it is worn and providing a new set of holes for the splice bars so that the rail can be relaid after the worn portion is removed.

Therefore rails have been taken up from the track and removed to a machine shop where the ends are sawn off and the rail is redrilled preparatory to its relaying. The ends are now burned off with an oxy-acetylene torch without taking up the rails but it is not economical to drill the ends with hand drills. The power operated drill, of the present invention, enables the rail to be drilled in the track or on the end of the ties thereby effecting great economies in this process of rail cropping. This machine is equipped with a 4 H. P. motor and will drill a one and one half inch hole in a 135 lb. rail in one and three quarter minutes. It weighs approximately 350 lbs. and can easily be operated and removed from the track by two men. It will drill rails that are laid forming part of the running track or it will drill rails that are set up on the ends of the ties preparatory to laying or it will drill a single rail and will drill holes very close to the end of such single rails.

The machine is mounted upon rollers to roll upon the track from place to place and is readily disengaged from the rail and removed in an emergency such as might arise in clearing the track for an approaching train.

This invention is designed along the lines shown in U. S. Patent 1,421,194, issued in my name on June 27, 1922. A number of features are embodied in this machine which are not found in the former. These are brought about by the increased weight and power of the machine, by the necessity for drilling through a marked point and by the necessity for quickly positioning the drill to various sizes of rail and to varying conditions of track and ties so that the time required to position the drill will not be out of proportion to the time consumed in drilling the hole.

Referring to the drawings, Fig. 3 represents the end section of a railway rail, Fig. 1 is the main frame of the machine which is mounted to roll upon the rollers 13 and 14 on one rail of the track. The entire machine is balanced upon these rollers so that it can be moved along the track with comparatively little effort. The frame 12 has right angle extensions 15 and 16. The extension 15 supports the gearing and the drill and the extension 16 supports the engine or motor. The feeding mechanism for the drill is housed in 17 and 18 is an adjustable shoe whereby the elevation of the drill is adjusted. The handle 19 at one end of the frame and the handles 20 and 21 at the opposite end enable the machine to be lifted from the track by two men. The frame 16 is formed in a T to support the handles as indicated at 22 and 25 is the bed.
for the engine or motor 23 having the fly wheel 24 and connected to the driving shaft 26.

The gear transmission from the motor to the drill spindle is shown in Fig. 4. The engine or motor shaft is indicated by 26 upon which the gear 27 is mounted; this gear engages 28 which is mounted integrally with the gear 29 which engages 30 mounted upon the horizontal shaft 31 which carries the bevel gear 32 at the opposite end. This gear engages the bevel gear 33 mounted upon the vertical shaft 34 which, at the lower end, carries the bevel gear 35 which engages the bevel gear 36 rotating on the axial line of the drill. This gear transmission provides a positive drive and as shown has a reduction of about 18 to 1 between the engine shaft and the drill spindle. The gears are supported by the cover 37. The bevel gears are enclosed by the cover 44 and the bevel gears on the drill spindle are enclosed by the casing 45. The drill spindle 37 has a spline 38 which engages the bevel gear 36 causing the drill 39 to rotate therewith. The drill 39 is secured in the chuck 40 and the spindle rotates in the bearings 41, 46, 47 and 48 Fig. 2 form an upstanding pipe rail by means of which the machine may be guided upon the track and also forms a convenient support for the engine or motor controls which are not shown in the drawings.

The drill feeding mechanism is housed in the casing 51 and comprises a sliding member 52 in which the end of the spindle 53 rotates. This spindle is secured by the nut 54 at the end to the sliding member and a thrust ball bearing 55 is introduced between the sliding member 52 and the spindle 37. It will be noted from Fig. 6 that the rack bar 56 is secured to the sliding member 52 and is the medium by which the sliding member is moved to feed the drill. A cover 57 conceals and protects the rack bar. The gear wheel 58 mounted upon shaft 59 and protected by the cover 60 engages the rack bar so that the movements of 52 are controlled by this gear. A hand wheel 61 is provided on the end of shaft 59 and is the means by which the drill spindle is rapidly moved towards or away from the drilling position. The periphery of this wheel is corrugated so that it may be grasped firmly by the hand.

On the shaft 59 the gear wheel 62 is mounted. This wheel is much larger in diameter than 58 and through its operation a considerable leverage is obtained against the working of the drill. Gear 62 is protected by a cover 67 by which it is entirely enclosed. Rotatably mounted upon the shaft 59 is the bracket 63 supporting the socket 64 of the feeding handle 65. This handle is provided with a pawl 66 by means of which it may be latched to the gear 62 so that the handle and gear move together, or it may be unlatched so that the feeding handle can be moved independently of 62. The pawl 66 is operated by the latch rod 69 and is normally held in engagement with 62 by the coil spring 68. The latch rod can be released manually by the latch rod handle 70 and it is also released automatically when the feed handle is in a predetermined position by the tappet 71, pivoted at 72 to the socket 64 and pivotally connected with the latch rod at 73. When the feed lever is moved to the left as indicated in Figs. 7 and 11, tappet 71 engages 74 and is raised thereby releasing the pawl 66 and enabling the drill to be moved by the hand wheel 61. The tappet releasing member 74 is secured at 75 to the gear case as shown in Figs. 1, 4 and 11 and releases the feed handle when the latter is thrown forward.

In using this machine the holes are centre punched and are drilled accurately to position. The drill must be operated at right angles to the rail as indicated by line a Fig. 9. The drilling mechanism is supported by the shoe 18 Fig. 11 which rests upon the ties of the track. Considerable variation exists between the ties and the rail and in order to obtain the proper position of the drill with relation to the rail, it is necessary to make frequent adjustments of the position of the shoe 18. This shoe is pivoted on a shaft 81 to the projection 82 of the casing 51, as shown in Fig. 6. A lug 83 formed integral with 18 is developed into a worm quadrant 84. This is engaged by the worm 85, Fig. 8 mounted on shaft 86 and supported by bracket 87. Turning handle 87 adjusts the position of 18 with a micrometer adjustment.

The thrust from the drill is taken up by the quadrant 91, Fig. 8. The end of this quadrant engages the rail on line a opposite the drill and is forked at 92 as indicated by the shaded lines so that the drill can pass between the legs of the fork. The quadrant 91 is mounted on shaft 93, Fig. 1 and is normally raised as indicated at 108 Fig. 3 by the coil spring 94. This holds the quadrant clear of the rail and the splice bars and bolts as the machine is moved on its rollers. The quadrant is lowered to the position shown in Fig. 5 by means of the pedal 100 and bar 99 bolted to the bracket 98 which is free to turn on shaft 93. A lug 97 on this bracket engages a lug 97° on collar 95 which turns shaft 93 and lowers the quadrant. When the pedal is released it is returned to its normal position by the spring 101. When the quadrant is lowered it is automatically latched in the lowered position by the plunger 103 working in the boss 102 and engaging a hole 103° Fig. 14 in the quadrant. This plunger is held in the engaging posi-
tion by the spring 104 and is released by the arm 105, which is pivoted at 106 and operated by the arm 107. Arm 105 is forked on the end to engage the bent over end of plunger 103. Pressure applied to 107 to withdraw plunger 103 permits the quadrant to return to the raised position instantly. A detailed plan view of this mechanism is shown in Fig. 13.

In order that the machine may be properly supported when on the ground, a foot 111 is pivotally connected to the frame 16 as shown in Figs. 1 and 3. This foot is level with the rail and in combination with the shoe 18 forms a rigid support. It is necessary to turn the foot out of the way when the machine is placed on or operated on the rail. For this purpose a latch 113 is provided having a plunger working in 115 and engaging holes in the frame 16 such as 114. When the latch 113 engages 114, the foot is positioned on line b Fig. 3 and as shown in Fig. 11.

The machine is clamped to the rail by the mechanism shown in Fig. 3. Latch 122 projecting from the frame 12, Fig. 1, form the bearings for shaft 122 upon which the clamping arm 123 is mounted, also the clamping members 124 and 125. A screw 126, adjusted by the knob 127, is screwed into each of the clamping members. These screws terminate in spheres 128 which engage the head of the rail as shown and can be adjusted to engage below the rail head and thus assist in holding the machine down on the track or can be adjusted to engage the side of the rail or to take up a position between these points. The clamping member 125 is slotted on its longitudinal center and is tightly clamped on 126 by the locking wheel 129. The wheel 130 performs the same function for clamping member 124. A toothed quadrant 131 is secured to the frame. This quadrant has its centre on shaft 122 and holds the clamping lever 123 in position by means of the latch 133 pivoted at 134 and engaging the quadrant at 135. This latch is released by the latch rod 132.

The height of the frame above the rail head is determined by the rollers 13 and 14. For this purpose these rollers are provided with eccentric bearings having a quick method of adjustment. The detail construction of this bearing is shown in Figs. 9 and 10. The roller shaft 141 is carried by the eccentric disc 142 which is provided with a flange 143 engaging the frame 144. A toothed quadrant 145 is also secured to this frame. A projected bracket 146 formed integral with the eccentric disc has a jaw 147 in which the toothed latch 148 is pivoted to engage the toothed quadrant 145. A lever handle 149 is secured to 146 and a plunger 150 in this handle releases the latch 148 so that the eccentric may be rotated in the frame 144 until the frame is at the desired height when it is locked in position by the latch 148. A corresponding eccentric is mounted on the opposite end of shaft 141 and rotates therewith.

It will be noted from Fig. 1 that the rollers 13 and 14 are spaced a considerable distance apart while the drill is located centrally between them. When holes are to be drilled close to the end of the rail it is apparent that one of the rollers will overhang the rail and if there is no adjacent rail this roller will have no support. In order to operate the machine under these conditions the leveling screws operated by the hand wheels 155 and 156, Fig. 1, are provided. These screws, it will be noted, are located close to the centre of the machine and therefore close to the drill. The hand wheel 156, Fig. 3 operates the threaded stem 157 which terminates in the point 158 engaging the rail head. A locking disc 159 is provided to lock screw 157 against turning from the vibration of the machine. The point 158 therefore, holds the machine in its proper relation to the rail when one of the rollers are projecting beyond the rail.

In operation the machine is placed upon the rail and its height above the rail is adjusted by the eccentricities of the rollers until the point of the drill aligns with the marking for the hole. The drill is then levelled by turning the shoe 18 with the handle 87. The quadrant 91 is lowered and latched and the clamping lever is operated to clamp the rail head. The drill is now brought up to the drilling position by the hand wheel 61 and after the motor is started it is fed by lever 65. One movement of this lever will feed the drill through the web of the rail. The pressure on the drill is regulated by this lever as desired. When the drilling is completed or when the machine is to be moved, the feed lever is moved to the starting position which unlatches it from the feed mechanism and the drill is moved away from the rail by hand wheel 61. The quadrant 91 is then unlatched and the clamping lever 123 released when the machine is free to be moved as desired.

The preferred embodiment of my invention is shown in the drawings but it is apparent that the details of the construction can be modified without departing from the intent and spirit of the invention.

Having thus described my invention, I claim:

1. In a machine for drilling rails of a railway track, the combination of a mechanism mounted upon a frame arranged to roll upon a rail of the track, said frame having projections at right angles to said rail, one projection supporting the drilling mechanism and resting upon a shoe and the other projection supporting a motor and having...
a foot pivotally connected thereto, means whereby said foot may be moved above the plane of said rail and a latch for holding said foot in position.

2. In a machine for drilling rails of a railway track, the combination of a mechanism mounted on a frame and operating a drill for drilling the web of said rail, a quadrant pivotally connected to said frame and arranged to engage said rail opposite said drill, said quadrant having a normal tendency to raise its rail engaging end above the plane of said rail.

3. In a machine for drilling rails of a railway track, the combination of a mechanism mounted on a frame and operating a drill for drilling the web of said rail, a quadrant pivotally connected to said frame and arranged to engage said rail opposite said drill, said quadrant having a normal tendency to raise its rail engaging end above the plane of said rail and a latch for holding it in the engaging position.

4. In a machine for drilling rails of a railway track, the combination of a mechanism mounted on a frame and operating a drill for drilling the web of the rail, a quadrant pivotally connected to said frame and arranged to engage said rail opposite said drill and a latch operating automatically for holding said quadrant in the engaging position and means for releasing said latch.

5. In a machine for drilling a rail of a railway track, in combination; a frame; means supporting the frame and allowing it to roll along supported by one rail only of the track; two studs passing through the frame; means to adjust the studs vertically so that they may be made to bear on the top of the rail and free the first mentioned means from the rail; means partly positioned on one side of the rail and partly positioned on the other side of the rail and bearing on the trackway for steadying and supporting the ends of the frame; a drill having its line of action substantially midway between the studs and means for operating the drill carried by the frame.

6. In a machine for drilling a rail of a railway track, in combination; a frame substantially in the form of a cross; means connected to the ends of one of the members of the cross for supporting and rolling the frame along one rail of the railway track; a drilling mechanism attached to the other member on one side of the first mentioned member and a motor attached to the second member on the other side of the first mentioned member, means connecting the drilling mechanism with the motor; pivoted means attached to the frame on the same side as the motor for bearing on the web of the rail on each side of and closely adjacent to substantially the line of action of the drilling mechanism and means for clamping the frame to the rail attached to the frame on the same side as the drilling mechanism.

7. In a machine for drilling a rail of a railway track, in combination; a frame having a portion positioned at a right angle to the rail and extending on both sides of the rail; means attached to the frame on one side of the rail for clamping the frame to the rail and means attached to the frame on the other side of the rail manually operable to bear against the web of the rail and manually operable means for releasing said first named means and means for automatically moving it free of the rail.

8. In a machine for drilling the rails of a railway track, the combination of a mechanism mounted upon a frame arranged to roll upon a rail of the track, said frame having projections at right angles to said rail, one projection supporting the drilling mechanism and having a shoe thereunder for supporting it with means for adjusting the height of said shoe and the other projection supporting a motor having a foot pivotally connected thereto, means whereby said foot may be moved above the plane of said rail and a latch for holding said foot in position.


EDWARD A. EVERETT.