Nov. 6, 1928. 1,690,102

J. L. CHRISTIAN

TRACK DRILL

Filed Oct. 9, 1926 2 Sheets-Sheet 1

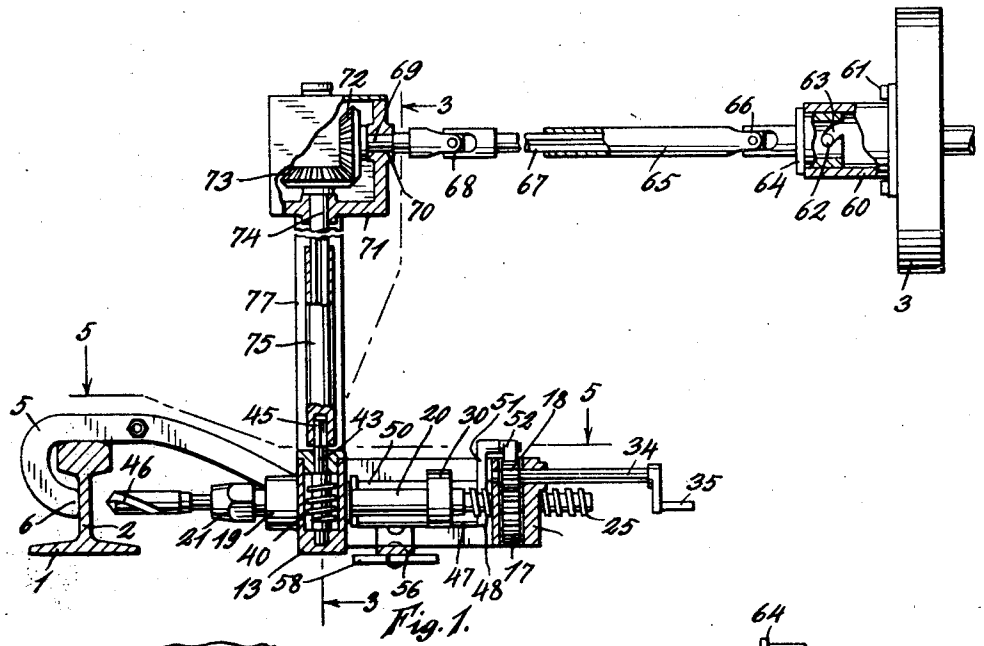


Fig. 1.

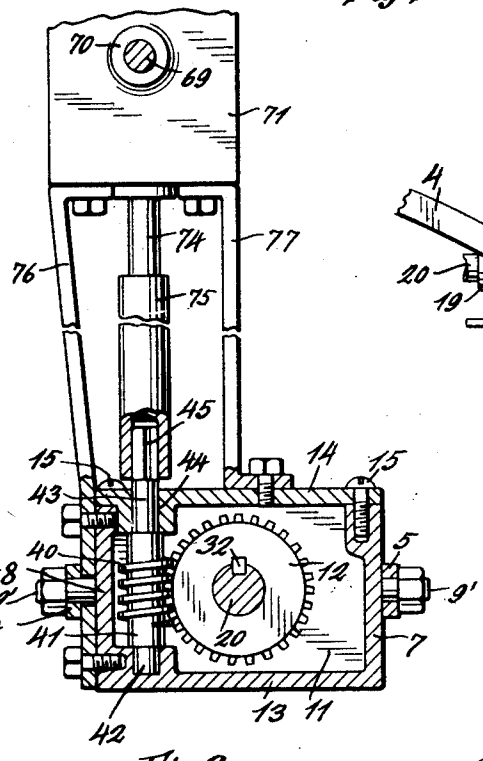


Fig. 3.

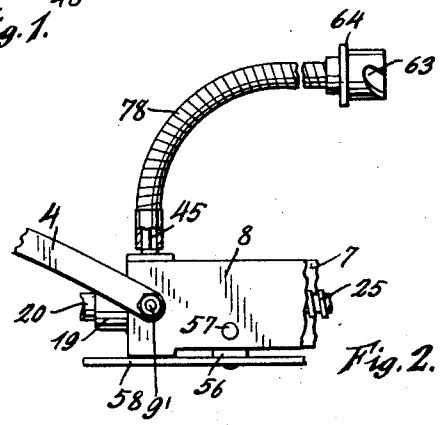


Fig. 2.

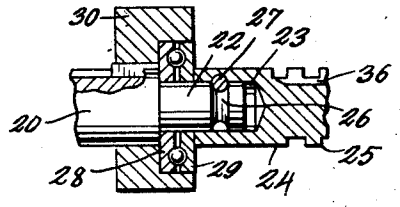


Fig. 4.

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TRACK DRILL

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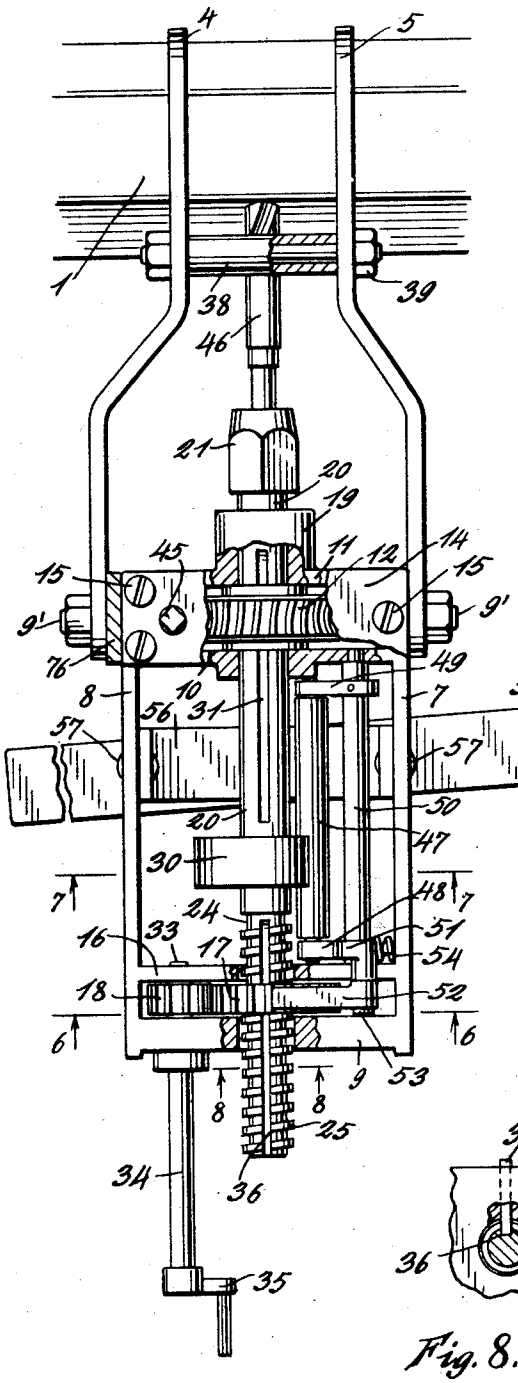


Fig.5.

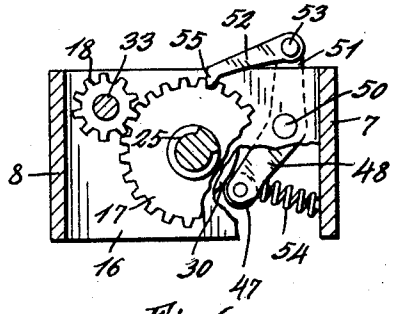


Fig.6.

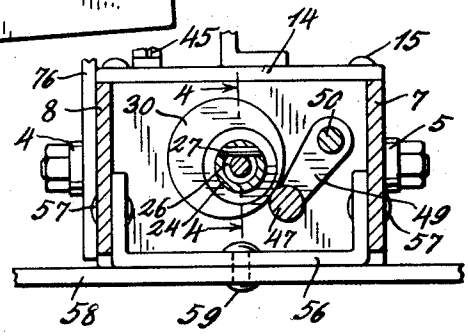


Fig.7.

Fig.8.

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UNITED STATES PATENT OFFICE.

JAMES L. CHRISTIAN, OF DENVER, COLORADO.

TRACK DRILL.

Application filed October 9, 1926. Serial No. 140,480.

This invention relates to improvements in track drills of the kind employed in drilling holes through the webs of railway rails, I-beams and other structural steel, but is adapted more particularly to the use of drilling holes in railway rails.

It is often necessary in railway construction to drill holes in the webs of railway rails for the purpose of making connections between adjacent rails. Whenever a new rail is to be inserted, the ends of the rail must be drilled to fit the openings in the fish plates and as this must be done out on the section, it has heretofore been accomplished almost exclusively by hand powered drills which are very slow and which therefore delay the operation to a considerable extent. It is the object of this invention to produce a drill construction that is adapted to be operated by power and which is provided with a suitable connection by means of which power can be applied to it from the gasoline engine, which is usually provided on the construction cars that are used by the track men. In this manner the holes can be very quickly drilled with a minimum amount of labor which speeds up the operation of replacing rails and reduces the expense incident thereto.

The above and other objects which may become apparent as the description proceeds are attained by means of a construction which I will not describe in detail, reference for this purpose being had to the accompanying drawings in which:

Fig. 1 is a side elevation partly in section showing my improved drill in place on a railway rail and showing the manner in which power is transmitted to it from the gasoline engine;

Fig. 2 is a fragmentary detail view showing a flexible shaft substituted for the power connection illustrated in Figure 1.

Fig. 3 is a section taken on line 3—3, Fig. 1, and is intended to show the worm gear drive and the construction of the gear housing;

Fig. 4 is a section taken on line 4—4, Fig. 7, and shows the construction of the thrust bearing and the cam which is associated therewith;

Fig. 5 is a view taken along line 5—5, Fig. 1, with parts broken away to better disclose the construction;

Fig. 6 is a section taken on line 6—6, Fig. 5;

Fig. 7 is a section taken on line 7—7, Fig. 5; and

Fig. 8 is a section taken on line 8—8, Fig. 5.

In the drawing reference numeral 1 represents a cross section of an ordinary railway rail of well known construction and 2 indicates the web which is to be perforated for the reception of bolts, while numeral 3 indicates the fly-wheel of an internal combustion engine, which is usually provided on the construction cars and, which furnish the power for moving the cars along the track and which will also furnish the power for operating the drill.

Referring now more particularly to Figures 1 and 5, it will be noted that I have provided two hook members 4 and 5, whose ends 6 are adapted to engage one side of the web 2. The other ends of these hook members are secured to opposite sides of a frame work, comprising side members 7 and 8, by means of bolts 9'. The side members 7 and 8 are parts of a rectangle whose ends are formed by transverse members 9 and 10 whose ends are preferably electrowelded to the side members so as to form a substantial unitary construction. The transverse member 10 connects the side members 7 and 8 a short distance back from the ends of these side members and another transverse member 11 is connected to the ends of the members 7 and 8 so as to form a space for the reception of the worm wheel 12. A plate 13 is connected to the lower edges of members 10 and 11 and also to the side members 7 and 8 so as to form a box whose open upper end is closed by means of a cover section 14. This cover section may be held in place by screws 15 in the manner shown in Figure 5. A transverse member 16 is electrowelded to the inner sides of the side members 7 and 8 and is placed a short distance from the inner surface of the end piece 9 so as to form a space for the reception of the gear 17 and the pinion 18. The transverse member 11 has a protruding hub 19 which forms a bearing for the shaft 20. The outer end of this shaft is provided with a chuck 21 and the other end has a portion 22 (Fig. 4) which is adapted to enter an axial opening 23 in the end of the portion 24, which is provided with screw threads 25. The reduced cylindrical end 22 has an annular groove 26 which is adapted to receive the pin 27 which keeps the parts 20

and 24 from moving longitudinally with respect to each other. A thrust bearing comprising ball races 28 and 29 is placed between the end of the shaft 20 and the end of the part 24 so as to produce a frictionless bearing which resists the thrust due to the feed mechanism, which will be hereinafter more fully described. A cam 30 surrounds the end of the shaft 20 and is nonrotatably attached to the latter. The shaft 20 has a slot 31 which extends substantially the entire length thereof and which is adapted to receive the spline 32 which is integral with or connected to the worm gear 12, so as to prevent the latter from rotating with respect to the shaft and to permit the shaft to slide transversely through the gear. The transverse members 9 and 16 are provided with perforations through which the threaded end 25 extends in the manner shown in Figure 5. The gear wheel 17 has a threaded opening which cooperates with the threads 25 and therefore when this gear is rotated it will move the parts 24 and 20 longitudinally and feed the drill. The pinion 18 is secured to shaft 33 which is journalled in the transverse parts 9 and 16 and is provided with a rearwardly extending portion 34 to which the handle 35 is secured. By rotating the handle 35, the gear 17 will be rotated and this, of course, will feed the drill in the manner indicated. The threaded portion 24 of the shaft is provided with a longitudinal groove 36 which is adapted to receive a spline 37 carried by the end member 9 and which cooperates with this groove to prevent the threaded portion from rotating so as to get the feeding action desired. The hook members 4 and 5 are spaced by means of a ferrule 38 and are clamped against the ends of the ferrule by means of a bolt 39 (Fig. 5).

The worm gear 12 which is nonrotatably secured to the shaft 20 is rotated by means of a worm 40 which is secured to or formed integral with the shaft 41. The lower end of this shaft, which has been indicated by reference numeral 42, is rotatably mounted in a bearing in the bottom member 13, while the upper reduced end 43 rotates, in a bearing 44 in the cover plate 14. The end 43 extends upwardly beyond the top of the cover member and has a square section 45 to which the power shaft may be attached. When the worm is rotated, it is obvious that the worm gear 12 will be rotated and this will cause the shaft 20 to turn and to rotate the drill 46 which is secured in the chuck 21. If we now suppose that power is supplied to the square end 45 for the purpose of rotating the latter, it is evident that the drill will be rotated and it can be fed towards the rail by means of the handle 35. If an automatic feed mechanism were not desired, it is evident that the parts already connected would be sufficient to enable the device to function as a drill. It is, however, desirable that the feeding shall be automatic and for this purpose I have provided an eccentric 30 which rotates with the shaft 20. This eccentric contacts with a roller 47 that is pivoted to the arms 48 and 49 which are nonrotatably secured to the shaft 50, whose ends are pivoted in the transverse bars 10 and 16. The arm 48 extends to both sides of the shaft 50 in the manner indicated in Figure 6 and the upper portion of this arm has been designated by reference numeral 51. The upper end of arm 51 is bent transversely and a pawl 52 is pivotally attached thereto by means of a pin 53. A coil spring 54 (Fig. 6) has its ends abutting the side member 7 and the lower end of the arm 48 so as to urge the roller towards the cam. When the shaft 20 and the cam 30 are rotated, it is evident that the roller 47 will be moved towards and away from the axis of the shaft 20, thereby oscillating the arm 51 and the pawl 52. The pawl is provided with a sharp end 55 which is adapted to engage the teeth in the gear wheel 17 so as to step this gear wheel around one tooth for every revolution of the shaft 20. This produces an automatic feed which makes it unnecessary to employ the manual feed device except for moving the drill towards the web when the operation is started and for withdrawing the same after the hole has been completed. In order to provide a support for the mechanism so that it will rest firmly on the road bed, I have connected the sides 7 and 8 by means of a yoke member 56 whose ends are secured to the side members by means of rivets 57. A bar 58 is pivoted intermediate its ends to the base of this yoke member by means of rivet 59. The bar 58 can be moved transversely when the drill is in operation and longitudinally when the drill is to be transported.

It has been customary to operate drills of this type by hand for the reason that they are used along the track where no power has been available. It is now the almost universal practice to equip the so-called "hand cars" with an internal combustion engine and therefore the workmen have an available source of power for operating the drill. In Fig. 1 I have shown a fly-wheel 3 which is part of the engine referred to. I have provided a socket 60 which is secured to the outside of the wheel 3 by means of bolts 61. This socket has an inwardly projecting bolt or pin 62 which is adapted to engage a slot 63 in the plug 64. This plug is attached to the outer end of the tubular shaft section 65 by means of a universal joint 66. The tubular part 65 has a noncircular cross section and has telescopically connected therewith a rod 67 which has a cross section that fits the interior of the part 65. A universal joint 68 connects the end of rod 67 with the shaft 69 which is journalled in the bearing 70 of the housing 71. A bevel gear 72 is connected to the inner

end of the shaft 69 and this meshes with a similar gear wheel 73 on the upper end of the shaft 74 which has a telescopic, but nonrotatable connection with the tubular shaft portion 75, whose lower end has a noncircular socket that receives the plug 45. The housing 71 is supported on the upper end of the uprights 76 and 77 whose lower ends are bolted to the side 8 and cover 14 respectively of the housing.

It is apparent from the above description taken in connection with Figs. 1 and 3 of the drawing that when the fly-wheel 3 is rotated, the drill will also be made to rotate and therefore the holes can be speedily drilled. The "hand car" may be left standing on the track or may be placed to one side as may be desired as the flexibility and extensibility of the power transmitting mechanism is sufficient to permit adjustment to be made for any position of the engine.

In Fig. 2 I have shown how a flexible shaft 78 can be substituted for the power transmitting means illustrated in Figs. 1 and 3. This form of connection is best suited for light work and the connection shown in Fig. 1 is used where heavy drilling is to be done.

From the above it will be apparent that I have produced an improved drill construction for track drills, which adapts the drill to be operated by power and which makes it possible to greatly reduce the cost and labor incident to the repair and maintenance of railway tracks.

Having described my invention what I claim as new is:

A power operated track drill comprising, in combination, a substantially rectangular framework having a closed compartment at one end, a two-part shaft extending through said framework, a worm wheel within the compartment, said gear being slidably but nonrotatably connected with the shaft, a cover member removably secured to the framework and forming one side of said compartment, a worm journaled in a bearing in the cover and operatively associated with the worm wheel, one part of said shaft having a chuck for holding a drill and the other being provided with threads, means for keeping the threaded end from rotating, a nut secured to the threaded end and means for rotating said nut when the worm wheel rotates the shaft, said means comprising a step by step mechanism.

In testimony whereof I affix my signature.

JAMES L. CHRISTIAN.