W. T. KRAUSCH & E. F. WEBER.

RAIL DRILLING CAR.

APPLICATION FILED MAY 5, 1917.

1,243,187.

Patented Oct. 16, 1917.

2 SHEETS—SHEET 1.

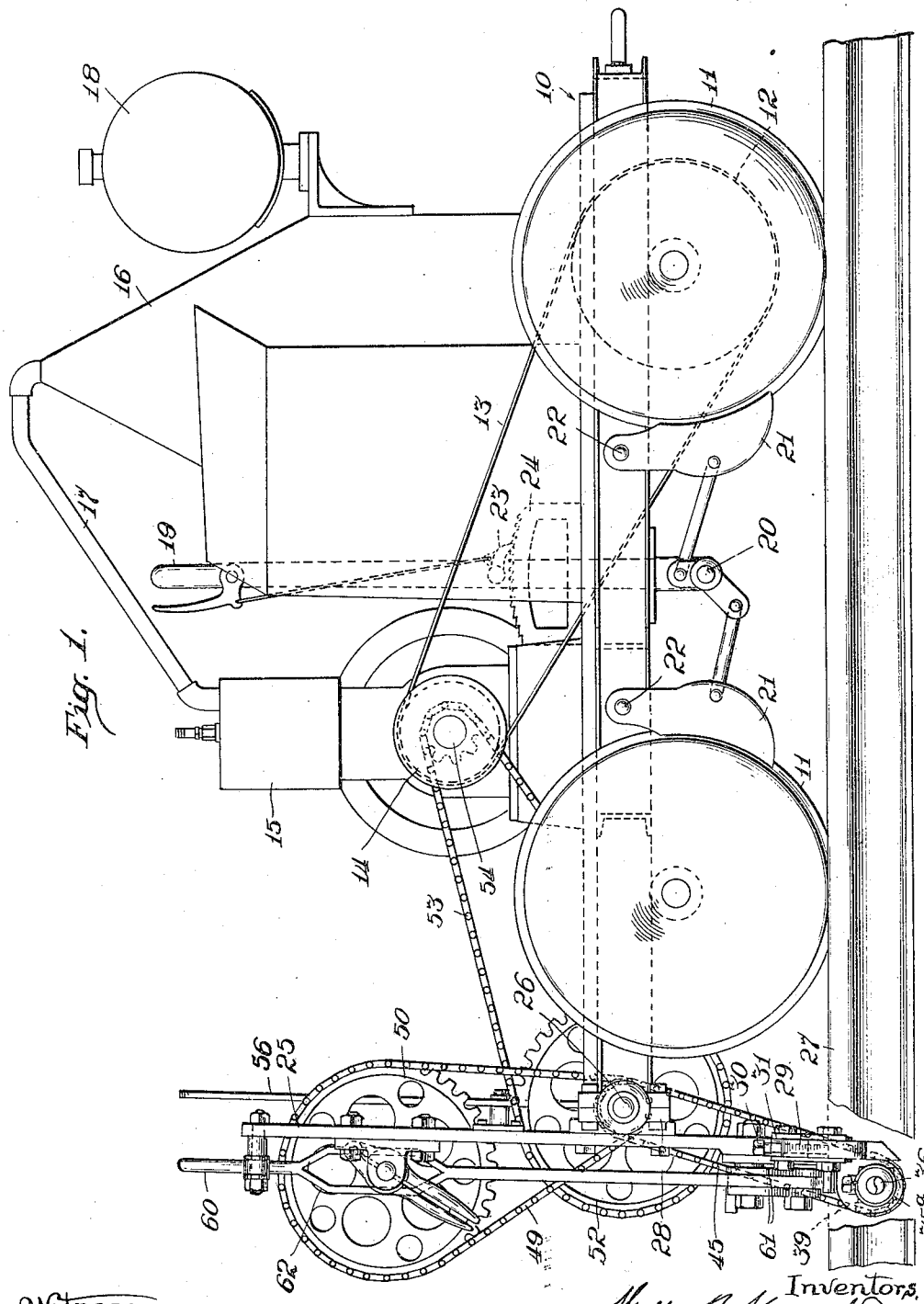

Fig. 1.

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2 SHEETS—SHEET 2.

Fig. 2.

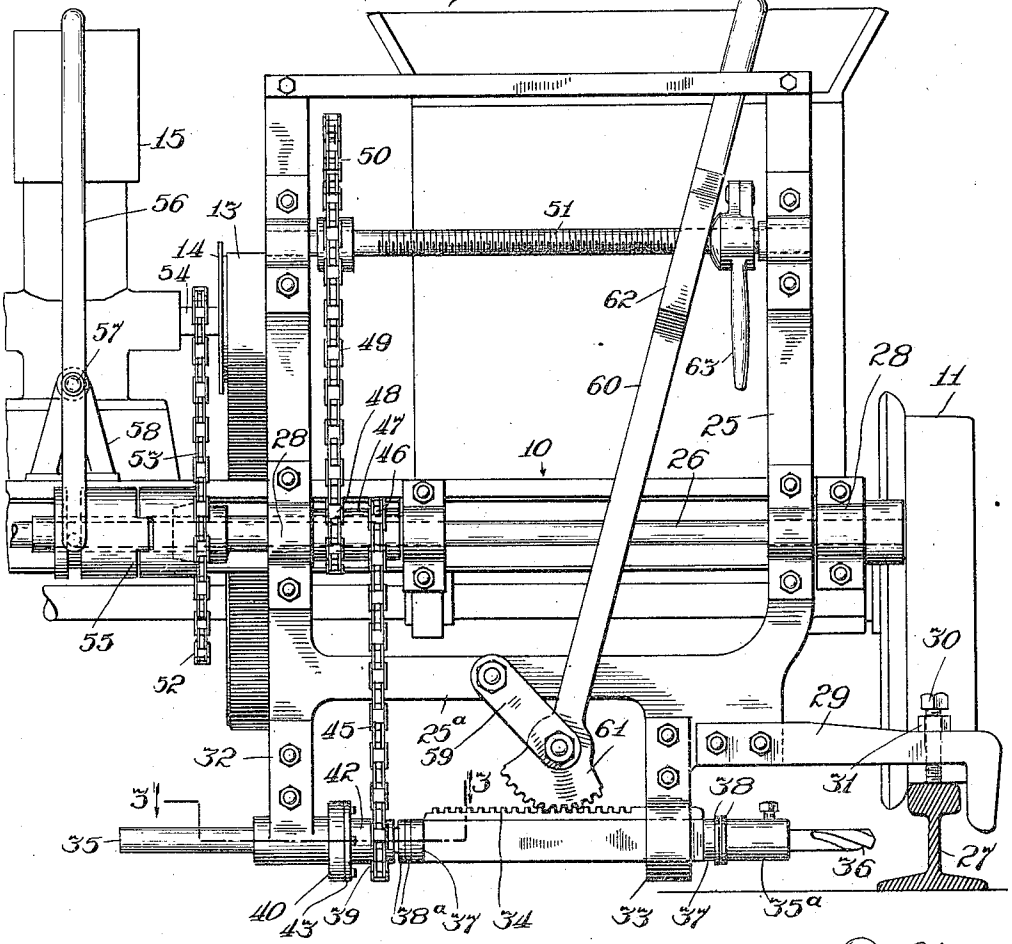


Fig. 3.

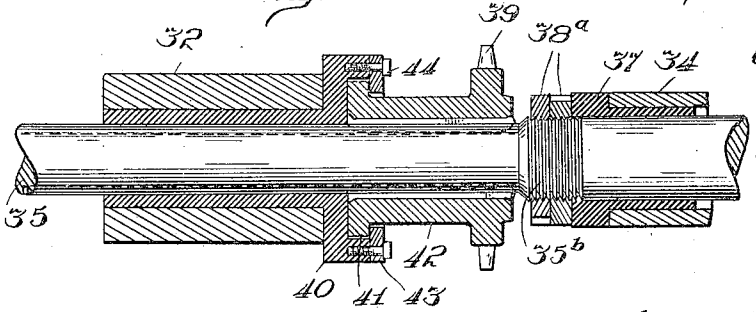
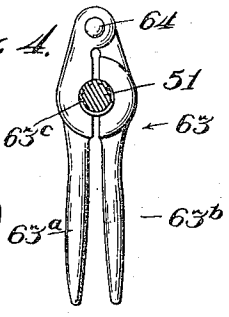


Fig. 4.



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UNITED STATES PATENT OFFICE.

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RAIL-DRILLING CAR.

1,243,187. Specification of Letters Patent. **Patented Oct. 16, 1917.**

Application filed May 5, 1917. Serial No. 166,703.

To all whom it may concern:

Be it known that we, WALTER T. KRAUSCH and ERNST F. WEBER, citizens of the United States, and residents of La Grange, in the county of Cook and State of Illinois, and of Chicago, in the county of Cook and State of Illinois, respectively, have invented certain new and useful Improvements in Rail-Drilling Cars, of which the following is a description, reference being had to the accompanying drawings, which form a part of our specification.

Our invention relates to a power-operated rail drilling car adapted to drill the rails after the same have been laid or put into place and on which the car is propelled; the device being especially intended for drilling holes in the web of the rail for the purpose of fastening rail-anchors, making joints, etc.

With our improved car, the drilling operations can be performed in materially less time than can be done with the manually operated drills at present employed; the device being capable of performing a greater amount of work than is possible to be accomplished by several rail-drilling gangs. The invention permits adjustment of the drill carrying frame or portion to various sized rails or to positions for drilling in different horizontal planes, and also permits the work to be accomplished with great uniformity and accuracy.

The invention contemplates a self-propelling car adapted to move along the rails on which it is to operate; the motive power whereby the car is propelled being also adapted to actuate the drilling mechanism.

The construction and advantages of our invention will be more fully comprehended from the following detailed description of the drawings wherein:—

Figure 1 is a side elevation of our improved car shown on rails, a portion of the latter being broken away to disclose the lower part of the drilling mechanism or drill proper.

Fig. 2 is a front elevation of a part of one end of the car, namely the end provided with the drilling mechanism.

Fig. 3 is a detail sectional view of one end of the drill-spindle, its mounting and a portion of its actuating mechanism; the section being taken on line 3—3 of Fig. 2, looking in the direction of the arrows.

Fig. 4 is a detail view of a feed-screw gripping member, shown in elevation.

In the particular exemplification of the invention, it comprises a suitable flat car floor 10 provided with proper running gear or wheels 11, journaled in the usual manner; one of the journals or axles being provided with a suitable pulley 12, see Fig. 1, which receives the endless driving element 13, driven off of a pulley 14 mounted on a power or driving shaft operated by a suitable internal combustion engine or motor indicated at 15.

As the engine forms no part of our invention, a specific description thereof need not be entered into, beyond the general statement that 16 represents a water-cooler connected by means of a conduit 17 with the water-jacket of the engine, while 18 represents a gasolene tank which has suitable connection with the carbureter of the motor as is usual with internal combustion motors.

The car is shown provided with a hand-lever 19 connected with a rock-shaft 20 to which are secured links for controlling the brake-shoes 21, 21 which are shown pivotally supported at 22; the position of the hand-lever being controlled or maintained by the pawl 23 which engages with the quadrant 24.

The forward end of the platform or underframe of the car is provided with a horizontally swinging frame 25 which is provided with suitable bearings or passages for a supporting shaft 26. The frame 25 may be of any suitable construction, being preferably rectangular in shape as shown in Fig. 2; and is supported at an intermediate point so as to have portions of the frame disposed above and below the pivotal point and enable the drill-proper to be brought into horizontal planes beneath the plane of the top of the rail 27 when the latter is to be drilled. The journal or shaft 26 is mounted in suitable bearing blocks 28, 28 secured in any suitable manner to the platform or underframe so as to extend slightly forward thereof and enable horizontal oscillation of the frame 25.

The lower part of the frame 25 is provided with a horizontally disposed member or gage 29 which is intended to extend across the rail; the outer end of the member 29 being preferably bent downwardly so as to provide the hook-formation shown in Fig. 2

to hook over and extend to the outside of the rail 27, as shown. The member 29 is provided with a screw-bolt 30 which is intended to engage with the head of the rail, as shown in Fig. 2; the adjusted position of the bolt being maintained by a set-nut 31.

The frame 25 is also provided with the depending hanger-portions or sleeves 32 and 33, adapted to support the drill mechanism which consists of a rack-bar 34, bored to receive a drill-spindle 35 and permit the latter to rotate therein; one end of the spindle 35 being provided with a head or drill chuck-portion 35^a in which the drill 36 is removably secured; while at an intermediate point, namely at a point adjacent the end of the rack-bar farthest removed from the drill end, the spindle is preferably screw-threaded, as shown at 35^b in Fig. 3. The rack-bar 34 has both ends counterbored so as to receive suitable bushings 37, 37; and the drill-spindle 35 is, in turn, provided with a ball-bearing cage 38, which is adapted to receive the end thrusts and provide anti-friction bearing intermediate of the bushing at the end of the rack-bar 34 and the drill-chuck portion 35^a. Movement of the rack-bar 34, lengthwise of the drill-spindle, is prevented by the nuts 38^a which screw onto the threaded portion of the drill-spindle against the bushing 37, thus holding the rack-bar intermediate of nuts 38^a and the chuck-portion 35^a of the spindle 35. The drill-spindle 35, at a point adjacent the nuts 38^a, is provided with a sprocket 39, feathered on the spindle 35, as shown in Fig. 3, so as to cause the spindle to rotate therewith and at the same time permit the spindle to travel in a lengthwise direction; the spindle being provided with a suitable key or slot-way extending lengthwise thereof for a proper distance.

The hanger-portion 32 of the frame 25 is provided with a suitable bushing 40 which has the cupped flange portion at its outer end, as shown in Fig. 3, to receive the flanged end 41 of the extended hub 42 of the sprocket 39. The flanged portion of the bushing 40 is adapted to have the annular member or ring 43 secured thereto by means of suitable screws or bolts 44; the ring 43 being adapted to engage with the flange 41 and thus prevent movement of the sprocket 39 lengthwise of the spindle 35.

The sprocket 39 is adapted to receive a chain 45 which passes about a sprocket 46 secured on a sleeve 47 mounted on shaft 26. Mounted on the same sleeve 47 is a sprocket 48 which receives a chain 49 which also passes about a large sprocket wheel 50 secured on a screw-shaft 51 rotatably mounted in suitable bearings provided in the upright portions of the frame 25, at a point above the pivotal point of the frame, as clearly shown in Figs. 1 and 2.

The sleeve 47 is prevented from moving longitudinally of shaft 26 by the bearing-block or hanger 28 as well as the frame 25. The sleeve 47 extends beyond the frame 25, namely to the left in Fig. 2, and is provided with a sprocket or pulley 52, which receives a chain or belt 53 which latter takes about a suitable pulley on the power or driving shaft 54 of the engine or motor. The sprocket wheels 46 and 48 are keyed to the sleeve 47 so as to rotate therewith, while the sprocket wheel 52 is loosely mounted thereon and has its hub provided with clutch-engaging surfaces, see Fig. 2.

Feathered on the outer end of the sleeve 47 is a clutch-member 55 adapted to be operated by the lever 56 and thereby brought into engagement with the clutch surfaces on the hub of the sprocket 52. With the clutch 55 thrown into engagement with sprocket 52 power will be transmitted to the sleeve 47 and, in turn, to the sprockets 46 and 48. Lever 56 is fulcrumed at 57 on a suitable standard or bracket 58.

Pivotally secured to the cross-bar 25^a of the frame 25, by means of a link 59, is a lever 60, the lower end whereof is made in the form of a sector 61 and provided with teeth which mesh with the rack-bar 34. The lever 60, adjacent the upper end, is preferably bifurcated at the point 62 so as to straddle the screw-rod 51 and at the same time permit the lever to be oscillated or swung through the arc of a circle and thereby cause the rack-bar 34, and with it drill-spindle 35, to move in a horizontal direction.

In order that the lever 60 may be automatically moved through one stroke of its oscillation and at a consistent and even degree, we provide a gripper member 63, which is adapted to take about the screw-rod 51, as shown in Fig. 2; the gripper being shown in detail in Fig. 4. The member 63 preferably consists of the two members 63^a and 63^b pivoted together at 64; with an intermediate portion of each member 63^a and 63^b socketed and threaded at the point 63^c adapted to mesh with the threads of the screw-rod 51. As is apparent from the construction, the gripper member 63 will have operative relation with the screw-rod 51 as soon as the portions 63^a and 63^b are forced or drawn together and held in that position, thereby causing the gripper member 63 to travel along the screw-rod 51 in the direction or lead of the threads thereof; it being understood that the threads of screw-rod 51 lead from the right to left in the construction as illustrated in Fig. 2. The operative relation between the gripper member 63 and the screw-rod 51 will be affected or discontinued as soon as separation of members 63^a and 63^b is permitted. In gripping member 63, so as to cause the intimate relation be-

tween its threaded socket and the screw-rod 51, the member 63 will be made to travel lengthwise of screw-rod 51, and at the same time cause lever 60 to swing or oscillate through the arc of a circle, toward the left in Fig. 2. Such movement of lever 60 will force rack-bar 34 in a horizontal direction and bring the drill 36 into drilling relation with the rail 27. The link 59 provides a fulcrum for lever 60 and causes the latter to be firmly forced down into intimate relation with the rack-bar 34 as the link 60 swings from right to left in Fig. 2, and thus not only induces positive longitudinal movement of the rack-bar, and also of the drill-spindle 35 (by reason of the rack-bar engaging with the drill-chuck portion 35ª of the drill-spindle through the medium of the anti-friction thrust-bearing 38) but maintains the drill in drilling relation with the rail.

In operation, the car is run along the rails to the point where the rails are to be drilled for the purpose of fastening rail anchors or making joints, etc., when the frame 25 is swung downwardly so as to bring the drill carried thereby into the proper horizontal plane beneath the top of the rail; the horizontal plane of the drill being determined and maintained by the gage mechanism, comprising the gage arm 29 and set-screw or bolt 30; thus causing the holes to be drilled at the desired height or point in the web of the rail. It is apparent that by screwing bolt 30 downwardly, the frame 25 will be forced into a position at an inclination to the perpendicular (the frame being free to swing on the shaft 26), thus causing the drill 36 to strike the rail at a higher point on the web than would be the case where the bolt 30 is screwed upwardly so as to permit gage arm 29 to come into more intimate relation with the top of the rail. The frame 25 having been thus adjusted, clutch 55, feathered on sleeve 47, is then operated by lever 56 (which straddles or is otherwise freely connected with the clutch) so as to form operative relation between sprocket 52 and sleeve 47 through the medium of clutch 55. This will cause sleeve 47 to be rotated, which, in turn, causes sprockets 47 and 48 to also rotate therewith; sprocket 46, through the medium of chain 45, causing the drill-spindle 35 with the drill 36 to revolve; while sprocket 48, through the medium of chain 49, causes screw-rod 51 to be revolved; it being understood, of course, that the speed of rotation of the drill-spindle, as well as of the screw-rod, being determined by the relative sizes of the sprocket-wheels on the sleeve 47, drill-spindle 35 and screw-rod 51; the drill-spindle, of course, being intended to rotate at a greater speed than screw-rod 51. Screw-rod 51 is, therefore, provided with the large sprocket-wheel 50 so that the speed of rotation of the screw-rod will be reduced below the rate of speed of sleeve 47. The clutch 55 having been operated as described, so as to transmit power to the drill-spindle and the screw-rod, the operator then grasps gripping member 63 so as to induce operative relation between it and screw-rod 51; the operator maintaining his grip on the gripper member until the drilling of the hole in the rail has been completed. The gripping of member 63 will force lever 60 toward the left in Fig. 2 and cause the drill-spindle 35, through the medium of the rack-bar 34, to move longitudinally toward the rail. As soon as the drilling operation has been completed, the operator releases gripping member 63 from the screw-rod 51 and swings lever 60 toward the right in Fig. 2, which causes the drill-spindle, through the medium of the rack-bar, to be withdrawn from operative relation with the rail. The drill-spindle will be forced to the left in Fig. 2, because of the intimate relation existing between the left hand end of rack-bar 34 and the nuts 38ª which are screwed on the threaded portion of the drill-spindle 35, as previously described. Should it be desired to provide drill holes at different points or in different horizontal planes in the web of the rail, the lock-nut 31 on the gage-bolt 30 is unscrewed or released, so that bolt 30 may be turned in the proper direction and cause the frame 25 to be given the inclination necessary to bring the drill-spindle in the desired horizontal plane.

It is apparent from the construction shown and described that the operation of drilling the rails can be very quickly accomplished and the car moved to various points along the rail where the drilling is to be done; the clutch 55 being thrown out of clutching engagement with sprocket 52 after the drilling operations have been completed, and while the car is moving along the rail; at which time, the pulley, provided with belt 13, is thrown into operative relation with the power or driven shaft of the engine so as to transmit power to the axle or journal on which the wheels 11 are secured.

We have shown and described what we believe to be the simplest adaptation of our invention, but it is apparent that the invention may have expression in somewhat different mechanical form from that disclosed in the drawings, without, however, departing from the scope of the appended claims.

What we claim is:—

1. A car of the class described, provided with power-imparting means and comprising a movable frame, a rack-bar slidably mounted in the lower part of said frame, a drill-spindle rotatably mounted in said rack-bar, a feed-screw rotatably mounted in said frame, means intermediate of said feed-screw and said rack-bar whereby the latter

is caused to travel when said feed-screw is rotated, and means intermediate of the power-imparting means, the drill-spindle and said feed-screw whereby rotation of the drill-spindle and feed-screw is induced.

2. A car of the class described, provided with power-imparting means and comprising a horizontally swinging frame adapted to be swung into proximity with the rails, a drill-spindle rotatably and slidably mounted in the lower part of said frame, a rack-bar mounted on said drill-spindle so as to move longitudinally therewith and permit rotation of the drill-spindle, a member fulcrumed on said frame so as to oscillate and be in mesh with said rack-bar, means whereby said member is caused to oscillate and the rack-bar and drill-spindle moved longitudinally thereby, and means intermediate of the power-imparting means, the drill-spindle and the fulcrumed member whereby the drill-spindle and fulcrumed member are actuated at the desired speed.

3. A car of the class described, comprising a frame pivoted intermediate of its ends so as to oscillate horizontally and have its lower end swung beneath the car into proximity with the rails, a drill-spindle rotatably mounted in the lower end of said frame and adapted to be moved longitudinally, a feed-screw rotatably mounted in the upper end of said frame, means intermediate of said feed-screw and said drill-spindle whereby the latter is caused to move longitudinally into drilling position when said feed-screw is rotated, and means for imparting power to said drill-spindle and said feed-screw.

4. A car of the class described, provided with a horizontally swinging frame adapted to be swung into proximity with the rails, a drill-spindle rotatably and slidably mounted in the lower end of said frame, a rack-bar mounted on said drill-spindle, adapted to control the longitudinal movement of the spindle, a feed-member rotatably mounted in the upper end of said frame, means intermediate of the feed-member and the rack-bar whereby the latter is forced longitudinally when said means is brought into operative relation with said feed-member, means whereby the frame will be held in adjusted relation with the rail to be drilled, and power-imparting means carried by the car whereby the car may be propelled and movement imparted to the drill-spindle and to said feed-member.

5. A car of the class described, provided with a vertically disposed frame pivotally mounted intermediate of its ends at one end of the car so as to swing one end of the frame into proximity with the rails, a drill-spindle rotatably and slidably mounted in the lower end of said frame, a feed-member rotatably mounted in the upper end of said frame, means intermediate of the feed-member and said drill-spindle whereby the latter is moved longitudinally into drilling position when said feed-member is rotated, said means being capable of having movement independently of said feed-member, and means mounted on the frame and adapted to have contact with the rail to be drilled, whereby the frame and said drill-spindle are positioned relative to the rail.

6. A car of the class described, provided with motive power, a frame oscillatingly mounted on one end of said car so as to swing vertically and permit one end to be brought into proximity with the rails, a drill-spindle rotatably mounted in the lower end of said frame and adapted to move longitudinally toward and away from the rail to be drilled, a feed-screw rotatably mounted in the upper end of the frame, an oscillating member intermediate of the feed-screw and said drill-spindle arranged to have operative relation with the latter and cause the same to move longitudinally when said member is oscillated, means intermediate of the feed-screw and said oscillating member adapted to have operative relation with the feed-screw and thereby cause said member to oscillate and force the drill-spindle toward the rail to be drilled, and means whereby power is imparted to said drill-spindle and feed-member.

7. A rail drilling car provided with motive power, a vertically swinging frame mounted on the car so as to permit a portion of the frame to depend beneath the car into proximity with the rails, a drill-spindle rotatably mounted in said frame and arranged to have longitudinal movement toward and away from the rail, a lever fulcrumed on the frame so as to be operable from the car and to oscillate transversely thereof, means intermediate of the lever and the drill-spindle whereby oscillations of the lever impart longitudinal movement to the drill-spindle, and controllable means intermediate of said motive power and the drill-spindle, whereby the latter may be rotated.

8. A car of the class described, provided with motive power, an adjustable frame mounted on the car so as to depend beneath the car-floor, a gage-member carried by the frame and adapted to contact with the rail to be drilled whereby positioning of the frame relative to the rail is determined, a rack-bar slidably mounted in said frame, a drill-spindle rotatably mounted in said bar, a lever fulcrumed on the frame and having a toothed segment arranged in operative relation with said rack-bar for imparting longitudinal movement thereto, and means whereby motive power is transmitted to the drill-spindle so as to cause the latter to rotate.

9. A car of the class described, compris-

ing a frame adjustably mounted on the car so as to depend beneath the car-floor, means whereby adjustment of the frame relative to the rail to be drilled is effected, a drill-spindle rotatably mounted in the lower end of the frame and arranged to move longitudinally, a rack-bar secured to said drill-spindle so as to move longitudinally therewith, a lever provided with a toothed segment arranged in mesh with the rack-bar, a fulcrum link pivotally connected to said lever and to said frame, whereby the former is held in firm relation with the rack-bar as said lever is oscillated toward the pivotal point of said link on the frame, and means whereby rotation is imparted to said drill-spindle.

10. A car of the class described, provided with motive power and having an adjustable frame depending beneath the car, means secured to the frame and adapted to have engagement with the rail to be drilled whereby the position of the frame relative to the rail is determined, a drill-spindle mounted in said frame so as to rotate and move longitudinally, a lever fulcrumed on the frame so as to oscillate transversely of the car, means intermediate of the lever and the drill-spindle whereby oscillations of the lever impart longitudinal movement to the drill-spindle, and power-operated means adapted to oscillate said lever at a predetermined degree of speed.

11. A car of the class described, provided with motive power and having a frame pivotally mounted at one end of the car so as to swing horizontally and depend beneath the car-floor, a drill-spindle rotatably and slidably mounted in the lower end of the frame, a rack-bar having operative relation with the drill-spindle so as to permit the latter to rotate and be moved lengthwise therewith, a feed-screw rotatably mounted in said frame, a fulcrumed lever mounted on the frame and provided with a toothed segment at its lower end in mesh with said rack-bar while the upper end of said lever is formed to permit the feed-screw to extend therethrough, a removable gripping member threaded so as to coöperate with the threads of the feed-screw and be made to move lengthwise of the latter when said member is compressed and thereby cause said fulcrumed lever to oscillate, and controllable power-imparting mechanism intermediate of the motive-power of the car, the drill-spindle and the feed-screw, whereby rotation to the drill-spindle and feed-screw is imparted.

12. A car of the class described, comprising a frame pivotally mounted at one end of the car so as to swing horizontally, a drill-spindle rotatably mounted in the lower end of said frame, said drill-spindle being provided with a drill-chuck at one end and with screw-threads at a point intermediate of its ends, a rack-bar mounted on the drill-spindle intermediate of the drill-chuck and the threaded portion thereof, means adapted to screw onto said threaded portion so as to maintain the rack-bar in position, anti-friction bearings intermediate of the rack-bar and the drill-chuck adapted to receive the end thrusts, means feathered on the drill-spindle whereby the latter is rotated and permitted to move longitudinally, and means meshing with the rack-bar whereby longitudinal movement of the latter with the drill spindle may be induced.

13. A car of the class described, provided with a frame pivoted on one end of the car so as to swing horizontally and depend beneath the car-floor into a plane beneath the top of the rail to be drilled, a gage-arm secured to the frame and adapted to extend across the rail, said gage-arm being provided with adjustable means whereby the adjustable position of said frame relative to the rail may be controlled, a drill-spindle rotatably and slidably mounted in the lower part of said frame, a rack-bar having operative relation with the drill-spindle so as to permit the latter to rotate and be made to move longitudinally with the rack-bar, a feed-member rotatably mounted in said frame, an oscillatingly mounted member intermediate of the rack-bar and said feed-member, and a bifurcated gripper member threaded so as to coöperate with the threads of the feed-member and cause said oscillatingly mounted member to be actuated thereby.

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