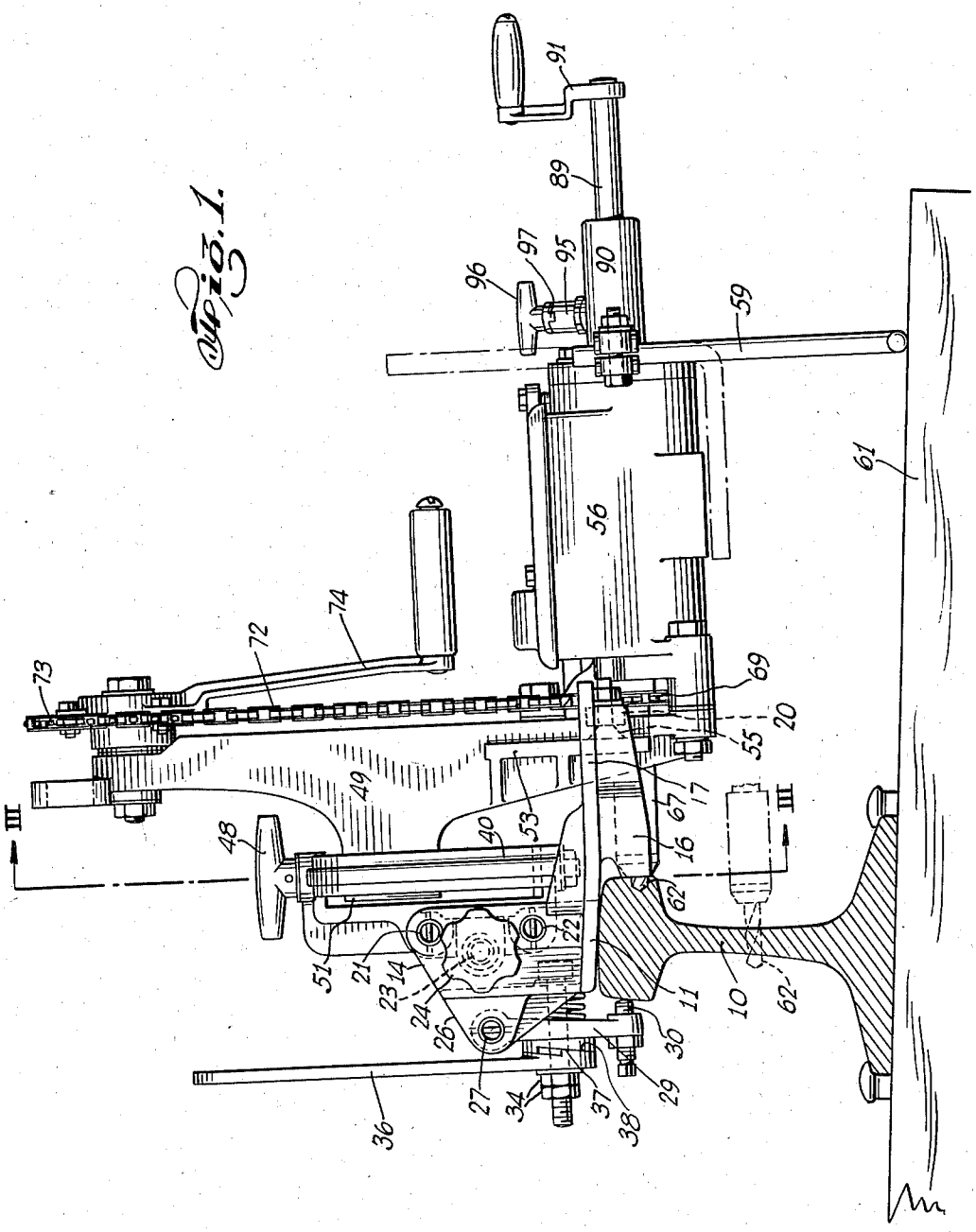
June 4, 1940. F. C. LAVARACK ET AL 2,203,415

RAIL DRILLING MACHINE

Original Filed May 7, 1936 4 Sheets-Sheet 1

Fig. 1.



INVENTOR
Benjamin Schlesinger
Frederick C. Lavarack
BY
Lyman E. Dodge
ATTORNEY

June 4, 1940. F. C. LAVARACK ET AL 2,203,415

RAIL DRILLING MACHINE

Original Filed May 7, 1936 4 Sheets-Sheet 2

Fig. 3.

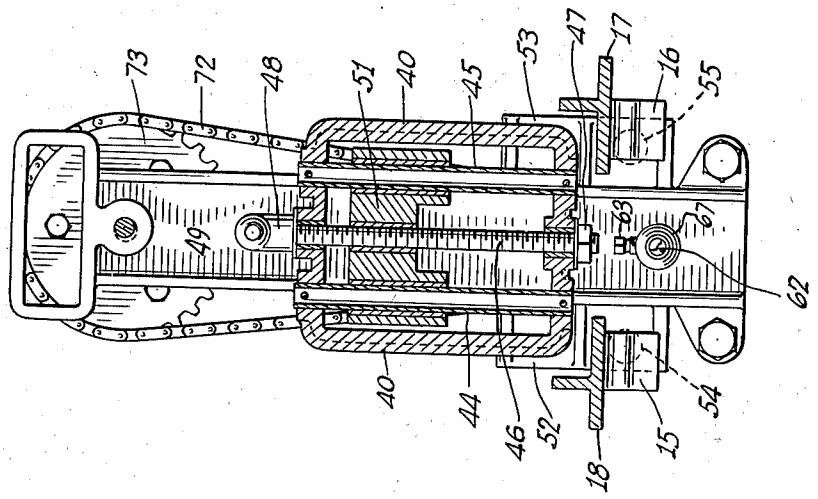
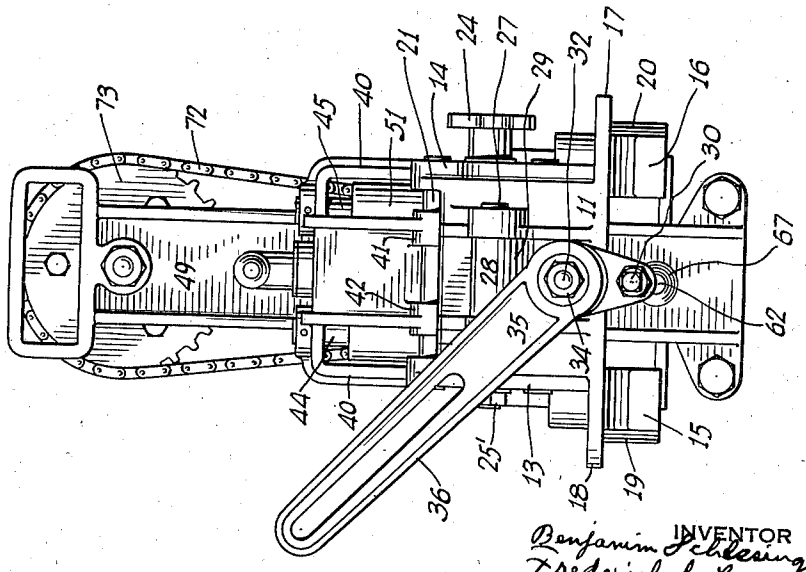


Fig. 2.



INVENTOR
Benjamin Schlesinger
Frederick C. Lavarack
BY
Lyman E. Dodge
ATTORNEY

June 4, 1940. F. C. LAVARACK ET AL 2,203,415

RAIL DRILLING MACHINE

Original Filed May 7, 1936 4 Sheets-Sheet 3

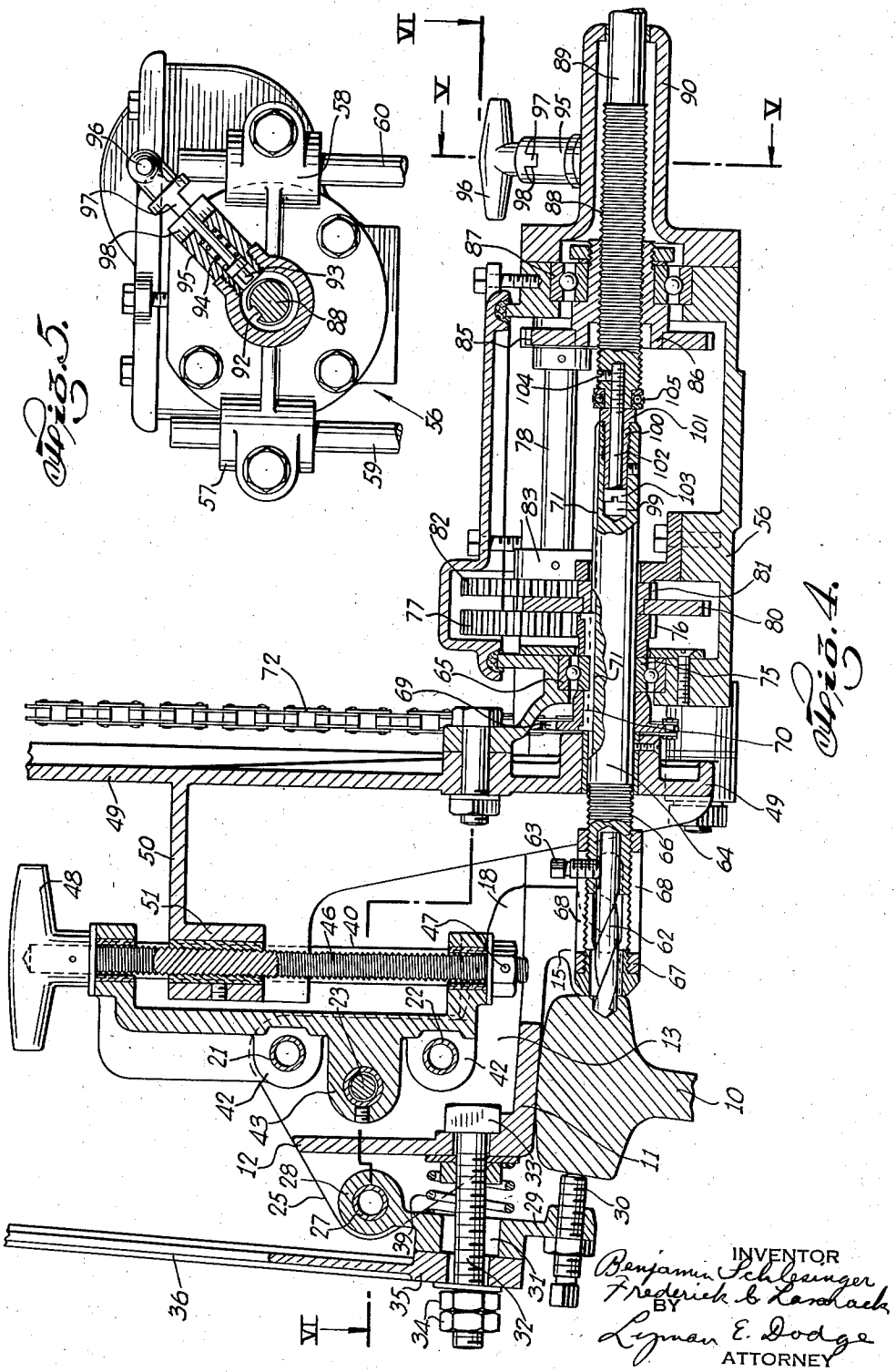


Fig. 5.

Fig. 4.

INVENTOR
Benjamin Schlesinger
Frederick C. Lavarack
BY
Lyman E. Dodge
ATTORNEY

June 4, 1940. F. C. LAVARACK ET AL 2,203,415

RAIL DRILLING MACHINE

Original Filed May 7, 1936 4 Sheets-Sheet 4

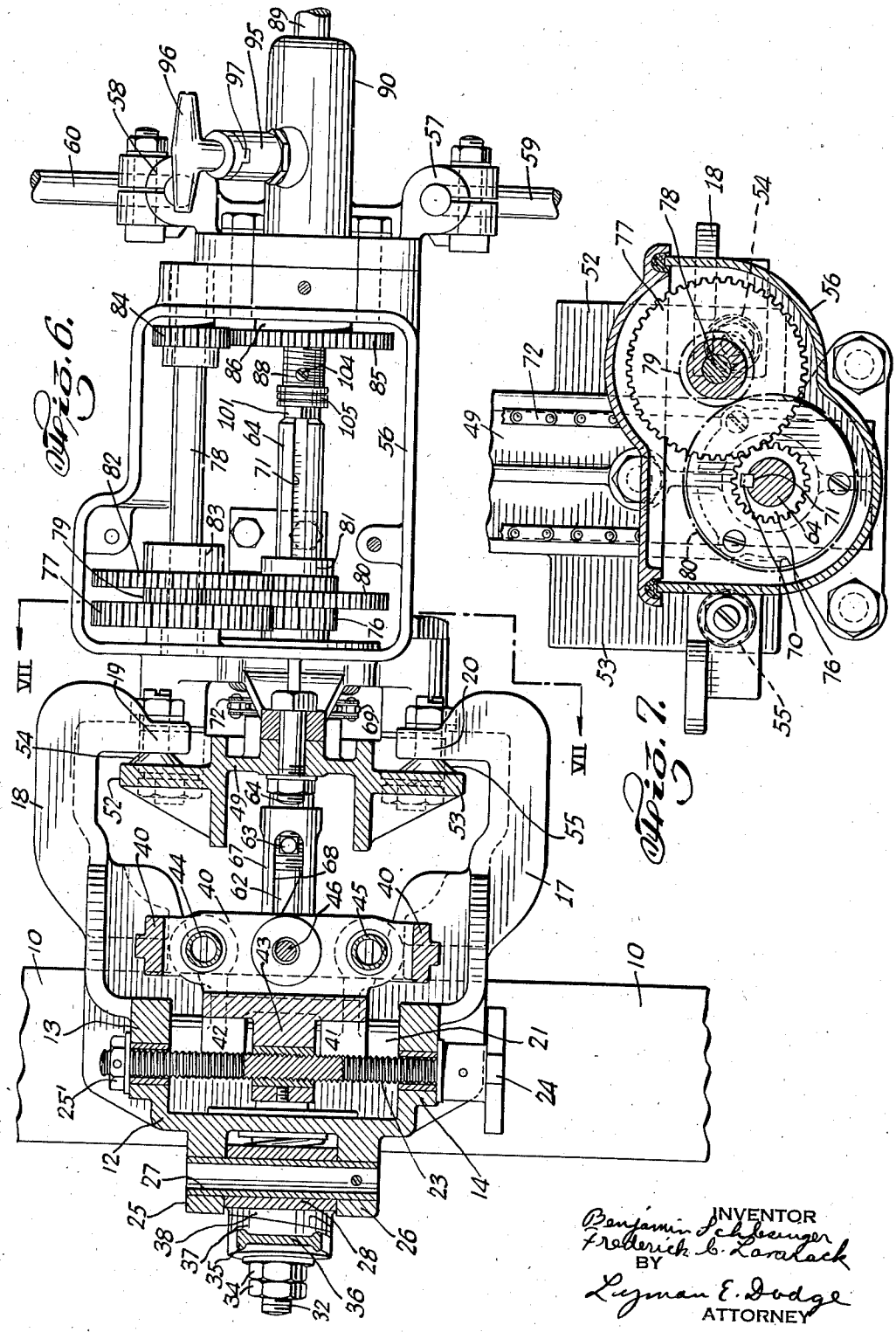


Fig. 6.

Fig. 7.

Benjamin Schlesinger
Frederick C. Lavarack
INVENTOR
BY
Lyman E. Dodge
ATTORNEY

Patented June 4, 1940 2,203,415

UNITED STATES PATENT OFFICE

2,203,415

RAIL DRILLING MACHINE

Frederick C. Lavarack, Montclair, N. J., and Benjamin Schlesinger, Flushing, N. Y., assignors to Railroad Accessories Corporation, New York, N. Y., a corporation of New York

Original application May 7, 1936, Serial No. 78,370. Divided and this application March 21, 1938, Serial No. 197,150

5 Claims. (Cl. 77—9)

This invention relates to new and useful improvements in drilling machines and has particular reference to a machine for drilling railroad rails.

An object of the invention is to provide a simple, compact, durable, efficient device which can be quickly and easily attached to the head of a railroad rail for the purpose of drilling holes therein at proper predetermined points. These holes are put in the rail preferably at the side of the head for the purpose of enabling electric circuit bonds or ties to connect the ends of adjacent rails so as to establish the necessary electric circuit for the railroad signalling device now employed.

A further object is to provide such an apparatus in which the parts can be quickly manipulated to adjust the device with proper relation to the rail and to adjust the drill with relation to the point of drilling.

A still further object is to provide means whereby the depth of a hole to be drilled can be predetermined and quickly attained without any liability to drill too deep a hole.

A further object is to provide simple and efficient means whereby in the event of an approaching train, the device can be quickly and easily removed from the rail without a liability of any confusion in the mind of the operator causing delay in such removal.

Further and more specific objects, features and advantages will more clearly appear from a consideration of the specification hereinafter when taken in connection with the accompanying drawings which form part of the specification and which illustrate a present preferred form of the invention.

In the general contemplation of the invention, it is to be observed that it includes a frame comprising a plurality of plates which can be set on top of a rail and having a plurality of cooperating elements which can be manually operated with speed and efficiency to grip the rail and hold the device thereon after the apparatus has been adjusted in the proper angular relation to the rail. Simple manipulatable elements permit the rail and its operating elements to be adjusted both vertically and horizontally in a simple and easy manner so as to align the drill with the point at which the hole is to be made in the rail. Equally simple manipulatable elements permit the drill itself to be advanced to the working point by hand and then to be definitely connected to operatable gearing so as to be rotated to drill and advance slowly as the drilling takes place. The rotation of the drill is effected by a crank connection operated by the person controlling the apparatus. A simple gage arrangement connected with the drill permits the exact depth of a hole to be achieved without over running.

The crank for rotating the drill in its working functions is rotated in a predetermined direction. The manipulatable element employed to advance the drill by hand to the work point is preferably rotated in the opposite direction and consequently this element, in order to withdraw the drill from the rail must be rotated in the same direction as the main crank is moved in drilling. This particular feature is important because as the operator is turning the main crank to drill he may at any moment be required to remove the device from the rail in a hurry and in order to do this he merely has to transfer his hand from the main handle to the auxiliary manipulating device and keep on rotating it in the same direction. This simplicity of operative relation thus prevents any psychological confusion which might result if the rotations of these elements to achieve the above mentioned results were other than stated.

A further feature of the invention resides in the provision of elements to insure, in the adjustment of the parts, that the drill is always kept in the proper angular relation to the work even though it is moved for adjustment to a new position.

A further feature of the invention concerns a simple construction whereby the reactive thrust of the drill is properly compensated for.

The preferred form of the invention is shown in the accompanying drawings of which: Figure 1 is a side elevation of the machine mounted in operative position on a rail; Fig. 2 is an end elevation, looking to the right in Fig. 1; Fig. 3 is a vertical cross-section taken on the line III—III of Fig. 1; Fig. 4 is a vertical longitudinal section taken through the machine and enlarged; Fig. 5 is a vertical cross-section taken on the line V—V of Fig. 4; Fig. 6 is a horizontal longitudinal section taken on the line VI—VI of Fig. 4; and Fig. 7 is a vertical cross-section taken on the line VII—VII of Fig. 6.

As shown in the drawings the preferred form of the invention involves a machine which is to be applied to the head of a rail 10 for the purpose of drilling holes in the side of the rail head to receive the ends of electrical conductors forming the electrical circuit bonds between the ends of adjacent rails. This apparatus includes a plate 11 which is disposed on top of the rail and has a longitudinal vertical wall 12 and side end walls 13 and 14 together with downwardly depending feet 15 and 16 and rearwardly extending wings 17 and 18 having longitudinally disposed ears 19 and 20 with faces disposed parallel to the side of the rail 10 for purposes to be hereinafter mentioned. Tubes 21 and 22 extend horizontally at different levels and parallel between the side

walls 13 and 14. A threaded shaft 23 extends horizontally between the walls 13 and 14 and at one end there is fixed thereto a hand wheel 24 whereby the shaft 23 may be turned. The threads on the shaft 23 are not threadably engaged with the walls 13 and 14 but are free to turn therein. The other end of the shaft is provided with a nut 25' fixed thereto.

Arms 25 and 26 extend forwardly in a parallel relation from the wall 12 and a tubular member 27 extends therebetween. This tubular member acts as a bearing for a collar 28 on the upper end of a depending bar 29. At its lower end this bar is provided with a set-screw 30 extending toward the adjacent side face of the rail head 10. The bar 29 is provided with an opening 31 through which a bolt 32 extends. This bolt extends through an opening in the plate 12 and has its head 33 lying back of said opening. The opposite end of the bolt 32 is provided with suitable nuts 34 adjacent to the lower end 35 of operating arm on handle 36. The face of the handle 36 at its lower end adjacent the bar 29 is provided with cam surfaces 37 cooperating with similar cam surfaces 38 on the adjacent face of the bar 29. A spring 39 extends between the wall 12 and the opposite face of the bar 29 tending to swing the bar 29 around the tube 27 always to the left, as viewed in Fig. 1, whereby the tendency is to move the set-screw 30 away from the face of the rail. It will be observed that by moving the handle 36 in one direction the bar 29 will be swung to the right against the action of spring 39 to engage the set-screw 30 with the rail whereas movement in the opposite direction will release the cams and permit the spring 39 to move the bar 29 and the set-screw 30 away from the rail. The dependent feet 15 and 16 on the rail engaging plate 11 will be seen in Fig. 1 cooperating with the opposite face of the rail and with the set-screw to firmly clamp the plate 11 in any desired position at the top of the rail and this operation can be effected very quickly and easily by the manipulation of the handle 26. A quick movement of the handle in one direction will firmly fasten the plate in position after the desired position has been assumed and will as quickly release the plate so that the whole device may be lifted from the rail in a second.

As shown in Fig. 3, there is formed a rectangular shaped open frame 40 having spaced vertical limbs and horizontal connecting members. This frame, as seen particularly in Fig. 4, has forwardly extending apertured lugs 41 and 42 adapted to embrace and slide along the tubular members 21 and 22. It also has a forwardly projecting apertured lug 43 interiorly threaded to engage with the threaded rod or shaft 23. Therefore the turning of the shaft 23 will move the lug 43 horizontally along the shaft and thereby move the frame 40 horizontally in a direction which is designed to be parallel to the side face of the rail. This parallel motion is insured by the engagement of the lugs 41 and 42 slidably with the tubular members 21 and 22.

As shown in Fig. 3, the frame 40 is provided with two spaced rods or tubular members 44 and 45 spaced parallel to each other and vertically within the outline of the frame 40. A threaded shaft 46 is also disposed vertically and journalled in the cross members of the frame 40. The lower end of the shaft 46 is provided with a nut 47 fixed thereto and the upper end of the shaft 46 is provided with a hand or wing nut 48. The threads and the shaft do not engage the cross pieces threadably but the shaft is free to turn in the cross pieces. A pedestal member 49 shown in Fig. 1, has a forwardly extending vertical flange or plate 50 on which is disposed an enlarged head 51 in horizontal position. This head 51 has apertures through which the rods 44 and 45 and the threaded shaft 46 pass. The shaft 46 is threadably engaged with its bore in the head 51 so that the turning of the wing nut 48 will turn the shaft 46 and vertically move the head 51 in a fixed vertical direction guided by the action of the engagement between the head 51 and the rods 44 and 45. In this manner therefore pedestal member 49 can be vertically adjusted. As shown in Fig. 6, the lower end of the pedestal member 49 is provided with laterally extending wings 52 and 53 spaced parallel to and in front of the wings or ears 19 and 20. Suitable cups of bearing members 54 and 55 fastened in any desired manner to the wings 19 and 20 bear against the adjacent faces of the lower end of the pedestal member 49 which is thus additionally guided in its vertical movement.

To the lower rear face of the pedestal or frame member 49 a casing 56 is bolted. This casing contains the drilling device and its operative mechanism. To the rear of this casing the lugs 57 and 58 are attached and these lugs act as bearing members for legs 59 and 60 which can be adjusted in their bearings and rest on the tie 61 at their lower ends to support the drilling casing at its outer end in the desired right angular position with respect to the rail.

The drill 62 is fastened by set-screw 63 in the end of a shaft 64 which is journalled in a bearing in the lower end of flange member 49 and in a ball bearing unit 65 in the end of casing 56. The outer end of this shaft 64 is threaded at 66 to receive a gage element 67 in the form of a hollow sleeve adjustably threaded on to the shaft 64 and having a plurality of longitudinal slots 68 therein. By threading the gage onto the shaft so that the end of the drill extends beyond the end of the gage the desired amount, the depth of the hole to be drilled can be accurately determined. When the gage is set in the required position then the set-screw is adjusted in the nearest slot to hold the gage in this position and to hold the drill in the end of the shaft. A gear 69 is fastened to shaft 64 by key 70 slidable in a key way 71 which extends the full length of the shaft 64. This permits the shaft 64 to rotate with the gear but permits the shaft to slide longitudinally with respect thereto. The gear 69 is engaged by a chain 72 extending upwardly around a toothed wheel 73 rotatably fastened to the flange member 49 and operable by means of a handle 74. The movable member 75 of the ball bearing unit 65 is rotatable with the shaft 64 through the key 70 and a gear 76 is fastened to the shaft 64 by the key 70 and meshes with a gear 77 loosely mounted on a secondary shaft 78. A smaller gear 79 is fastened to the gear 77 and rotates therewith and meshes with a larger gear 80 independently rotatable on shaft 64. A smaller gear 81 is fastened to gear 80 around shaft 64 and meshes with a larger gear 82 fastened to a hub 83 which is fastened to the secondary shaft 78. At the other end of shaft 78 is fastened thereto a gear 84 which meshes with a gear 85 fastened to a rotatable nut 86. This nut is journalled in the opposite end of the casing 56 in a ball bearing unit 87. This nut 86 is interiorly threaded to engage with the exterior threads 88 on an auxiliary shaft 89 which extends outwardly through

a hub 90 on the end of the casing 56 and has fastened thereto a handle 91 by means of which the auxiliary shaft can be turned when desired.

The auxiliary shaft 89 is provided with a long notch or slot 92 (see Fig. 5) into which a latch pin 93 is adapted to extend. This pin is backed by a spring 94 in a laterally disposed boss 95 attached to the hub 90. A handle 96 is fastened to the outer end of the latch pin 93 and has a tongue 97 adapted in certain positions to lie in a slot 98 on the top of the boss. In Fig. 5, the latch pin is shown withdrawn from the groove 92 so that the auxiliary shaft 89 can be turned by handle 91, but when the groove 92 is lined up with the end of latch pin 93 and the handle 96 is turned to permit tongue 97 to extend into the slot 98 then the spring 94 will force the pin 93 forward to lie in the groove 92 and lock the auxiliary shaft 89 against rotation so that thereafter it can not be manually operated but is ready to be moved longitudinally forward by the action of the rotatable nut 86.

The shaft 64 and the auxiliary shaft 89 are associated and are axially aligned. The inner end of shaft 64 is provided with a bore 99 into which is screwed a hollow sleeve 100 having a head 101. A threaded bolt 102 has its head 103 lying in the bore 99 and extending through the hollow sleeve to be threaded into the end of auxiliary shaft 89 and fastened therein by a set-screw 104. Around the shouldered end of auxiliary shaft 89 is disposed a ball thrust bearing unit 105 one element of which bears against a shoulder on an end of auxiliary shaft 89, the other element of which bears against the adjacent head 101 of the hollow sleeve 100. This thrust bearing between the two sections 64 and 89 will take up the reaction or thrust of the drill along the shaft as the drilling operation takes place.

In the operation of the device it becomes desirable to place the apparatus in a proper position with respect to the top of the rail, in order that a suitable hole of predetermined depth can be bored in the rail head. To this end the hand handle 36 is turned in the necessary direction to move the set-screw 30 away from the drill 62 and the machine is placed so that the plate 11 lies on top of the rail as shown in Fig. 1. The legs 59 and 60 are then adjusted to support the rear end of the machine at the proper height to give the desired axial slope to the drill. When the proper angle is obtained, the handle 36 is turned in the opposite direction to force the head screw 30 against the rail and thus cooperate with the feet 15 and 16 to hold the machine firmly in position on the rail head.

Before the machine is actually put on top of the rail the gage 68 has been adjusted on the shaft 64 so that the proper length of the drill 62 extends beyond the end of the gage depending upon the depth of the hole which it is desired to drill. The latch pin 93 is withdrawn from the notch 92 in the shaft 89 by pulling the handle 96 outwardly and giving it a quarter turn so that it assumes the position shown in Fig. 5. With this position of the parts, the handle 91 can be operated to rotate the shaft 89 and consequently the shaft 64. The rotation of the shaft 89 will preferably be such that a clockwise rotation of the handle is necessary in order to retract the drill from the work and consequently a counter clock motion of the handle 91 is necessary to manually advance the drill to the work. This relation of the movement of handle 91 is of importance since the handle 74 is turned clockwise to actuate the gearing to advance the shaft 64 longitudinally through the cooperation of nut 86, because if an operator is using the machine on the rail and drilling the hole in the rail when a train comes along it is necesary to remove the machine from the rail with great rapidity. To do this it is merely necessary to swing the handle 36 to release the set-screw 30, then the hand is taken off the handle 74 and grasps the handle 91 and continues to turn it in the same direction, namely, clockwise to withdraw the drill. This permits the operator to change from one handle to another and continue his hand motion in the same direction to achieve the required high speed of the removal of the device from the rail. If it were necessary for the operator to think or remember that the handle 91 should be moved in a different direction than the handle 74 in removing the device from the rail, it would tend to cause confusion.

Assuming then that the device has been adjusted in the proper position and fastened to the rail head the handle 91 is turned in a counter-clock direction to advance the drill to the face of the rail. Then the latch pin 93, by turning the handle 96, is allowed to drop into the notch 92. This prevents the rotation of shaft 89 by manual means but makes it ready for movement through the nut 86. At the same time the nut 48 is turned to adjust the drill at the proper vertical level with respect to the rail and the handle 24 is turned to similarly adjust the drill at the proper point in the horizontal plane. After these adjustments have been made, the handle 74 is turned in a clockwise direction thus turning the gear 69 and the shaft 64 to effect the drilling operation. The advance of the shaft 64 is effected by the pushing motion axially of the shaft 89 by the rotation of nut 86 through the intermediary of the gearing described. It will be seen that the shaft 64 can rotate under power independent of whether the axial shaft 89 is rotating or not. As the drilling continues the front face of the gage 67 will eventually abut the face of the rail and prevent further advancement of the drill.

Although a principal use of the machine may well be the forming of an orifice in the head of the rail, it is to be understood that the machine is also adapted for drilling an orifice in the web of the rail. When it is desired to drill an orifice in the web of the rail the drill is adjusted to the position as shown in dotted lines in Fig. 1 which shows the drill after it has passed through the web of the rail. This adjustment is obtained by means of the screw 46 and the wing nut 48. When drilling the web of the rail it will be unnecessary to use the gage 67 and consequently it is screwed back so as to allow the drill to pass entirely through the web. The clamping, operating and removal of the machine is the same when drilling the web of the rail as when drilling the head of the rail.

It will therefore be seen that this invention contemplates a simple rugged, efficient device which can be operated in a simple easy manner. Even an unskilled workman could very quickly and readily adjust it onto the rail and as quickly and easily remove it therefrom. The adjustments to set the device on the rail and to adjust the drill in the proper position with respect to the work points are achieved by very few and very simple manual operations, therefore, the

time required to drill the rails is reduced to a minimum and the skill required of the person operating the device is also reduced to a minimum.

While the invention has been described in detail and with respect to a present preferred form thereof it is not to be limited to such details and forms since many changes and modifications may be made in the invention without departing from the spirit and scope of the invention in its broadest aspects. Hence it is desired to cover any and all forms and modifications of the invention which may come within the language or scope of any one or more of the appended claims.

What we claim as new and desire to secure by Letters Patent of the United States, is:

1. A rail drilling apparatus which comprises a plate member adapted to be disposed upon the tread face of a rail; an upright bracket mounted rigidly upon said plate member, and supporting fixed horizontal guides; a first upright cross-head movable horizontally upon said guides in substantially an upright longitudinal plane of the rail, and having upright guides in a plane parallel with that of said horizontal guides; a second cross-head movable substantially vertically upon said upright guides; a drill-head connected fixedly with said system of cross-heads and adjustable therewith to dispose the drill at any desired point at the side of the rail; means adapted to be engaged adjustably with the track structure adjacent to the rail to support the free end of said drill-head with said drill presented along an axis normal to the plane of a rail face to be drilled, and readily attachable-detachable means to clamp said plate member to said rail head.

2. A rail drilling apparatus which comprises a plate member adapted to be disposed upon the tread face of a rail; an upright bracket mounted rigidly upon said plate member, and supporting fixed horizontal guides; a first upright cross-head movable horizontally upon said guides in substantially an upright longitudinal plane of the rail, and having upright guides in a plane parallel with that of said horizontal guides; a second cross-head movable substantially vertically upon said upright guides; a drill-head connected fixedly with said system of cross-heads and adjustable therewith to dispose the drill at any desired point at the side of the rail; a pair of independently adjustable legs adapted to be engaged adjustably with the track structure adjacent to the rail to support the free end of said drill-head with said drill presented along an axis normal to the plane of a rail face to be drilled; and readily attachable-detachable means to clamp said plate member to said rail head; said clamping means, cross-heads and drill-head being disposed preponderantly at and above the plane of the drilling operation, and the entire structure being adapted to be secured to the rail head exclusively by said readily detachable clamp, and constituting a unitary structure easily transportable and operable by a single operative.

3. A rail drilling apparatus which comprises a member adapted to be disposed across the top of the rail; a quick throw manually operable means to clamp said member to the rail; two rearwardly and laterally extending wings on said member each provided with an ear at the end thereof; a support on said member adapted to extend upwardly above the rail; a drill frame adapted to be supported by said support; manually operable means for adjusting said support relative to said member in a right line in a horizontal direction in a vertical plane substantially parallel to the face of the rail while said member retains its position clamped to the rail; manually operable means for adjusting the support vertically in a right line in a vertical plane at a right angle to the rail to be drilled while said member retains its position clamped to the rail; said horizontal and vertical adjustments permitting the drill frame to be moved to different drilling positions after a single setting of said member; and said support provided with downwardly and laterally extending wings positioned in contact with the first mentioned wings whereby the support including the drill frame is guided and supported by the wings of the member.

4. A rail drilling apparatus which comprises a member adapted to be disposed across the top of the rail; means for rigidly clamping said member to the rail; a pair of spaced side walls positioned transversely to the rail rising from said member; a pair of guiding tubes substantially horizontally positioned extending between said side walls; a substantially rectangular open frame provided with forwardly extending aperture lugs surrounding said tubes and supported and guided thereby; a pedestal member having a forwardly extending enlarged head positioned within said frame; a pair of tubular members supported by the said frame and passing through the said head guiding the said head; said frame having a forwardly extending lug positioned between the said side walls; said lug provided with an internal thread and a threaded member passing therethrough and through the two side walls and being provided with means for preventing movement longitudinally relatively to the side walls and provided with means for rotation thereof whereby the transverse frame may be moved relatively away from and toward each side wall; said transverse frame provided with a threaded rod passing through opposite sides of the transverse frame and restrained from movement longitudinally in respect thereto and adapted to be rotated, said head of said pedestal member provided with a through bore formed with a thread through which the last mentioned threaded rod passes whereby the pedestal member may be moved toward and away from the sides of the frame through which the last mentioned threaded rod extends; and a drill head provided with a drill and means for operating the drill secured to the pedestal member whereby the drill may be positioned at a desired spot on the rail preparatory to drilling therein.

5. In a rail drilling apparatus, in combination: a plate adapted to rest upon the top of a rail and provided with means for clamping to the rail; said plate provided with rearwardly and laterally extending wings each provided with an ear; a pedestal supporting a drill head, said pedestal provided with downwardly and outwardly extending wings positioned to contact with said ears; means to adjust the pedestal in each of two right lines at a right angle to each other in a plane parallel with the face of the ears whereby the pedestal is supported against tilting and guided at its lower end by the ears.

FREDERICK C. LAVARACK.
BENJAMIN SCHLESINGER.