July 16, 1940. J. C. FOREMAN ET AL 2,207,854

RAILWAY TIE BED SHAPING MACHINE

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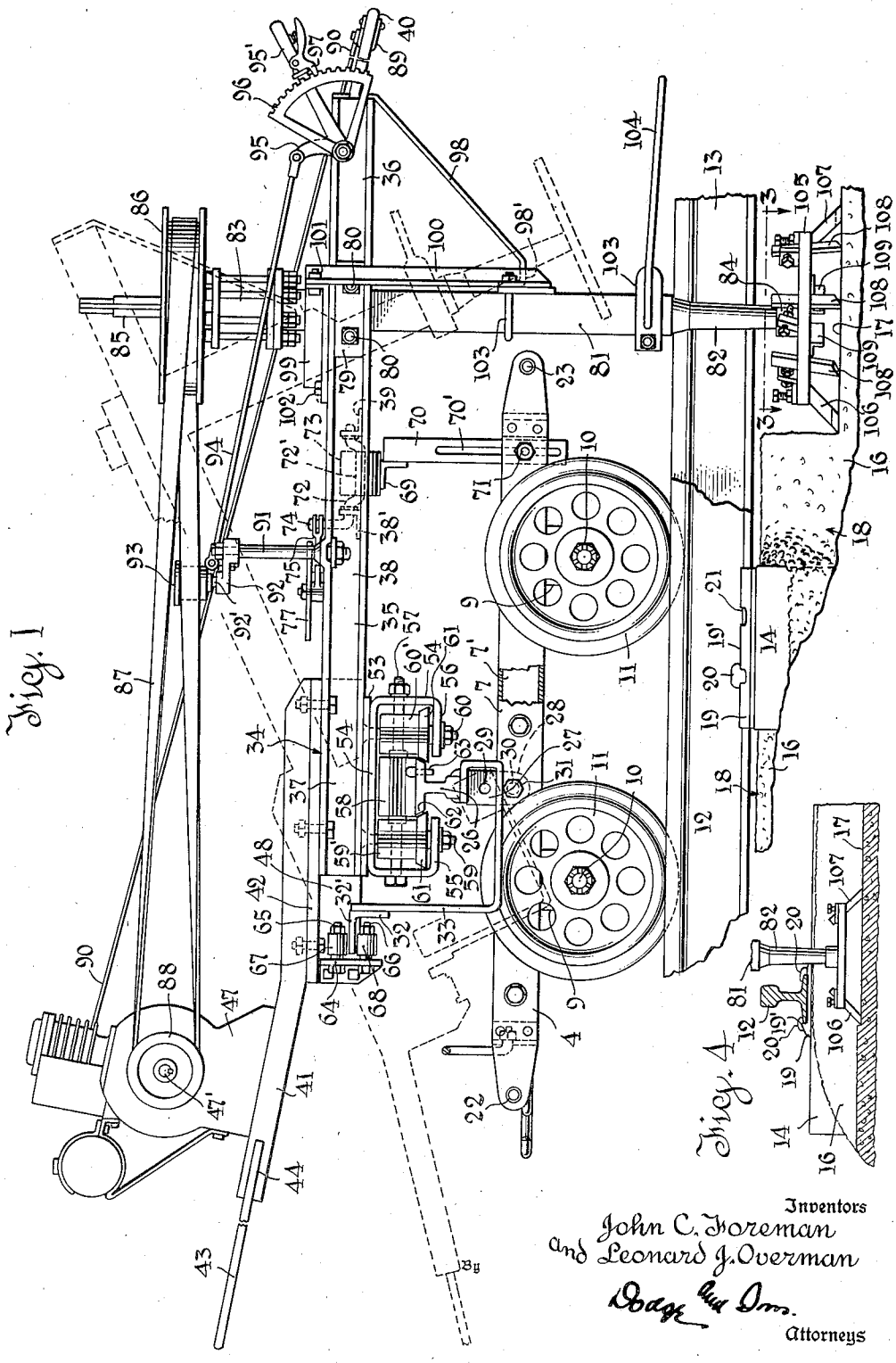


Fig. 1

Fig. 4

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Fig. 3

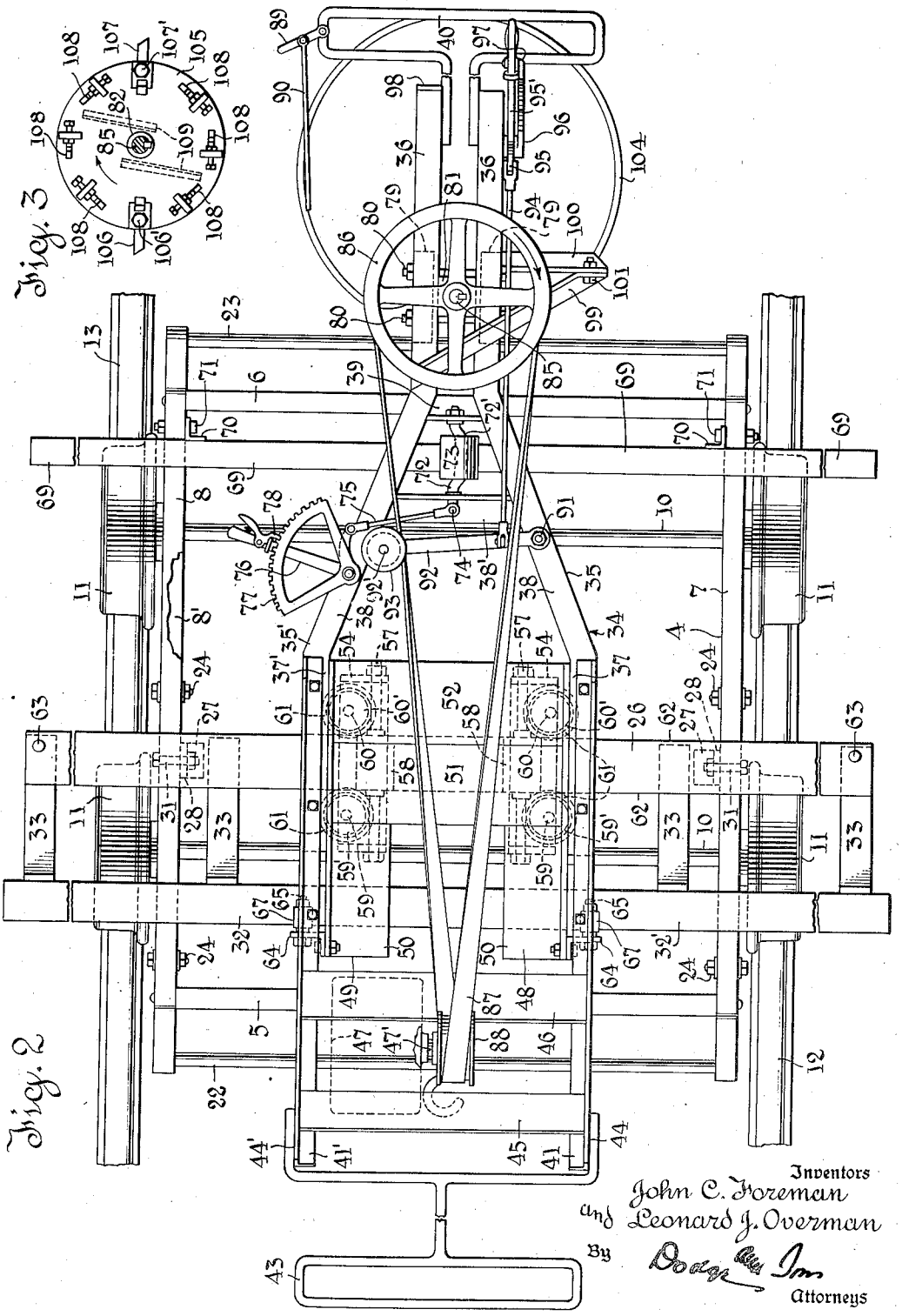


Fig. 2

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RAILWAY TIE BED SHAPING MACHINE

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15 Claims. (Cl. 37—104)

The present invention pertains to railway road bed grading apparatus and, more particularly, to a machine for grading or shaping the original tie beds for the individual ties after the old ties have been removed and preliminary to their replacement by new ties.

As a result of the mechanical wear and tear on railway ties which have been in use for some time, the thickness of the ties gradually decreases under the rails. This obviously reduces the original clearance between the bottoms of the rails and the individual tie beds, i. e., those areas of the ballast road bed which support the ties. Consequently, whenever an old tie is removed the old ballast tie bed must be cut down sufficiently to permit insertion of the thicker new tie into place.

The present practice is to lower the tie bed surface by hand picking. However, it is impossible in this manner to provide a perfect fit for the new tie without completely destroying the original ballast surface or bed on which the old tie rested. This is a serious objection to the hand picking method because it results in destruction of the best tie beds, since the old ties are replaced first and these, having been in place longest, have the best foundations. After destruction of the original tie bed by hand picking, it requires numerous retampings over a period of several years before the tie bed is sufficiently restored to carry its load. In the meantime, the weight of the traffic is thrown onto the adjoining ties and thereby shortens their period of usefulness. Placement of new ties on tie beds shaped by hand picking also aids in the development of transverse fissure rails, with resulting rail failures and the possibility of derailment.

The purpose of the present invention is to provide a machine having power driven grading or dressing means adapted for operation to cut down or grade the old tie beds to the proper level parallel to the rails so as to accurately receive the new ties, but without injuring or even substantially disturbing the old tie bed ballast surfaces as a result of the dressing operation. In this manner there is furnished a plane-surface, cross bed for each new tie which consists entirely of ballast which has not been loosened from the well-packed condition which it possessed while the old tie was still in service. Thus, each new tie, being placed on a solid or established tie bed or ballast foundation, can carry its full load immediately.

An important object is the designing of a simple and relatively light, but rugged, machine for the purpose stated, which is in the form of a wheeled device mounted for ready movement on the track rails so that it may be operated to dress old tie beds in quick succession and thus greatly reduce the time ordinarily required to replace old ties with new ones. In operation, the machine functions through ready manual manipulation thereof by a minimum of operators to dress down the tie beds, not only between and outside of the rails, but under the rails. Hence, the entire tie bed is properly shaped to solidly receive the new tie. A feature of the machine is the employment of a specially designed cutting head to facilitate dressing of the tie bed beneath the rails.

A further feature of the machine resides in its rigid construction and its mounting on the rails, thus insuring accurate and constant control of the depth at which the tie bed dressing means shall operate, and the amount of ballast to be removed from the tie bed. The depth of cutting may be readily and accurately varied by manual adjustment to insure a perfect fit for any size tie to be inserted, thereby avoiding the need of any tamping of the bed, since the tie will rest on a solid bed adapted to bear its full load at once.

An outstanding feature is the designing of the machine so that the power driven, tie bed grading means, and the supporting means therefor, are adapted for ready and easy manual manipulation and control by the operators to dress the tie bed, to elevate the grading means in order to clear the rails in transferring operations from inside the rails to the outside thereof, and to elevate the grading means to inoperative position as when not in use. A power source for the grading means, which is mounted on the portable track machine, is arranged to aid in the ready manipulation of the grading means just mentioned.

Further objects and advantages will be apparent from the following detailed description and the accompanying drawings, which latter show a practical embodiment of the invention now in use.

Figure 1 is a side elevation of the machine in operating position on a railway track with the cutter head operating on the tie bed midway between the rails, the inoperative or rail clearing position of the cutter head and its pivoted supporting frame being indicated partly in dotted lines;

Fig. 2 is a plan view of the same;

Fig. 3 is a section on line 3—3 of Fig. 1, showing the arrangement of the cutters on the cutting head; and

Fig. 4 is a fragmentary sectional view, crosswise of the rails and road bed, showing the rotary cutter head (with certain of the cutters omitted) operating beneath a rail.

The tie bed shaping machine, as illustrated, comprises a main supporting truck body or under frame 4 of generally rectangular form made up of end channel irons 5, 6 and side channel irons 7, 8 rigidly secured together, as by riveting or welding at the corners. Journal boxes 9, axles 10 and wheels 11 support the truck on rails 12, 13. The rails 12, 13 are supported by ties, one of which is shown at 14. Ballast 16, which may be of any suitable type, such as disintegrated granite, etc. extends under and forms a solid supporting bed 17 for each tie and also substantially fills the crib spaces 18 between adjoining ties.

Interposed between each rail and each tie is a tie plate 19 having a shoulder 19' engaging the outer edge of the rail base. Spikes 20 extend through openings 21 in the tie plate to secure the rail, the tie plate and the tie together.

Side channels 7, 8 of the truck frame are extended at their ends to support front and rear, cross rods 22, 23 which serve as hand holds for manually moving the machine on the track. Suitably secured in side channels 7, 8 as by means of bolts and nuts 24, are wooden fillers 7', 8', the purpose of which will appear later.

Arranged transversely of and above the machine truck 4, and towards the rear thereof, is an extended, horizontal track or guide rail 26 which is adapted to support the tie bed shaping means for movement crosswise of the road bed as described later. Track 26 is pivotally supported by the sides of the truck for swinging movement in a vertical plane lengthwise of the truck with track 26 parallel to rails 12, 13, and hence, parallel to the ties. For this purpose, track 26 has secured to the underside thereof, as by welding, a pair of angle members 27, 27. The upright arm 28 of each of these members depends just inside of truck frame 4 and is provided with an upper perforation 29 and a lower perforation 30 (Fig. 1). A pivot bolt and nut 31 is arranged in each of the lower perforations 30 and extends through the adjoining side channel iron and filler of the truck frame to pivotally mount track 26 in place.

As will be clear, track 26 projects considerably beyond the sides of truck body 4 to support the later described tie bed shaping means and the supporting means therefor in their transverse movements during shaping of the individual tie beds 17 between and under rails 12, 13, and also outside of the rails. A horizontal, angle-iron guide rail 32 also extends crosswise of the machine parallel to, but somewhat above, rail 26, and is rigidly secured to rail 26 by L-shaped members 33 which are welded or otherwise suitably attached to track 26 and rail 32. Thus, guide rail 32 is unitary with track 26 and partakes of the pivotal movements of the latter for a purpose explained later.

Arranged above track 26 and supported thereby intermediate its ends, for bodily movement along the track transversely of the machine and for unitary pivotal or swinging movement in a vertical plane with track 26 on its pivots 31, 31, is an elongated, rigid upper frame or boom 34. This frame extends lengthwise of the machine and somewhat beyond the ends of truck frame 4. Frame 34 carries the tie bed grading means at its forward portion and the power driving means therefor at its rear portion so as to thus substantially counterbalance frame 34 on pivots 31, 31 and thus facilitate pivotal movement of this frame when moved by the operator as set forth hereinafter.

Frame 34 comprises a pair of channel irons 35, 35' each having parallel forward portions 36, 36, parallel rear portions 37, 37 and converging intermediate portions 38, 38. Channel irons 35, 35' are rigidly connected together by angle irons 38', 39, welded thereto, and also by a forward, operating handle 40 welded to frame portions 36, 36.

Upwardly-bent angle irons 41, 41' are supported at their forward portions on channels 35, 35' and are rigidly secured thereto and to intermediate spacer members 42 (only one shown) by bolts passing through these parts as indicated. The outer or rear ends of angle irons 41, 41' are rigidly connected together by a rear operating handle 43 welded thereto at 44 and 44'. Plates 45 and 46, welded to angle irons 41, 41', provide a bed upon which is supported and suitably secured a source of motive power, such as the internal combustion engine 47 illustrated.

Welded to the inner sides of portions 37, 37' of channels 35, 35' and projecting rearwardly thereof are relatively large angle irons 48, 49. Supported on the horizontal portions 50, 50 of these angle irons and welded thereto so as to brace frame 34 are plates 51, 52. Each horizontal angle portion 50 has welded to its underside a plate 53 to which latter is also welded an inverted U-shaped yoke or housing 54 having a top portion 54' and a pair of inwardly bent lower arms 55, 56. Suitably mounted in the sides of each yoke 54 is a removable shaft or pin 57 carrying a horizontal roller 58 which rests on track 26. Thus, the two rollers 58 support the entire upper frame or carriage 34 and the various parts carried thereby for ready rolling movement along track 26 transversely of the machine and the road bed. Track 26 being relatively wide and rollers 58, 58 being elongated, a substantial supporting surface is thereby provided for frame 34.

Suitably mounted in plate 53 and the top 54' and arms 55, 56 of each yoke 54, is a pair of vertical pins or shafts 59, 60 having rollers 59', 60' arranged on opposite sides of track 26. Rollers 59', 60' are offset horizontally from rollers 58, 58 (Fig. 2), and each roller 59', 60' has an upwardly and inwardly tapered end flange 61 which extends beneath the reversely beveled edge 62 formed at each side of the head of track 26. Thus flanges 61 of the four rollers 59', 59', 60', 60' coact with track edges 62, 62 to effectively prevent any substantial longitudinal shifting or horizontal twisting of frame or carriage 34 on track 26. Hence, horizontal rollers 58, 58 are always maintained in proper position on the track.

Flanges 61 of the four vertical rollers just mentioned, together with horizontal rollers 58, 58, also coact with the head of track 26, as will be evident, to cause the track to swing about its pivot pins 31, 31 substantially as a unit with frame 34 when the latter is raised or lowered at either end by its operating handle 40 or 43. Removable pins 63, 63 at the ends of track 26 limit the movement of carriage 34 crosswise of the machine by engagement with horizontal rollers 58, 58.

Bolted to the rear end of each of large angle irons 48 and 49 is a small, vertically-arranged angle iron 64. Rotatably mounted on removable studs 65 and 66 rigidly secured in each of angle irons 64 is a pair of horizontal balancing rollers 67 and 68. Rollers 67, 67 are disposed above the

horizontal portion 32' of guide rail 32 and rollers 68, 68 below the same for coaction therewith to aid in balancing frame or boom 34 on track 26, while permitting free movement of frame 34 laterally of the machine on track 26. When handle 43 is depressed or handle 40 raised to elevate the forward end of frame 34 toward the inoperative, dotted-line position of Fig. 1, rollers 67, 67 force guide rail 32 downwardly and, through members 33, impart an additional turning force to track 26. This not only greatly facilitates the pivotal movement of track 26 and elevation of the forward end of frame 34, but also minimizes the cramping or binding of rollers 58, 59' and 60' on track 26, which might otherwise interfere with desired movement of frame 34 along track 26 at this time. Rollers 68, 68 coact similarly with guide rail 32 for the same purpose, only in a reverse direction, when handle 40 is depressed or handle 43 elevated to lower the forward end of frame 34 towards the full-line, operative or tie bed shaping position of Fig. 1.

Another horizontal angle iron guide rail 69 extends across the machine to support the forward end of frame 34 when it is in the horizontal, tie bed shaping position of Figs. 1 and 2, and during its movements along track 26 while in this position. Guide rail 69 is rigidly supported parallel to the track rails 12, 13 by a pair of upright angle members 70, 70 welded thereto at their upper ends. Each member 70 is slotted at 70' to receive a bolt 71 which extends through the truck frame 4. In this manner, guide rail 69 is rigidly but adjustably supported on the truck frame 4.

Mounted in angle members 38' and 39 is a rotatable shaft 72 having an eccentric portion 72'. On the latter is rotatably mounted a roller 73 which bears on guide rail 69. Roller 73 supports the front end of frame 34 on guide rail 69 at all times when the frame is in its operating or bed dressing position. Shaft 72 is formed with a crank 74 which is operatively connected by a link 75 to one arm of a bell crank lever 76 pivoted on frame 34. A rack segment 77 is associated with the operating arm of the bell crank lever for coaction with a conventional grip-operated pawl 78 on the lever arm. This provides for ready rotation of shaft 72 and the securing thereof in any adjusted position. Obviously rotation of shaft 72 will change the vertical position of roller 73, because of the eccentric 72', and thereby raise or lower the forward or tie bed cutter end of frame 34, depending upon the direction of rotation of the shaft. This adjustment, as appears later, is used to variably control or gage the depth at which the cutter means operate in dressing the tie bed.

Rigidly clamped between forward portions 36, 36 of frame 34, by means of blocks 79, 79 in the frame channels and bolts 80, 80, is a sectional, vertical, outer drive shaft housing 81 of rectangular, horizontal cross-section. Within housing 81 is clamped an inner housing 82, having an upper roller bearing 83 and a lower thrust bearing 84, through which a vertical cutter-head drive shaft 85 extends. Keyed to the upper end of drive shaft 85 is a flanged pulley 86 from which extends an endless driving belt 87 connected at its opposite end to pulley 88 on the driving shaft 47' of engine 47, whereby operation of the engine serves to rapidly revolve cutter head shaft 85 clockwise as indicated in Figs. 2 and 3. Handle 40 for frame 34 carries a pivoted lever 89 having a reach rod 90 operatively connecting the lever and the throttle of engine 47, whereby the speed of the latter may be conveniently controlled by the operator while manipulating the cutter frame 34 by handle 40.

Also convenient to the operator manipulating handle 40 are means for controlling a tightener for belt 87 so as to vary its tension and thus the power transmitted to cutter shaft 85 by the engine. The belt tightener comprises a post 91 rigidly mounted upon frame 34 and having a horizontal arm 92 pivotally mounted on its upper end. A stud 92' on the outer end of arm 92 carries a rotatable, flanged idler roller 93 which engages endless belt 87. A reach rod 94 operatively connects arm 92 with one arm of a bell crank lever 95 pivoted on the forward portion of frame 34 adjoining handle 40. A rack segment 96 is associated wth the operating arm 95' of the bell crank lever for coaction with a conventional grip-operated pawl 97 on lever arm 95'. By operating lever arm 95', roller 93 may be swung horizontally to vary its pressure on belt 87 and hence the tension of the belt, whereupon arm 95' is secured in adjusted position.

Shaft housing 81 is further braced, to insure its rigid mounting in frame 34, by means of a brace 98 attached to the forward end of frame 34 and to housing 81 at 98'. Another brace for shaft housing 81 is formed by angle members 99 and 100 which are bolted together at 101. Member 99 is bolted to frame 34 at 102 and a U-clamp 103 secures a member 100 to housing 81. A second clamp 103, bolted around housing 81, carries a hoop-like safety guard 104 adapted to protect the operator's feet and limbs from the rapidly rotated cutter head now to be described.

The tie bed shaping means or cutter head comprises a horizontally-disposed, flat disk 105 of relatively large diameter keyed to the lower end of drive shaft 85. As shown most clearly in Figs. 1 and 3, this disk has adjustably mounted in openings therein a number of tie bed or ballast cutting knives or digging elements the cutting edges of which are all located in a single horizontal plane. These knives include a diametrically-opposed side cutting pair of knives 106, 107 secured by set screws 106', 107' and inclined radially beyond the periphery of disk 105. Thus, these knives control the width of the grading or dressing cut of the cutter head, as shown in Fig. 1, and may also be used to trim upright surfaces of the road bed where necessary in preparing the tie bed. An annular series of base cutting knives 108 is similarly adjustably mounted around the margin of disk 105 and are inclined outwardly towards the periphery of the disk. A pair of underhead cleaning blades 109, 109 is secured to the underside of disk 105.

In using the herein-described tie bed shaping machine, the old ties and tie plates are removed in the usual manner without disturbing the surfaces of the old tie beds. The machine is then moved along the railway track, with cutter head 105 elevated to clear the road bed and any ties still in place, until the cutter head, when lowered, is directly over the old tie bed 17 which is to be dressed or planed down to receive a new tie. The thickness of the new tie is now measured and lever 76 swung in the proper direction to raise or lower the front end of frame or carriage 34, and hence cutter head 105, so that the knives of the latter are set, when roller 73 is resting on guide rail 69, to cut at a depth below the bases of rails 12, 13 equal to the thickness of the new tie plus

the thickness of the tie plate. Thus, when the tie bed is refinished at this new level, it will be adapted to accurately receive the new tie and the tie plates on the original, solid bed.

Assuming engine 47 is now running so that the cutter head 105 is rapidly rotated, the operator at the front end of the machine uses handle 40 to hold roller 73 on guide rail 69, or to move it down onto the guide rail, so that the ballast tie bed 17 under cutter head 105 will be cut away to the proper, predetermined depth. At the same time this operator, assisted by an operator using handle 43, may readily move carriage 34 bodily crosswise of the machine along track 26 and guide rail 69, so as to progressively grade or plane the tie bed 17 lengthwise thereof across the road bed at the new, predetermined level. Cutter head 105 is of sufficient diameter to plane the tie bed 17 over its entire width without the necessity of moving the machine and cutter head lengthwise of tracks 12, 13.

During the above operations, the operator at the front end may, as circumstances demand, vary the power supplied by motor 47 by operating lever 39, and may also control the transmission of power from the motor to cutter head 105 by adjusting the belt tightener through lever 95'.

The machine is designed and readily operable to grade or shape to a new plane surface the entire surface of the old tie bed 17, even beneath the rails 12, 13 as indicated in Fig. 4. Although other procedure may be followed, generally in planing off a tie bed 17, operations are started outside of one of the railway rails 12, 13. For instance, frame 34 may be first manipulated by the operators, by vertical swinging of the front end of the frame and shifting of the frame crosswise of the road bed, to bring the cutter head in position to dress the tie bed outside of and partly under rail 13. The cutter head is then raised sufficiently, as indicated in Fig. 1, to clear the rail 13 when carriage 34 is shifted laterally to move the cutter head into position between the rails. The cutter head being so moved, it is lowered and the bed planed off between the rails, the resurfacing under rail 13 being completed at this time and the bed 17 also partly regraded under rail 13 as shown in Fig. 4. The cutter head is now lifted as before so that it will pass over rail 12, whereupon it is shifted laterally and lowered, the operator then completing the resurfacing of the entire tie bed 17 by regrading the bed outside of rail 12 and finishing the grading under this rail.

Except for the presence of loosened and easily removable particles of ballast remaining on the tie bed following the planing operation described but which are readily removed by a broom or shovel, the tie bed 17 is now finished and ready to receive the new tie. Consequently, the cutter head is raised and the machine moved along tracks 12, 13 into proper position for refinishing the next tie bed. The new tie is slipped into place on the finished bed and rails 12, 13 elevated to permit insertion of the tie plates, which, together with the rails, are then spiked in place. The first train over the track firmly seats the tie plates, the rails and the ties, and hence the track at this point is immediately supported on a solid foundation without need of any tamping of the ballast tie bed.

Although other suitable types of cutting heads may be used, the rotating disk type shown has various important advantages and is therefore preferred. In using the rotating disk type of cutter head, the cutter head may be made of minimum overall thickness or height in order to facilitate its operation beneath the rails. In addition, the cutter head operating shaft 85 and its housing 82 may be of a minimum overall size to permit maximum movement of the cutter head beneath the rails and hence dressing of the greater part of the tie bed 17 beneath each rail when operating from either side of the rail. The cutter head is of relatively large diameter so that, as a result of operating from both sides of each track rail 12, 13, the entire tie bed surface beneath each rail is accurately regraded.

As stated, frame 34 is supported by track 26 and guide rail 69 when the frame is in its horizontal or operating position and during all bodily shifting movements thereof crosswise of the machine during actual grading of the tie bed. Therefore, track 26 and guide rail 69 function as limiting means to gage the depth to which the cutter head grades the tie bed, and insures that the new tie bed surface will be parallel to the bottoms of the rails. As explained already, variation of the level to which the cutter head grades the tie bed may be obtained by adjusting roller 73. This takes care of relatively small variations in the thickness of new ties. When it is necessary to grade to lower levels, this may be accomplished by lowering members 70, 70, and hence the guide rail 69, and then securing these members again with the guide rail parallel to the track rails 12, 13. Whenever this lowering adjustment is excessive, the pivot about which track 26 and boom 34 oscillates is lowered so as to insure that the actual cutting plane of cutter head 105 will be substantially parallel to the bottoms of the track rails. This is effected by removing pivot pins 31, 31, lowering track 26 and frame 34, and then securing pins 31, 31 in the upper holes 29, 29 of pivot members 27, 27. In other words, holes 29, 29 are used when grading at lower levels, and holes 30, 30, when operating at higher levels.

The facility with which the machine may be operated will be obvious from the above description. Since the newly finished tie bed is still in its original well-packed condition, thus requiring no retamping when the new tie is put in place, and less ballast has to be removed from the old tie bed, the machine can be operated to dress tie beds in relatively rapid succession, thereby greatly decreasing the time heretofore required in replacing old ties. The insertion of the new ties on established tie beds, resurfaced as described herein, permits maintenance of the track at much less cost, and improves the riding condition of the track. It also prevents traffic delays by eliminating speed restrictions which are necessary in places where heavy tie removals have been made by the hand-picking method.

While the invention has been described in some detail, no necessary limitation thereto is implied, and modifications within the scope of the appended claims are contemplated.

What is claimed is:

1. A railway tie bed shaping machine comprising a support adapted for mounting on the railway track rails; a carriage on the support; grading means on the carriage, said carriage and grading means being movable transversely of the support and the railway rails for grading substantially the entire surface of the tie bed including those portions of the bed beneath the railway rails and said grading means being movable transversely of the support for the entire length of the tie bed, the grading means being of such

size and so constructed and so arranged upon the support as to provide for movement of said grading means beneath the railway rails to grade said portions of the tie bed beneath said railway rails to the proper level to receive a new tie; and means for driving the grading means.

2. A railway tie bed shaping machine comprising a support mounted on the rails; a carriage on the support; grading means on the carriage, said carriage and grading means being movable transversely of the support and the rails and said grading means also being movable vertically for grading a tie bed; stop means on the support for limiting downward movement of the grading means to control the grading level; and means for driving the grading means.

3. The combination of claim 2 further characterized in that means are provided for effecting relatively small changes in the lowermost level at which the grading means may operate, and separate means are provided for effecting relatively large changes therein.

4. A railway tie bed shaping machine comprising a frame adapted for mounting on the railway track rails; grading means, including a rotatable cutting head, mounted on the frame for movement transversely of the frame and the railway track rails to grade a tie bed, said grading means including the rotatable cutting head being of such size and so constructed and so arranged upon the frame as to provide for movement of said rotatable cutting head beneath a railway rail to grade the tie bed beneath said railway rail to the proper level to receive a tie; and means for driving the grading means.

5. A railway tie bed shaping machine comprising a support mounted on the rails; grading means mounted on the support for movement transversely thereof and for vertical movement to grade a tie bed and to pass over a rail, said grading means including a rotatable, disk-type cutter head adapted to grade the tie bed beneath a rail and having an effective cutting diameter sufficient to simultaneously cut the entire width of the tie bed and also to grade the entire tie bed surface beneath a rail; and means for driving the grading means.

6. A railway tie bed shaping machine comprising a frame adapted for mounting on the railway track rails; grading means, having a single cutting head, carried by the frame for movement transversely of the frame and the railway rails to grade substantially the entire surface of a tie bed including those portions of the bed beneath the railway rails, said cutting head being movable transversely of the frame for the entire length of the tie bed, the grading means including the cutting head being of such size and so constructed and so arranged upon the frame as to provide for movement of said cutting head beneath the railway rails to grade said portions of the tie bed beneath said railway rails to the proper level to receive a new tie; and means for driving the cutting head.

7. A railway tie bed shaping machine comprising a frame mounted on the rails; an arm on said frame; grading means on the arm, said arm and grading means being vertically swingable lengthwise of the frame and the rails and bodily movable transversely of the frame and the rails for grading a tie bed; and means for driving the grading means.

8. A railway tie bed shaping machine comprising a frame mounted on the track rails; a pair of supporting rails arranged crosswise of said frame; a carriage on said supporting rails; grading means on said carriage, said carriage and grading means being movable transversely of the frame on said supporting rails for grading a tie bed, at least one of said supporting rails being vertically adjustable to vary the grading level of the grading means; and means for driving the grading means.

9. The combination of claim 8 wherein the vertically adjustable supporting rail is located between the other supporting rail and the grading means, and an eccentrically mounted roller is mounted for adjustment between the carriage and the adjustable supporting rail for effecting minor changes in the operating level of the grading means.

10. A railway tie bed shaping machine comprising a frame movable along the track rails; a pair of spaced supporting rails arranged crosswise of said frame; a longitudinally-extending carriage carried by said supporting rails intermediate its ends; grading means on one end of the carriage, one of said supporting rails being intermediate the grading means and the other supporting rail and the latter rail being pivoted to the frame for oscillation in a vertical plane, said carriage being connected to the pivoted rail for oscillation therewith and free of connection with said other supporting rail but restricted thereby in its pivotal movement to limit the lowermost level at which the grading means may operate, the carriage and grading means being manually and bodily movable transversely of the frame for grading a tie bed; and driving means on the frame for said grading means.

11. The combination of claim 10 further characterized in that roller means are provided to support the carriage on the carriage movement limiting rail, said roller means being adjustable to vary the lowermost level at which the grading means may operate.

12. The combination of claim 10 further characterized in that roller means are provided to support the carriage for movement along the pivoted supporting rail and to prevent displacement of the frame from said rail in all directions laterally thereof; and that means are provided for imparting swinging movement to the pivoted rail, independently of said roller means, when the frame is oscillated, whereby to prevent undesirable binding action between the pivoted rail and the roller means.

13. The combination of claim 10 further characterized in that roller means are provided to support said carriage for movement along said pivoted supporting rail and to substantially prevent all movement of the frame transversely of said rail; roller means are provided to support the carriage for movement along said movement limiting rail; a third rail, supported by the pivoted rail, is arranged crosswise of the frame between the pivoted rail and the opposite end of the frame; and a pair of substantially horizontally-disposed, vertically-spaced roller devices is located on the frame with said third rail disposed therebetween, whereby, upon oscillation of the frame, coaction of said roller devices with the upper and lower faces of the third rail will impart swinging movement to the pivoted rail.

14. A railway tie bed shaping machine comprising a wheeled truck adapted to travel on the rails; a boom mounted on the truck for vertical swinging movement lengthwise of the truck and the rails and also bodily movement transversely of the truck and the rails; power driven tie bed grading means carried by the boom; and means

on the truck for limiting the swinging movement of the boom to control the lowermost depth at which said grading means may operate to grade a tie bed.

15. A railway tie bed shaping machine comprising a wheeled truck adapted to travel on the rails; a transverse support pivoted on said truck for vertical swinging movement lengthwise of the truck; a boom mounted intermediate its ends on said support for vertical swinging movement therewith and also for bodily movement on said support transversely of the truck; tie bed grading means carried by one end of the boom; a prime mover carried by the opposite end of the boom to substantially counterbalance the boom; a driving connection between the prime mover and the grading means; and adjustable gaging means interposed between the truck and the boom in all transverse positions of adjustment of the boom, whereby to limit the depth to which the grading means may operate to dress a tie bed.

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