Feb. 16, 1960 J. B. McWILLIAMS ET AL 2,925,048

RAILWAY TRACK SERVICING MACHINE

Filed Dec. 27, 1955 7 Sheets-Sheet 1

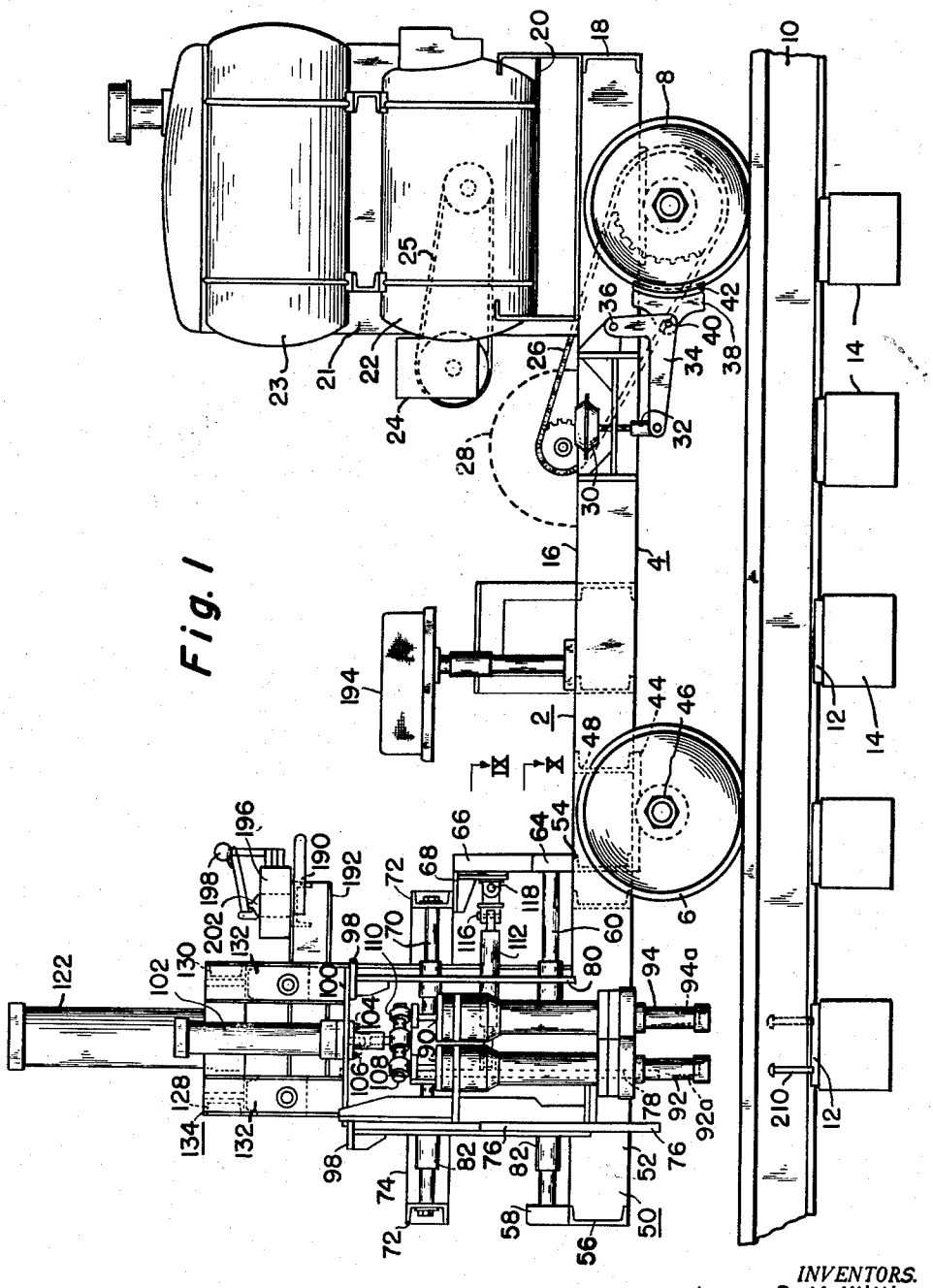


Fig. 1

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RAILWAY TRACK SERVICING MACHINE

Filed Dec. 27, 1955 7 Sheets-Sheet 2

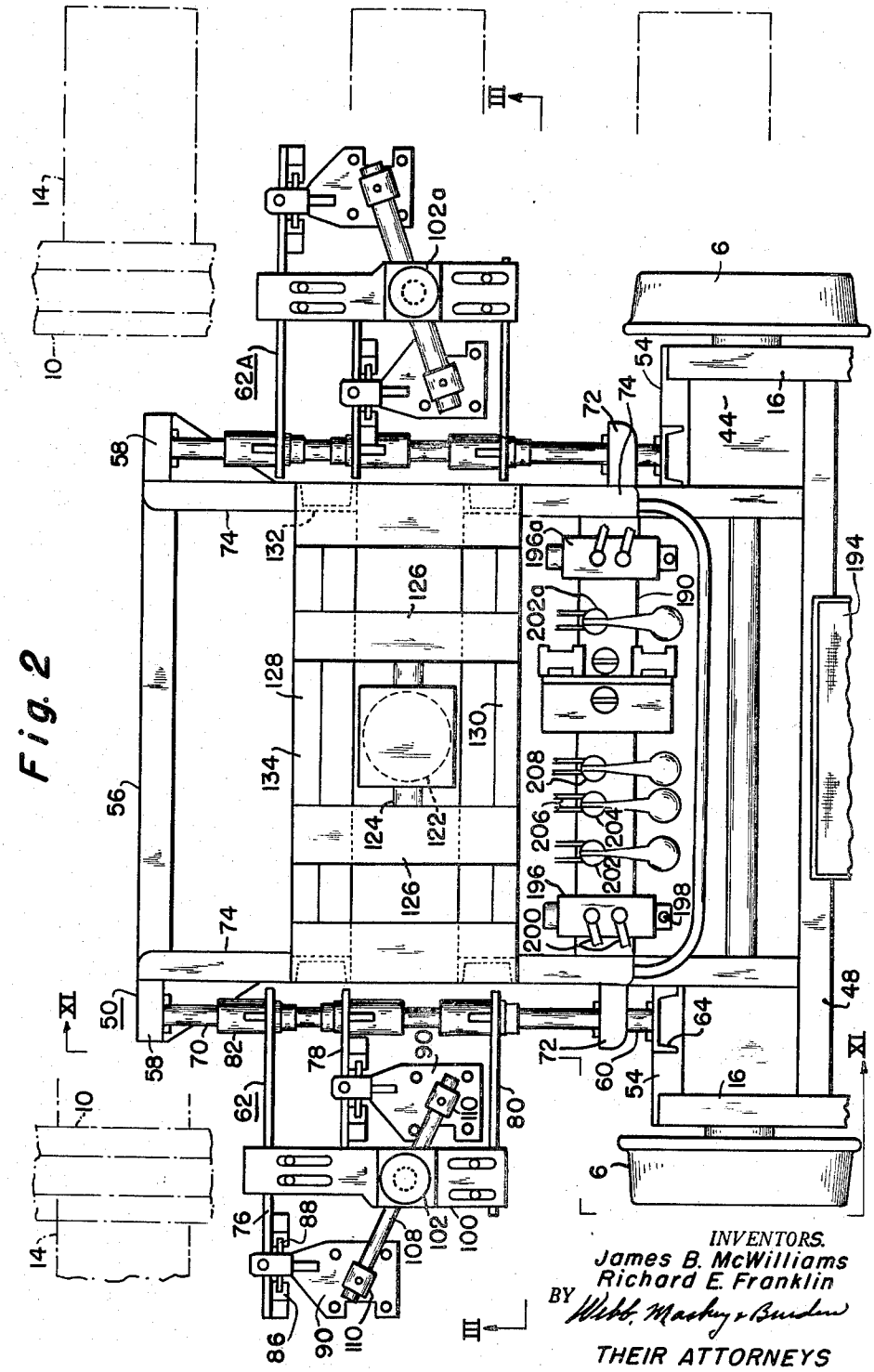


Fig. 2

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RAILWAY TRACK SERVICING MACHINE

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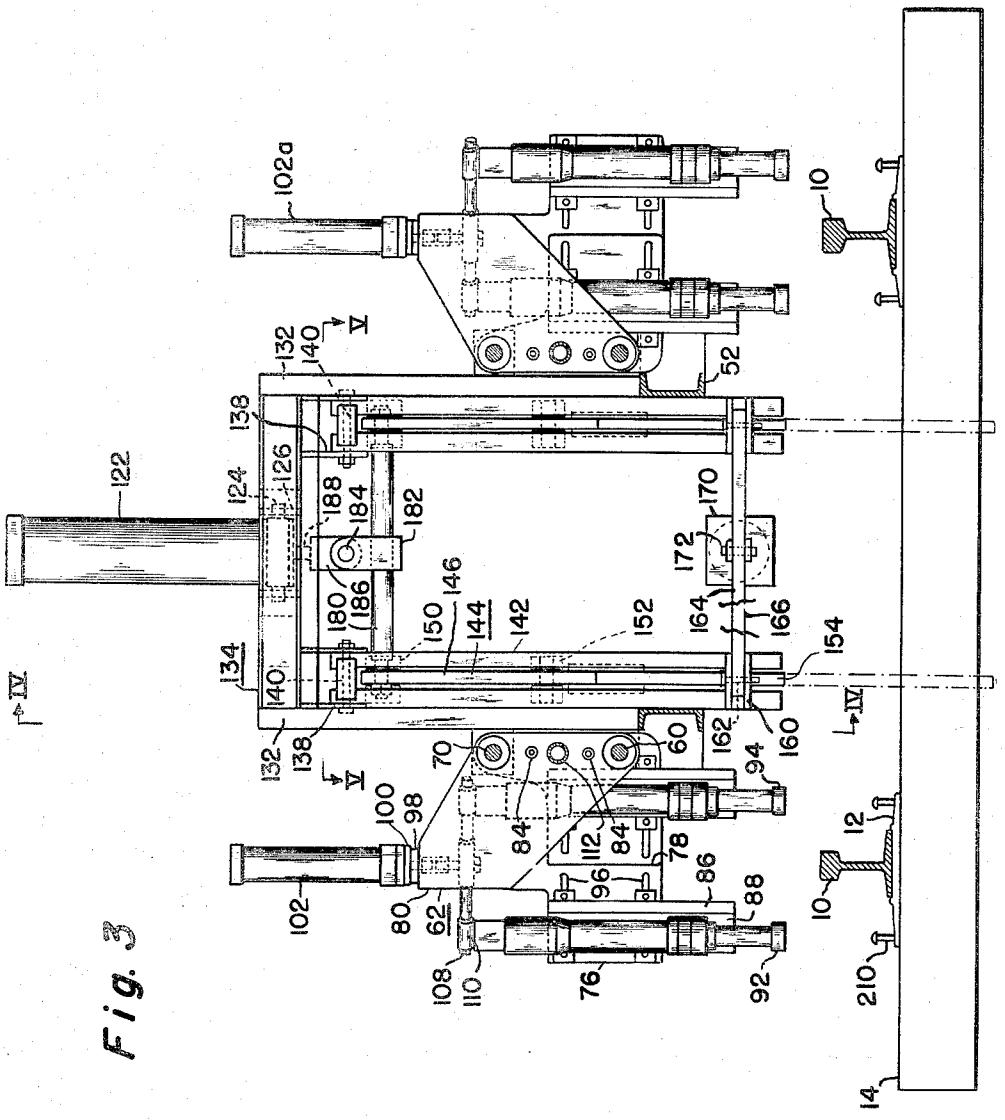


Fig. 3

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RAILWAY TRACK SERVICING MACHINE

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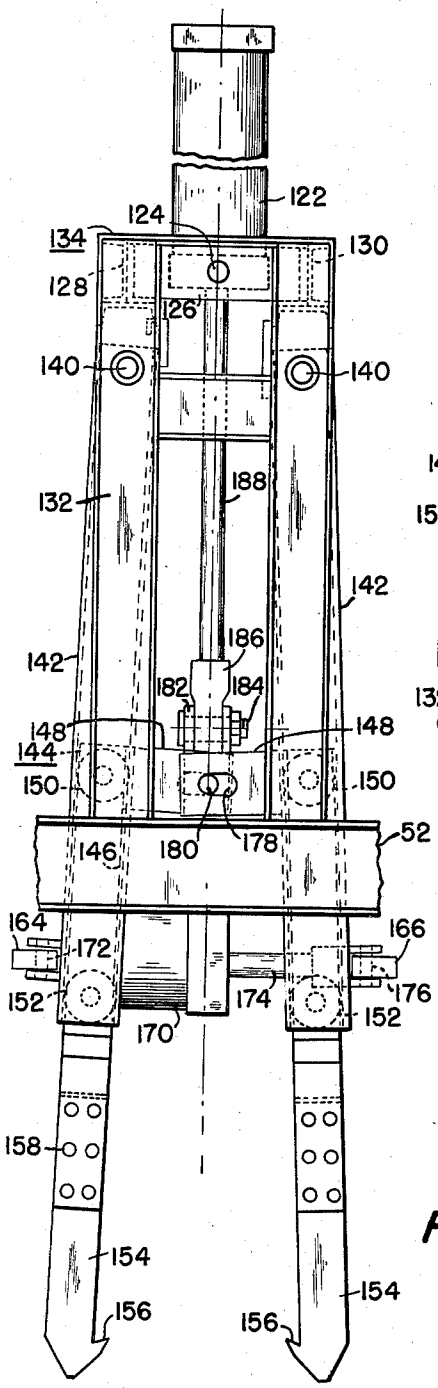


Fig. 4

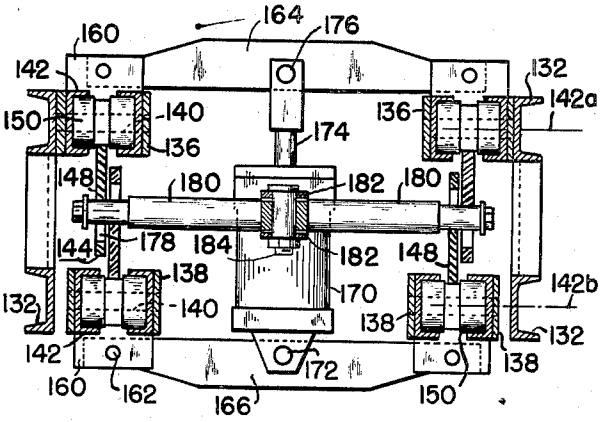


Fig. 5

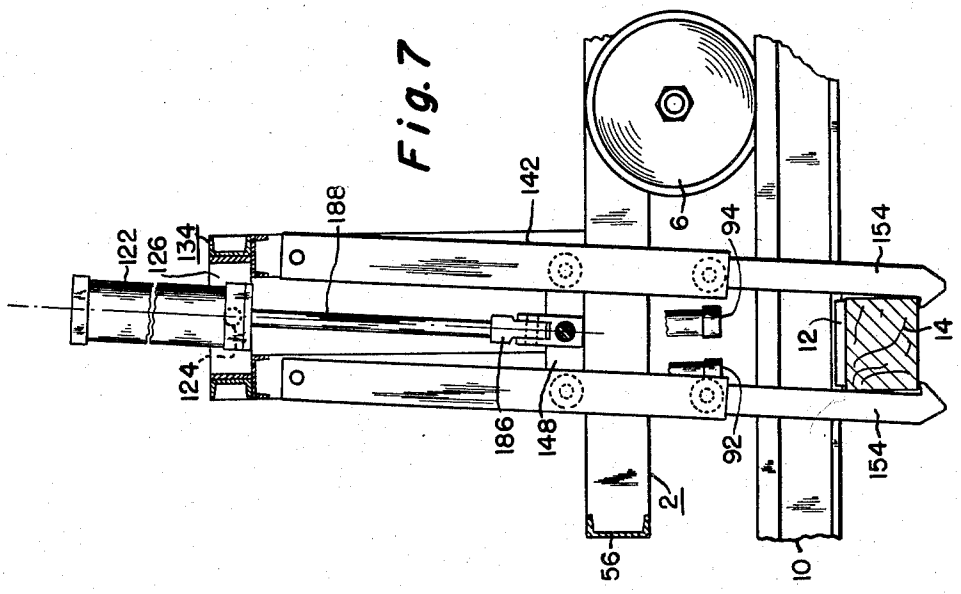
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RAILWAY TRACK SERVICING MACHINE

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Fig. 7



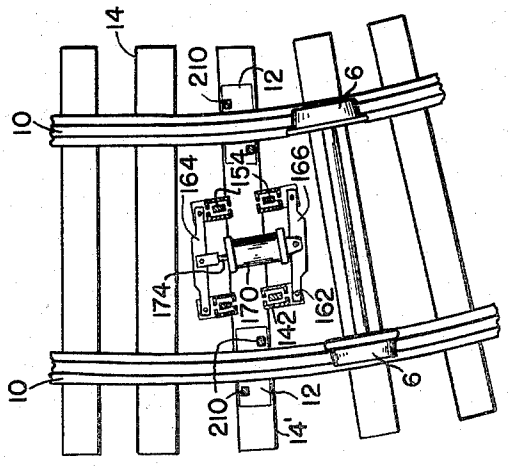


Fig. 6

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RAILWAY TRACK SERVICING MACHINE

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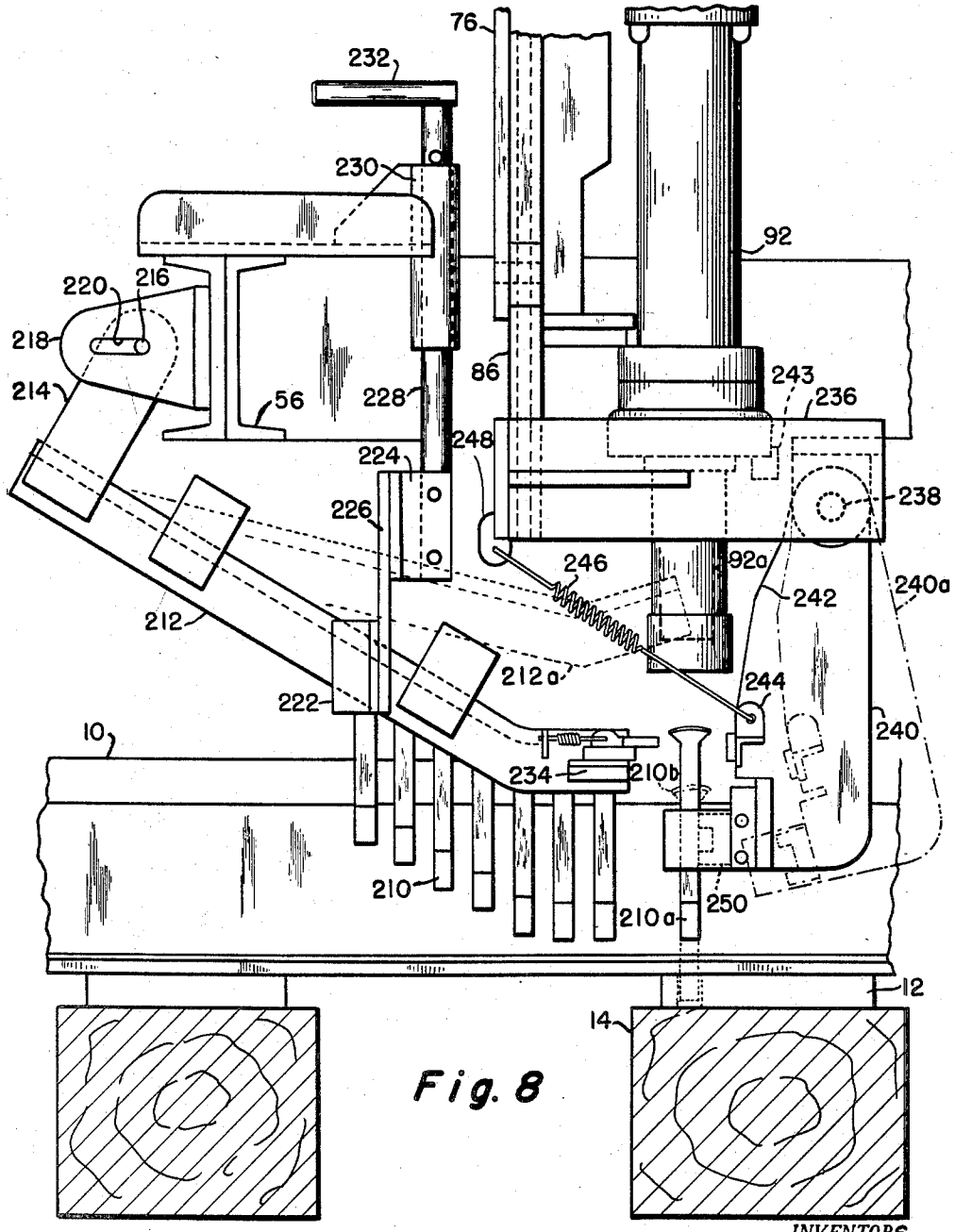


Fig. 8

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RAILWAY TRACK SERVICING MACHINE

Filed Dec. 27, 1955 7 Sheets-Sheet 7

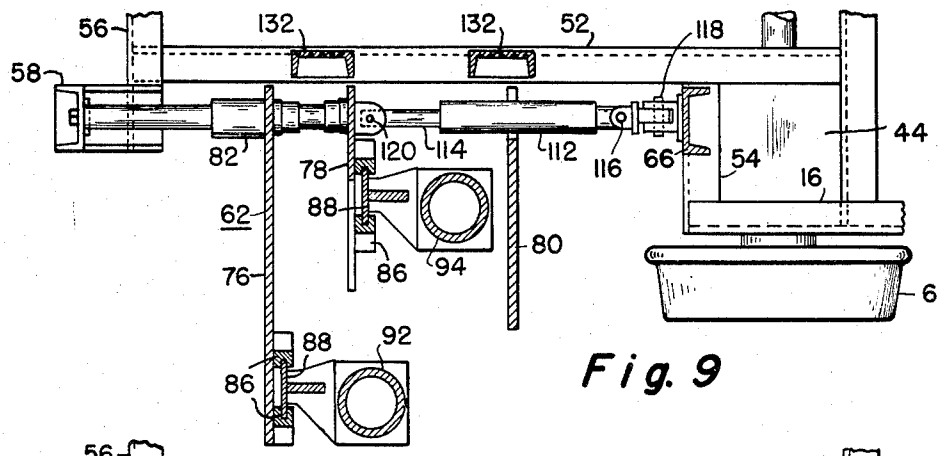


Fig. 9

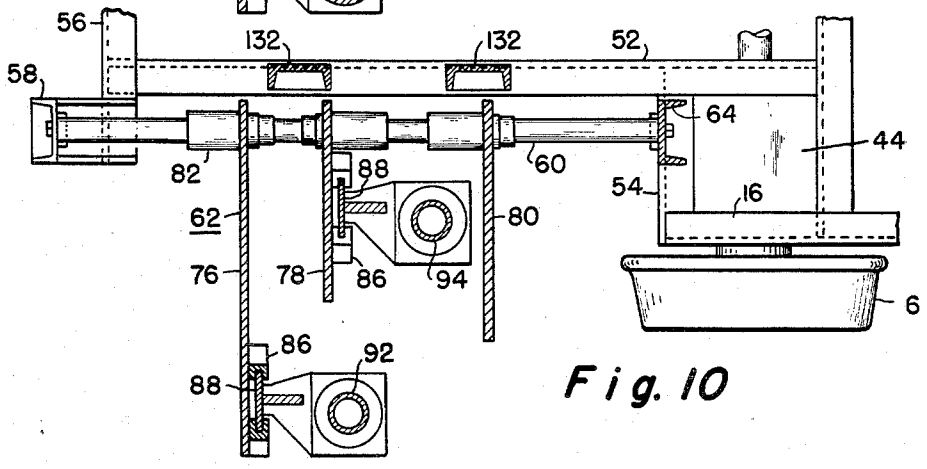


Fig. 10

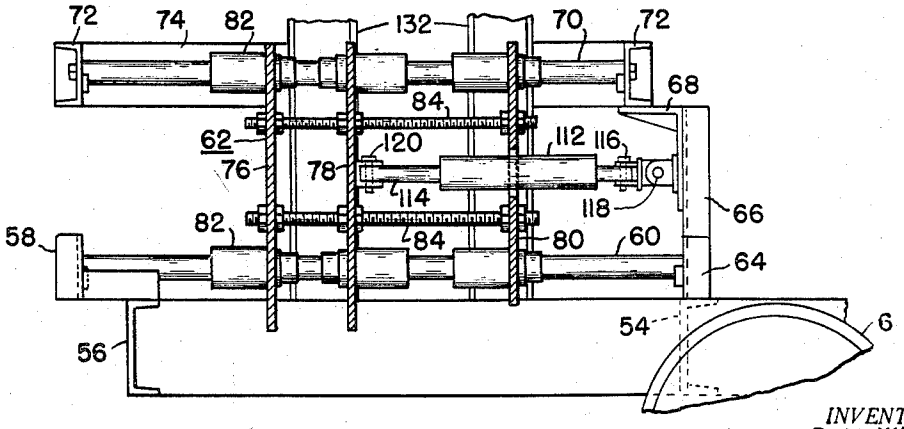


Fig. 11

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2,925,048

RAILWAY TRACK SERVICING MACHINE

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Application December 27, 1955, Serial No. 555,496

6 Claims. (Cl. 104—17)

This invention relates to a railway track servicing machine and, more particularly, to a machine which operates to raise ties into contact with the bases of the rails and drives spikes into the tie plates and ties. Prior known tie raising and spike driving machines comprise a truck adapted to run on rails and a head or framework for supporting air hammers rigidly mounted on the truck. It is, therefore, necessary in driving spikes into a tie to exactly spot the truck so that the hammer carrying head is in vertical alignment with the end of the tie to be spiked. If the tie lies askew of the track, it is necessary to exactly spot the truck so that the hammer carrying head is in direct vertical alignment with one end of the tie, drive the two spikes at that end of the tie, then move the truck forwardly or rearwardly and again spot it at a position in which the hammer carrying head is in direct vertical alignment with the other end of the tie. In spiking rails on a curve, a similar problem is involved in that the tie does not lie in a plane which is exactly parallel with the front end of the truck. In other words, the tie does not lie at exactly right angles to the longitudinal axis of the truck. Accordingly, the truck must be spotted at one position for driving the spikes at one end of the tie and then moved to another position for driving the spikes at the other end of the tie.

The above mentioned difficulties are eliminated in our machine which comprises a truck adapted to run on rails, a carriage supported by and located at each side of the truck and adjustable fore and aft of the truck. A plurality of power driven hammers is supported by each of the carriages and power means is provided for moving the carriages fore and aft of the truck. In the preferred embodiment herein described, each of the carriages is independently adjustable fore and aft by independent power means.

In using our machine, the truck can be moved to a position in which the carriages on which the power driven hammers are supported are out of vertical alignment with the ends of the tie to be spiked. Thereafter, one of the carriages or both of them are adjusted fore and aft relative to the truck to bring the hammers in direct vertical alignment with the ends of the tie. Our machine is particularly useful in laying curved track wherein the tie does not lie at exactly right angles to the longitudinal axis of the truck. After having moved the truck to the approximate desired position, the carriages can be moved independently of each other relative to the truck in a fore-or-aft direction so as to exactly align the hammers on each of the carriages with the ends of the tie to be spiked.

Other advantages of our machine are set forth hereinafter.

In the accompanying drawings which illustrate a preferred embodiment of our invention,

Figure 1 is a side elevation of the machine with certain parts omitted;

Figure 2 is an enlarged plan view of the front portion of the machine shown in Figure 1;

Figure 3 is a vertical transverse section taken on the line III—III of Figure 2;

Figure 4 is a side elevation, on an enlarged scale, taken along the line IV—IV of Figure 3;

Figure 5 is a horizontal section, on an enlarged scale, taken on the line V—V of Figure 3;

Figure 6 is a schematic plan view corresponding to Figure 5 but taken at a lower level and showing a curved portion of track;

Figure 7 is an exaggerated operational view of the tongs in side elevation corresponding to the showing of Figure 4;

Figure 8 is a side elevational view of a spike feeding attachment for the truck and a spike holder for the hammer carriages;

Figure 9 is a horizontal section taken on the line IX—IX of Figure 1;

Figure 10 is a horizontal section taken on the line X—X of Figure 1; and

Figure 11 is a vertical section taken on the line XI—XI of Figure 2.

Referring more particularly to the accompanying drawings, a truck indicated generally by reference numeral 2 and having a frame indicated generally by reference numeral 4 has front wheels 6 and rear wheels 8 adapted to run on rails 10 of a previously laid portion of track. The rails rest on tie plates 12 supported by ties 14. The frame 4, which is generally rectangular, includes a pair of longitudinally extending, transversely spaced main side rails 16 and a transverse rear rail 18 rigidly interconnecting the side rails 16 at their rear extremities. The rear of the truck has an upraised horizontal platform 20 which supports an air compressor 21 having a compressed air storage tank 22 and a fuel tank 23. A hydraulic pump 24 driven by a belt 25 is operated to force hydraulic liquid, preferably oil, under pressure for a use hereinafter more fully set forth. The rear wheels 8 are driven by a chain and sprocket drive 26 which is operated by a reversible pneumatic propulsion motor 28 supplied with air from the tank 22.

A double acting pneumatic diaphragm motor 30 is mounted to each of the main side rails 16 at a point forwardly of the rear wheels 8, each of the motors 30 having a depending power reciprocable rod 32. Each of the rods 32 is pivotally connected at its lower end to the forwardly extending arm of a bell crank 34 having a vertically upwardly extending arm pivotally mounted at 36 to the adjacent side rail 16. A brake 38 is pivotally connected at 40 to the apex of the bell crank 34 and the brake has a brakeshoe 42 adapted to engage the wheel 8. When the rod 32 is moved downwardly, the bell crank 34 is rocked about the pivot 36 to apply and set the brakeshoe 42 firmly against the driving wheel 8.

The front ends of the main side rails 16 rest on a steel plate 44 carrying bearings for the journal 46 of the front wheels 6. A front cross member 48 is welded to the plate 44 and to the side rails 16. The plate 44 supports the rear end of a generally rectangular cantilevered platform indicated generally by reference numeral 50 which includes a pair of spaced-apart side rails 52 welded at their rear ends to the plate 44 and to the cross member 48. A pair of short reinforcing cross members 54 connect together the front extremities of the main side rails 16 and a rear portion of the side rails 52. The side rails 52 are secured together at their front ends by a front cross member 56 which protrudes laterally a short distance beyond the side rails 52 on each side thereof. The protruding opposite ends of the front cross member 56 carry a pair of upstanding brackets 58, each of which supports the front end of a lower longitudinally extending rod 60 for slidably mounting a hammer carriage indicated generally by reference numeral 62 at the

left-hand side of the truck 2. The lower rod 60 for the carriage 62 is connected at its rear end to an upstanding bracket 64 which is fixed to the short transverse member 54 at the left-hand side of the truck. The bracket 64 has an upstanding leg 66 which, at its upper end, supports a bracket 68. An upper rod 70 is mounted at its ends in brackets 72 secured to a longitudinal member 74.

The left-hand carriage 62 for the air hammers is slidably mounted on the upper and lower rods 70 and 60, respectively, and comprises a set of longitudinally spaced-apart, vertically disposed plates consisting of a front plate 76, an intermediate plate 78 and a rear plate 80. The front plate 76 carries a pair of sleeve bearings 82 received on the rods 70 and 60 and is secured to the intermediate and rear plates 78 and 80, respectively, by a set of longitudinally extending bolts 84 (see Fig. 11), the bolts having clamping nuts threadably received thereon at each of the opposite sides of the three plates. The front plate 76 carries a pair of fixed vertically disposed channel members 86 which face each other and define a trackway or guide for a vertically disposed crosshead 88 slidable up and down therein. The crosshead 88 is connected to a bracket 90 which is connected to the case of an outboard air hammer indicated generally by reference numeral 92 to guide the same in down and up movement toward and away from the tie 14 over which it is located. The intermediate plate 78 has a similar guide and crosshead for guiding the case of an inboard air hammer 94. The hammers 92 and 94 are adapted to straddle one of the rails 10 supported on the ties. Slots 96 in the front and intermediate plates 76 and 78 permit the channel members 86 to be adjusted inwardly and outwardly with relation to the vertical plane of the rail 10 to bring the outboard and inboard hammers 92 and 94 into exact spaced relationship with respect to the rail.

The rear plate 80 is slidably mounted on the rods 60 and 70 in the same manner as the front plate 76. Each of the plates 76 and 80 has an upper bracket 98 secured to it which supports a mounting plate 100 at its opposite ends. The mounting plate 100 straddles the intermediate plate 78 so as to permit relative fore-and-aft adjustment between the plates 76 and 78 when the nuts on the tie rods 84 are loosened.

The mounting plate 100 carries a vertically disposed, double acting air cylinder 102 which is rigidly secured at its lower end by bolts 104 to the mounting plate and has a depending piston rod 106 for raising and lowering the hammers 92 and 94. The piston rod 106 is connected to the hammers by a horizontally disposed, forwardly and outwardly extending bar 108 which carries a pair of inwardly and outwardly adjustable sleeves 110 secured to the brackets 90 which are secured to the upper ends of the cases of the hammers 92 and 94. The hammers 92 and 94 have reciprocable spike hammering plungers 92*a* and 94*a*, respectively, which are pneumatically operated in conventional manner.

The carriage 62 is adjusted fore or aft along the rods 60 and 70 by a hydraulic cylinder 112 and piston rod 114 having a piston operating in the cylinder. The cylinder 112 is pivotally mounted at its rear end on a vertical pivot 116 and on a transverse pivot 118 supported by the upstanding leg 66. The piston rod 114 is pivotally connected at 120 to the intermediate plate 78 of carriage 62. Extension or retraction of piston rod 114 in cylinder 112 adjusts the carriage 62 supporting the hammers 92 and 94 fore or aft of the truck 2 so that the hammers are in direct vertical alignment with the spikes to be driven. The slots 96 allow inward or outward adjustment of the hammers.

A carriage indicated generally by reference numeral 62A, whose construction and operation are the same as that of the carriage 62, is located at the right-hand side of the truck. It supports two air hammers similar to the hammers 92 and 94 and can be adjusted fore and aft relative to the truck 2 by a cylinder and piston rod similar to the cylinder 112 and piston rod 114.

Reference is now made to Figures 3, 4 and 5 which illustrate the construction and operation of tong means for grasping a tie, raising it against the base of the rails and holding it while spikes are being driven.

An air cylinder 122 which is centrally located transversely of the truck 2 is pivotally mounted adjacent its lower end on transverse pivots 124 mounted in longitudinally extending beams 126. The beams 126 are supported by spaced front and rear cross beams 128 and 130, respectively, from four vertical beams 132 which at their lower ends are rigidly secured to the longitudinally extending beams 52. The beams 126, 128 and 130 provide an upper platform indicated generally by reference numeral 134 on which the cylinder 122 is pivotally supported.

The front and rear cross beams 128 and 130, respectively, in the upper platform 134 support pairs of closely spaced depending front lugs 136 and rear lugs 138 which carry a pivot 140 between the lugs of each pair at each of the four corners of but slightly below the upper platform 134. Each of the pivots 140 carries a pair of depending confronting channel-shaped guide rails 142, two pairs of which are adapted to swing about a transversely extending front axis 142*a* and two pairs of which are adapted to swing about a transversely extending rear axis 142*b*. A bell crank indicated generally by reference numeral 144 is located between each pair of guide rails 142. Each bell crank 144 has a vertically extending leg 146 and a horizontally extending leg 148. Each of the bell cranks 144 carries a pair of rollers 150 at the apex of the vertical leg 146 and the horizontal leg 148 which are received by and track in a corresponding pair of guide rails 142. The lower portion of the vertical leg 146 of each bell crank 144 also carries a roller 152 received and tracking in a pair of guide rails 142. The vertical legs 146 of the bell cranks each carry a tong 154 having a claw portion 156 and a plurality of fastening bolts 158, whereby the tong 154 is detachably secured to spaced-apart plates welded to the vertical legs 146. The lower ends of each pair of guide rails 142 are rigidly secured together by a bracket 160, each bracket carrying a pivot 162. A front equalizer bar 164 and a rear equalizer bar 166 are pivotally connected at their ends by the pivots 162 to the brackets 160. An air cylinder 170 is pivotally connected at 172 to the rear equalizer bar 166 and a piston rod 174 having a piston operating in cylinder 170 is pivotally connected at 176 to the front equalizer bar 164. Retraction of the piston rod 174 into its cylinder operates through the equalizer bars 164 and 166 to move the guide rails 142 and the bell cranks 144 toward each other so that the tongs 154 can grasp a tie located between them. Extension of the piston rod 174 from its cylinder opens the tongs.

The horizontal legs 148 of the bell cranks 144 extend toward each other and overlap and are provided with slots 178 which receive the ends of a transversely extending pin 180. The pin 180 is supported in a U-shaped bracket 182 which is pivotally connected by a longitudinally extending pin 184 to a fitting 186 to which the lower end of a piston rod 188 is secured. The piston rod has a piston operating in the cylinder 122. Raising and lowering of the piston rod 188 causes the bell cranks 144 to raise and lower in the guide rails 142 to bring the tongs 154 of the bell cranks 144 into inoperative raised position or to low them to operative position in which they can grasp a tie.

Referring to Figures 1 and 2, a control panel 190 is mounted on a support 192 within convenient reach of an operator seated on a seat 194 supported from the truck 2. A valve 196 mounted on the control panel is operable by a handle 198. The valve controls the flow of hydraulic liquid from the pump 24 through conduits 200 to the opposite ends of cylinder 112 to adjust the left-hand car-

riage 62 fore or aft relative to the truck 2. A similar valve 196a controls the fore-and-aft adjustment of the carriage 62A. Two valves 202 and 202a control the flow of air from air storage tank 22 to the cylinders 102 and 102a for lowering and raising the air hammers 92 and 94 on the carriage 62 and the corresponding hammers on the carriage 62A toward or away from the tie to be spiked. A valve 204 controls the flow of compressed air from tank 22 through conduits 206 to the upper and lower ends of cylinder 122 for lowering and raising the tongs 154. A valve 208 controls the flow of compressed air from tank 22 to cylinder 170 to close and open the tongs 154.

An example of the flexibility of operation of the tie grasping tongs 154 is apparent from the schematic showing of Figure 6. In this figure, the tie 14' lies askew of the other ties 14. The tie 14' does not lie in a plane which is at exactly right angles to the longitudinal axis of the truck. The tongs 154 are lowered by lowering piston rod 188 and then the piston rod 174 is retracted into its cylinder 170 to cause the tongs to grasp the tie 14'. The pivoted connections 162 of the equalizer bars 164 and 166 to the guide rails 142 allow the tongs 154 to firmly grasp the tie. Then the piston rod 188 is raised to raise the tie against the base of the rails 10. The carriages 62 and 62A are then adjusted fore or aft to bring the hammers 92 and 94 on the left-hand carriage and the corresponding hammers on the right-hand carriage into exact vertical alignment with the spikes which are to be driven and thereafter the hammers are operated to drive the spikes. The driving of the spikes of the left-hand rail and of the right-hand rail can take place simultaneously without first driving the spikes of one rail and then bodily moving the truck 2 to the next position for driving the spikes of the other rail.

Figure 7 illustrates the fact that in lifting a tie 14 into engagement with the base of a rail 10 and driving the spikes, the truck 2 need not be exactly spotted so that the pivot 124 for the lifting cylinder 122 is in exact vertical alignment with the tie 14. In this figure, the truck 2 whose position is indicated by the position of its lower frame and front cross member 56 and its upper platform 134, may be spotted in a position of mere approximation relative to a tie 14 which may be normal to or askew of the rails 10. The tongs 154, while spread apart, are lowered by lowering piston rod 188 and then piston rod 174 is retracted in its cylinder 170 so that the tongs clamp the tie. When so clamped, the tie and the pivot 124 are not in exact vertical alignment with each other. Piston rod 188 is then raised to raise the tie against the base of the rails 10. If it is desired to spike the tie in this position, the carriages 62 and 62A are adjusted fore or aft so as to bring the air hammers 92 and 94 and the corresponding hammers on the other side of the truck into the desired positions over the tie and then the plungers of the hammers are operated to drive the spikes into the tie. On the other hand, one or more retractions and extensions of the piston rod 188 with a tie grasped by the tongs 154 will, by gravity, ordinarily result in the tie assuming a nearly vertically aligned position with respect to the transverse pivot 124 supporting the cylinder 122 and the operator may, if desired, operate the cylinder 122 in this manner to accomplish the alignment.

Figure 8 illustrates automatic mechanism for feeding spikes 210 and for holding them in position suitable for driving them into a tie. A spike feed chute 212 is supported adjacent its upper end by a bracket 214 carrying a pin 216 and a bracket 218 having a slot 220 receiving the pin. The bracket 218 is secured to the front cross member 56 of the truck 2. The chute 212 is also supported intermediate its ends by brackets 222 and 224, plate 226 and a pin 228 slidable in a sleeve 230 secured to the truck, the pin 228 being capable of being raised and lowered by a handle 232. The chute 212 can be swung to the inoperative dotted line position 212a by raising the handle 232. The chute is inclined downwardly and rearwardly and has a substantially horizontal end portion which carries an escape mechanism 234 of known design permitting the spikes 210 to pass out the rear of the chute one at a time. The front plate 76 of carriage 62 which supports the hammers 92 and 94 carries the channel member guides 86 in depending relation therefrom and the guides have a rearwardly extending bracket 236 rigid therewith and carrying a transversely disposed pivot 238 which pivotally supports the upper end of an L-shaped magnetic spike holder 240. Adjacent the upper end thereof, the spike holder 240 has a cam surface portion 242 engageable by an enlarged portion 243 of the case of the hammer 92 when the hammer is lowered so as to cam the magnetic spike holder into the inoperative dotted line position 240a of Figure 8. A spring securing bracket 244 is carried by the magnetic spike holder 240 and is attached to one end of a helical spring 246 which is anchored at its opposite end to a bracket 248 carried by the guide 86 depending from the front plate 76. The spring 246 acts in a direction to urge the magnetic spike holder 240 from the angled dotted line position 240a of inaction into the solid line operative position of Figure 8.

Extension of piston rod 114 from its cylinder 112 causes the carriage 62 to move the hammers 92 and 94 and the magnetic spike holder 240 forwardly toward the escape mechanism 234 at the end portion of the chute 212. The lower leg of the L-shaped spike holder 240 has a permanent horseshoe magnet 250 mounted adjacent the extremity thereof, which magnetically picks up a spike 210 and retracts the spike with the holder as the carriage 62 is moved rearwardly to a position about a tie 14. Although only one spike chute 212 and one spike holder 240 are shown, there is a spike chute and a spike holder for each hammer. Thus, there are two chutes and two spike holders at each side of the truck. When the carriage 62 has been moved rearwardly to the position shown in Figure 8, two spikes are adapted to be driven, one by the hammer 92 and the other by the hammer 94. The hammers 92 and 94 are then lowered to approach the spikes, the spikes being in position 210a, and then the plungers 92a and 94a are actuated to drive the spikes into the ties. The spikes, in being driven downwardly through holes in a rail plate 12 as shown in Figures 1 and 8 into a tie 14 advance to progressive positions, such as position 210b, at which time the cam 242 is engaged by the enlarged hammer case portion 243 to cause the magnetic spike holder 240 to swing away from the spike into the dotted line position 240a. By this time, the spike is well started in the tie 14 and further blows on the spike head by the plunger 92a cause the spike to be driven downwardly into a substantially flush position with respect to the tie plate. Raising the hammer 92 permits the magnetic spike holder 240 to be swung by spring 246 to its solid line position.

The invention is not limited to the preferred embodiment but may be otherwise embodied or practiced within the scole of the following claims.

We claim:

1. A railway track servicing machine comprising a truck adapted to run on rails, a carriage located at each side of the truck, an upper and a lower rod fixed to the truck at each side thereof and extending longitudinally thereof, each carriage comprising a vertically extending front plate, rear plate and intermediate plate extending transversely of the truck and spaced apart longitudinally of the truck and slidably mounted on said rods, a vertically extending guide secured to each of said front and intermediate plates, a crosshead slidable in each of said guides, a hammer secured to each of said crossheads, and power means for raising and lowering both of said hammers as a unit.

2. A railway track servicing machine comprising a truck adapted to run on rails, an upstanding frame

mounted on the truck, front and rear pairs of vertically disposed guides pivotally mounted adjacent their upper ends on transverse pins in the frame, pairs of bell cranks having vertically disposed legs slidable in said guides and having horizontal legs pivotally connected to a common transverse pin, power means pivotally mounted on the frame for raising and lowering said common transverse pin to raise and lower said bell cranks in said guides, tie gripping elements affixed to the lower ends of said vertical legs, and a second power means connected to said guides for moving them and the vertically disposed legs of said bell cranks and said tie gripping elements toward and away from each other to hold and release a railway tie.

3. A railway track servicing machine comprising a truck adapated to run on rails, an upstanding frame mounted on the truck, front and rear pairs of vertically disposed guides pivotally mounted adjacent their upper ends on transverse pins in the frame, pairs of bell cranks having vertically disposed legs slidable in said guides and having horizontal legs pivotally connected to a common transverse pin, tie tongs affixed to said vertical legs, an air cylinder pivotally mounted on the frame, a piston rod having a piston operating in said air cylinder, said piston rod being connected to said common transverse pin for raising and lowering said bell cranks in said guides, and a second air cylinder and piston rod having a piston operating therein and connecting said guides for moving them and the vertically disposed legs of said bell cranks and the tie tongs toward and away from each other to hold and release a railway tie.

4. A railway track servicing machine according to claim 2, comprising a front equalizer bar pivotally connecting said front pair of vertically disposed guides and a rear equalizer bar pivotally connecting said rear pair of vertically disposed guides, said second power means pivotally connecting said equalizer bars to each other.

5. A railway track servicing machine comprising a vehicle adapted to run on rails, two pairs of tongs mounted on said vehicle, power means to move said pairs from an elevated position to a lowered position into straddling relationship to a tie, power means to move the tongs of each pair toward and away from each other to grasp and release a railway tie, a mounting frame pivotally interconnecting the pairs of tongs such that each pair of tongs may move longitudinally relative to the other pair of tongs and to the vehicle; both pairs of tongs when in the lowered position being adapted to grasp a tie which is askew of the rails.

6. A railway track servicing machine comprising a truck adapted to run on rails, a carriage supported by and located at each side of the truck and adjustable fore and aft of the truck, fluid power means for moving said carriages fore and aft, a plurality of power driven hammers rigidly supported by each of said carriages, a second power means for moving said plurality of power driven hammers on each carriage vertically, an upstanding frame mounted on the truck in the proximity of said hammers, front and rear pairs of vertically disposed guides pivotally mounted adjacent their upper ends on transverse pivot axes in the frame, tongs slidably mounted in said guides, a third power means for raising and lowering said tongs in said guides, a fourth power means for moving said tongs toward and away from each other to hold and release a railway tie.

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