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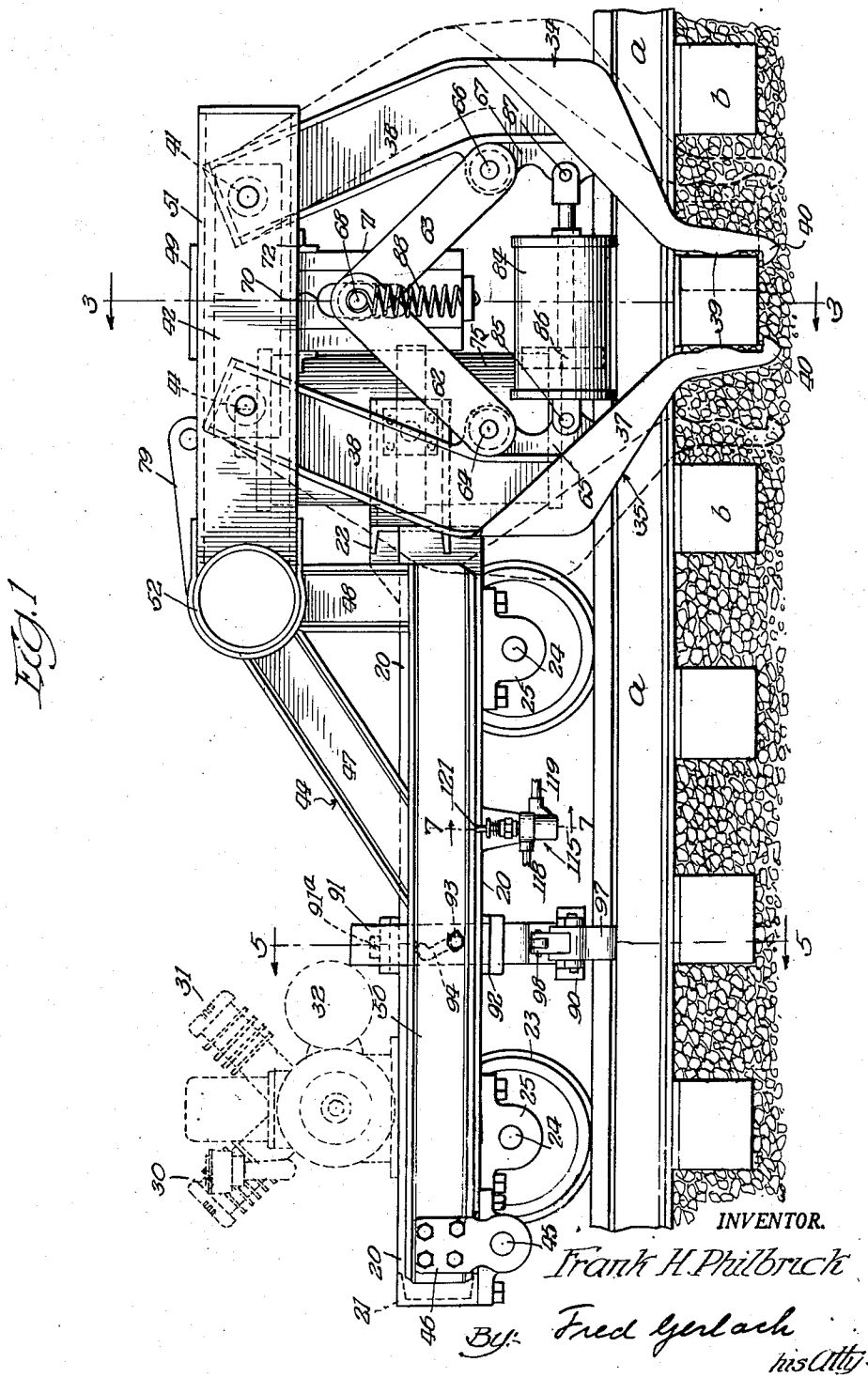
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2,696,971

METHOD AND MACHINE FOR SPACING RAILWAY TIES

Filed Nov. 30, 1949

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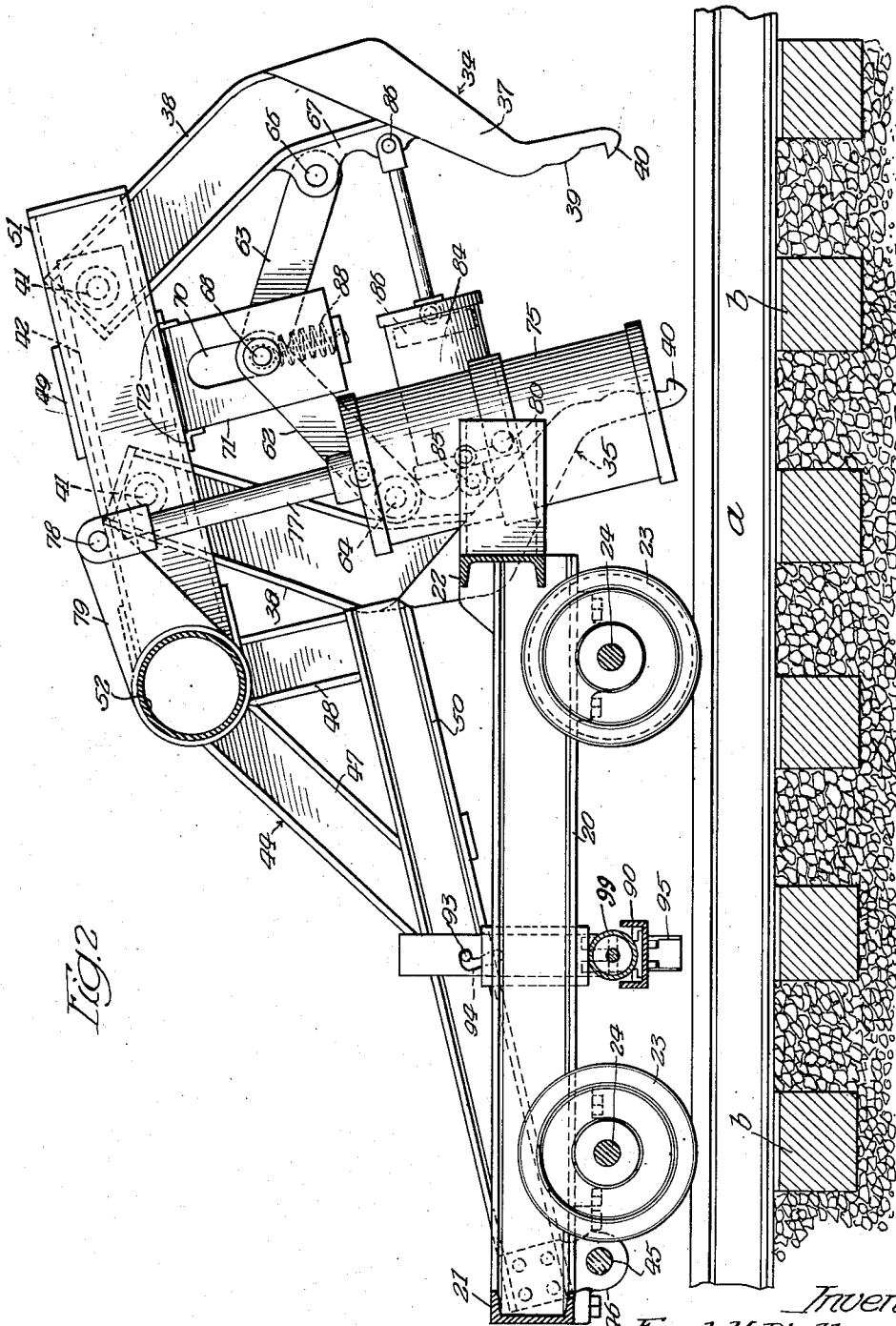
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5 Sheets-Sheet 2



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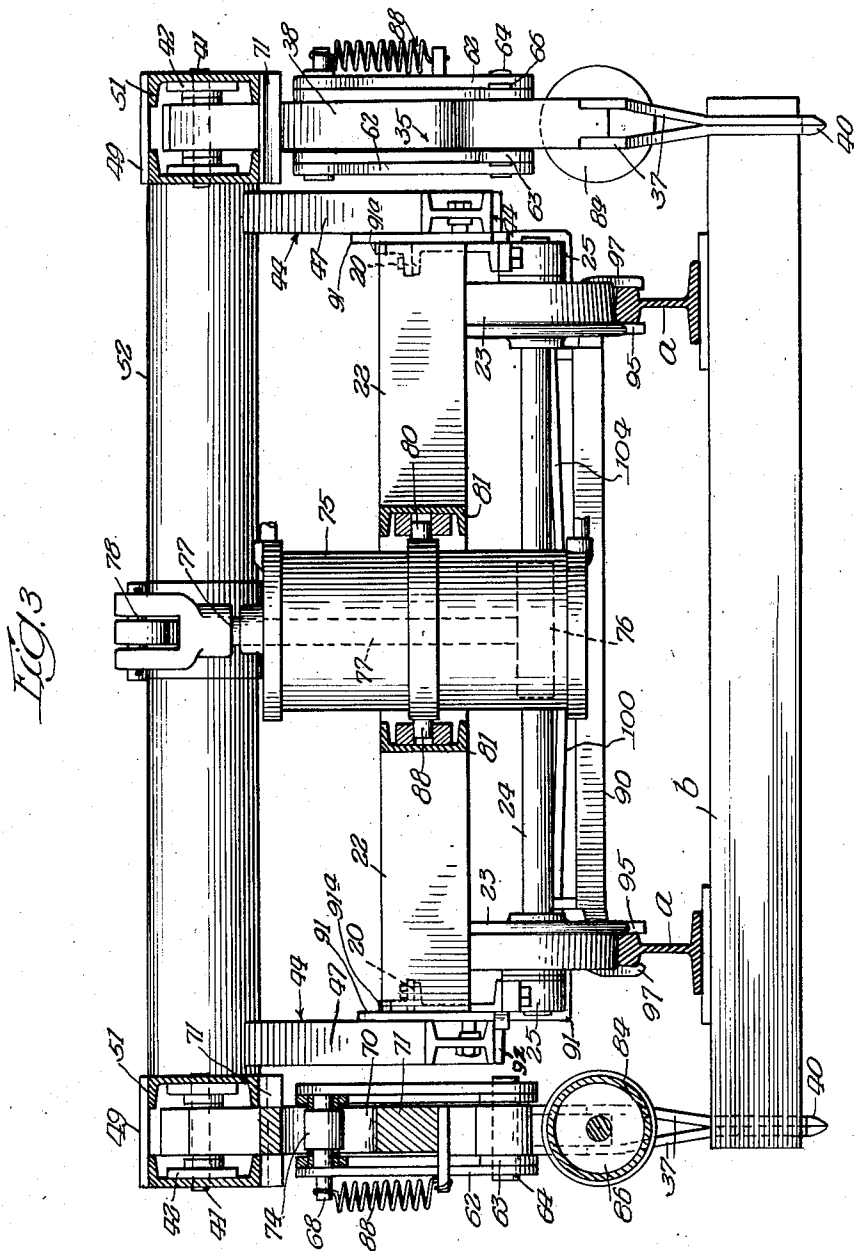
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5 Sheets-Sheet 3



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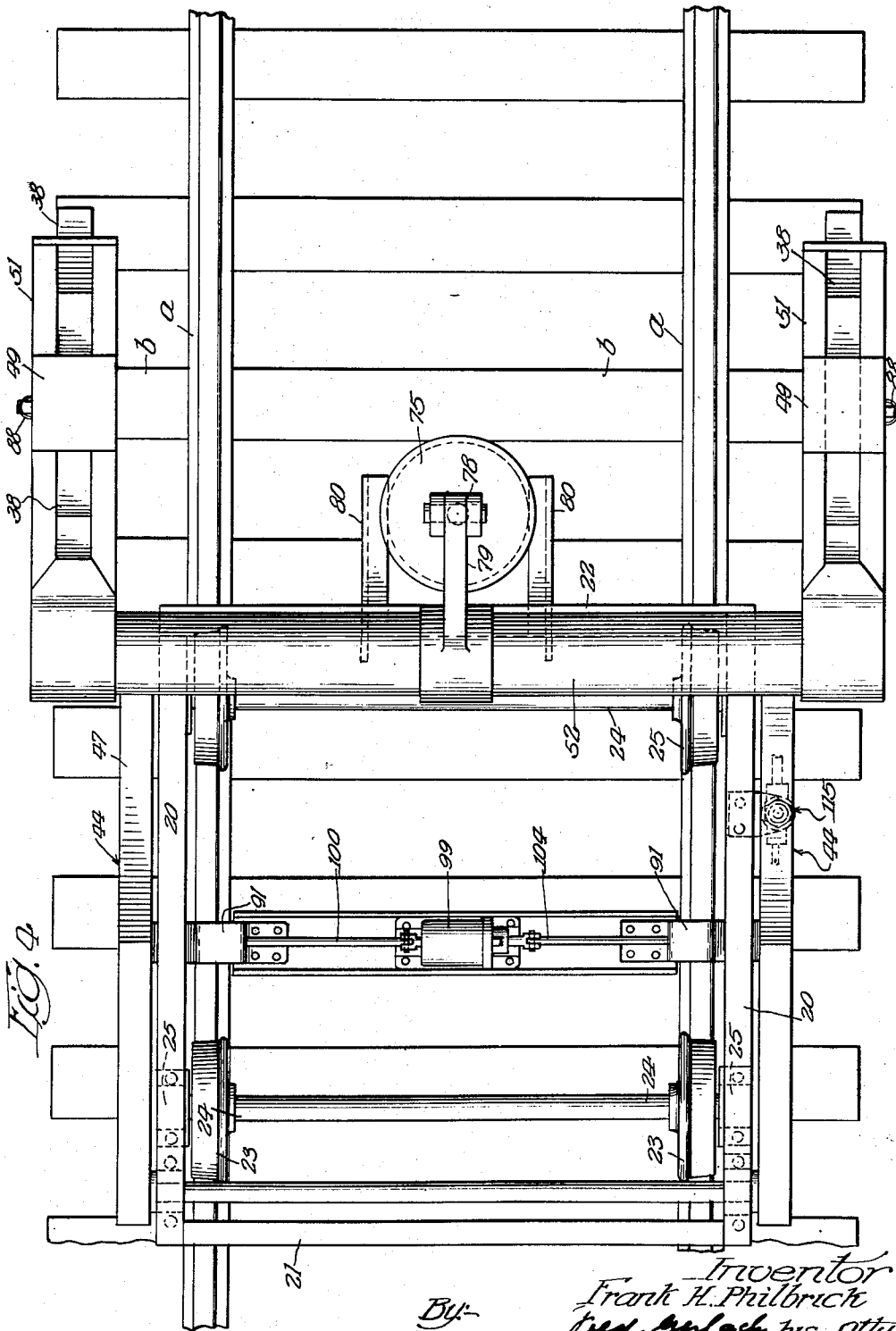
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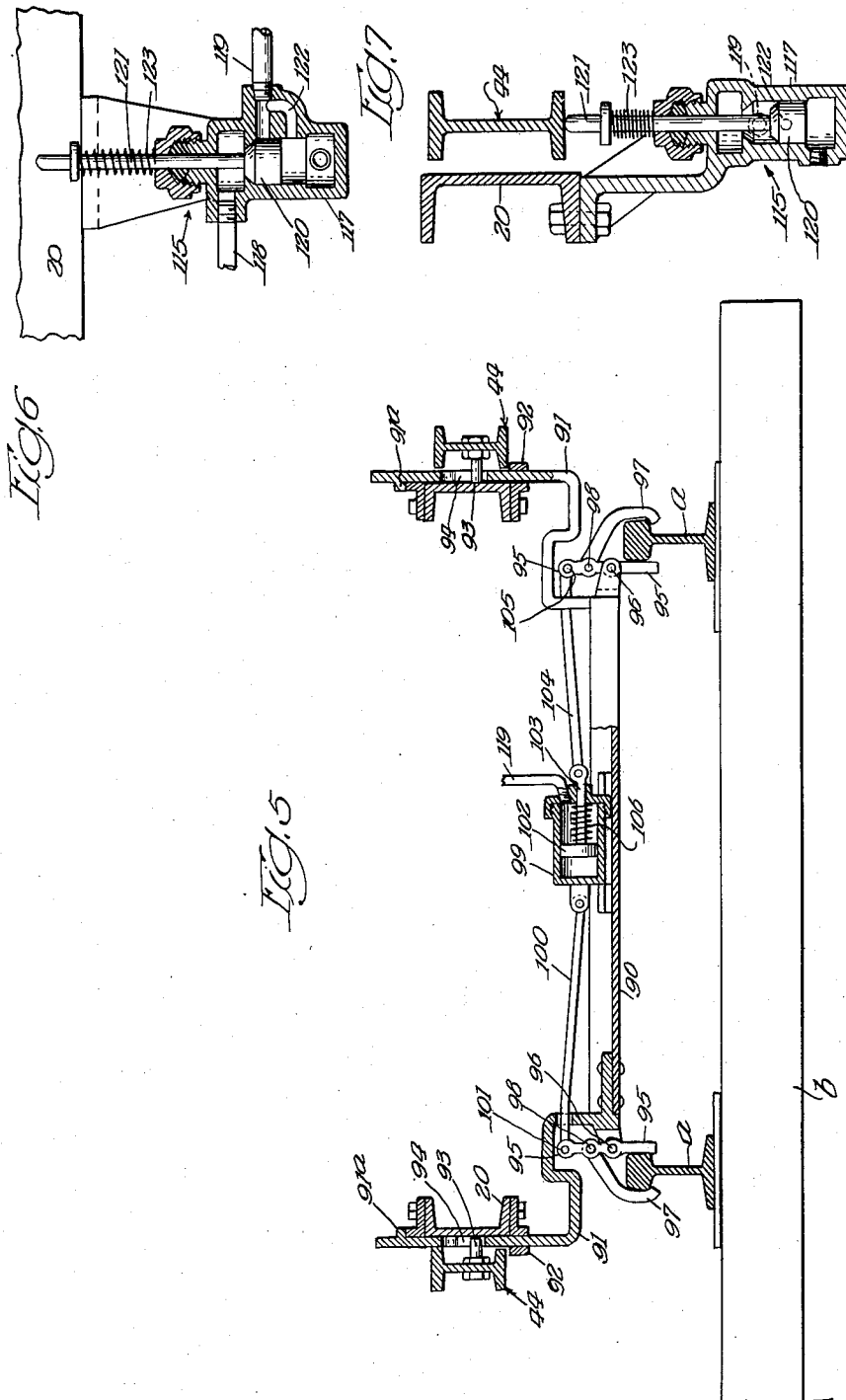
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METHOD AND MACHINE FOR SPACING RAILWAY TIES

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5 Sheets-Sheet 5



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METHOD AND MACHINE FOR SPACING RAILWAY TIES

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13 Claims. (Cl. 254—121)

The invention relates to machines for spacing ties under railway rails.

One object of the invention is to provide a machine for expediting the correct spacing of ties under the rails.

Another object of the invention is to provide a machine which is adapted to expeditiously correct space ties which have been displaced by railway operation or other causes from their correctly spaced positions under the railway rails.

Another object of the invention is to provide an improved machine for spacing railway ties under railway rails which is also adapted to lift the ties against the bottom of the rails while the rails are being spiked to the ties.

Another object of the invention is to provide improved locking devices for securing the supporting truck of the machine against movement along the rails during the tie-spacing operation, the locking devices being automatically controlled in connection with the raising and lowering of the tie-engaging members.

Other objects of the invention will appear from the detailed description.

The invention consists in the several novel features hereinafter described and more particularly defined by claims at the conclusion hereof.

In the drawings:

Fig. 1 is a side elevation of a machine embodying the invention, the tie-spacing members being shown in tie-engaging position, parts being shown in section;

Fig. 2 is a longitudinal section, the tie-engaging members being shown in their raised position;

Fig. 3 is a transverse section taken on line 3—3 of Fig. 1, one of the tie-engaging devices being shown in elevation;

Fig. 4 is a plan view, parts being omitted;

Fig. 5 is a section taken on line 5—5 of Fig. 1, illustrating the rail-locking devices;

Fig. 6 is a section of the automatically controlled valve for controlling the operation of the locking devices.

Fig. 7 is a section taken on line 7—7 of Fig. 1.

The invention is exemplified with a portable truck adapted to travel on a railway track. The truck comprises a frame including side-sills 20, a transverse end member 21 and a transverse member 22, all formed of channel beams and rigidly secured together, pairs of wheels 23 mounted on axles 24 which are journaled in bearings 25 which are secured to the side-sills 20. An internal combustion engine 30 is mounted on the truck frame for providing power for propelling the truck, as well understood in the art, and an air compressor 31 is adapted to be driven by the engine for providing a supply of compressed air in a tank 32 for the operation of the spacing and lifting devices. The engine and compressor may be of any suitable construction, as well understood in the art. The wheels 23 of the truck are adapted to travel on the rails *a* of a railway track for transporting the truck and the mechanism thereon into position for spacing and lifting the ties *b* under the rails.

The machine comprises devices for engaging the ties under the rails, positioning the ties in correctly spaced position from one another and for lifting the ties against the bottom of the rails while the latter are being secured under the rails. The tie-spacing mechanism comprises a pair of oppositely arranged coaxing tie-engaging members, generally designated 34 and 35 at each side of the truck frame. Each of said members comprises a pair

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of plates 37 welded to the sides of a pendant arm 38 formed of an I-beam. The plates 37 of members 34 and 35 are provided with curved abutments 39 for engaging one side of a tie, and hooks 40 for engaging the underside of the tie for lifting purposes.

The upper end of each tie-engaging member is pivotally suspended on a transverse pin 41 which is supported in a vertically swinging lifting beam or frame, generally designated 44, and functions as a structure for raising and lowering the tie-engaging members. The lifting beam 44 is pivotally supported for vertical swinging movement on a cross-shaft 45 which is journaled in bearings fixed to the underside of the truck frame and comprises, lower I-beam sections 50 at the outer sides of the sills 20 provided with brackets 46 fixed to the cross-shaft 45; upper sections 51; a tubular cross-member 52; brace beams 47 and 48 between tubular member 52 and lower sections 50, all rigidly secured together by welding to form a rigid structure. Pins 41 extend through bearing plates 42 which are fixed to the inner sides of sections 51. Each upper section 51 comprises a pair of channel sections fixedly secured by welding to the tubular cross-member 52 and a plate 49 welded to the top of said channel sections.

The arm 38 of each pair of members 34, 35 includes downwardly divergent upper portions, and plates 37 include downwardly convergent portions between arms 38. The lower ends of the tie-engaging members are pointed to adapt them to penetrate the ballast between the ties when said members are lowered to tie-engaging level. Each pair of coaxing tie-engaging members 34, 35 is connected by a pair of upwardly convergent toggle links 62 and 63. Link 62 is connected by a pivot 64 to a bracket 65 fixed to the section 38 of member 35. Each link 63 is connected by a pivot pin 66 to a bracket 67 on the section 38 of member 34. A pivot pin 68 connects the upper inner end of each pair of links 62 and 63. Each pivot pin 68 extends through a vertical slot 70 in a pendant guide 71, which is fixedly secured to a section 51 of the lifting beam by welding and angle sections 72. Pin 68 extends through a roller 74 which travels in slot 70 of the guide 71. Dual links 62 and 63 are provided at each side of each guide member 71, and pin 68 extends through the links at both sides. The toggle-linkage and the pin-connection between the connected ends of the links and the vertical guide for said pin-connection function to produce equidistant swinging movement of the members 34 and 35 for shifting an incorrectly spaced tie laterally to a centralized position between the pivoted tie-engaging members. The lower ends of slots 70 limit the downward movement of pin 68 and limit the spreading movement of the tie-engaging members.

The lifting beam 44 is operable to raise the tie-engaging members into position above track level for clearance in transporting the machine along the track and to lower said members to tie-engaging level. The mechanism for shifting the lifting beam is pneumatically operable and comprises a vertically extending cylinder 75, a piston 76 slidable in said cylinder and provided with a stem 77 to the upper end of which is pivoted at 78 an arm 79 which is rigidly secured by welding to the tubular cross-member 52 of the lifting beam. Cylinder 75 is provided with trunnions 80 which are pivotally mounted in bearings mounted on bars 81 which are welded to and project forwardly from the transverse member 22 of the truck frame. The piston 76 is adapted to be lifted by compressed air to raise beam 44 when air is admitted to the lower end of the cylinder and to lower said beam when air is admitted to said cylinder above the piston. Any suitable valve means, as well understood in the art, and flexible pipes may be used for controlling air to and from both ends of cylinder 75.

The tie-engaging members 34 and 35 are pivotally supported by pins 41 to permit them to be spread apart and lowered at the sides of a displaced tie and to shift a tie between them for forcing it laterally under the rails, and a pneumatically operable device is provided for forcing the tie-engaging members of each coaxing pair toward the other. This device comprises a cylinder 84 which is pivotally supported at 85 on the bracket 65 on member 35; a piston 86 slidable in cylinder 84 and provided with

a stem which is pivoted at 87 to bracket 67 on member 34. Springs 88 between the pivot pin 68 and guides 71 are adapted to operate the links 62 and 63 to spread apart the tie-engaging members. When air is admitted between one end of the cylinder 84 and piston 86 they will be operated to force members 34 and 35 toward each other until a tie is engaged by the opposed curved abutments 39. During the movement of the tie-engaging members, the toggle links 62 and 63, pin 68 and guide 71 will cause equidistant movement of said members to centralize the tie and cause it to be positioned in properly spaced relation to the adjoining ties. Any suitable valve means and flexible pipes may be used for controlling the supply and exhaust of air to and from cylinder 84. When air is exhausted from cylinder 84, spring 88 will operate links 62 and 63 to spread the tie-engaging members apart and the lower end of slot 70 will limit the spreading movement.

Devices are provided for locking the truck against movement along the railway rails while the ties are forced into spaced position. These devices are pneumatically operated and automatically controlled by the raising and lowering of the lifting beam 44. The locking devices are supported on a transverse channel bar 90, which is fixedly secured to the lower ends of a pair of suspension bars 91 which are slidably guided in brackets 92 which are fixed to the side-sills 20, respectively, and are raised by the lifting beam. Stud 93 are fixed to the sections 50 of the lifting beam and extend through slots 94 in the upper ends of bars 91. When the lifting beam 44 is lowered, the locking devices are lowered for engaging the tracks and when beam 44 is lifted the locking devices will be raised to clear the rails for transportation of the truck. A locking device is provided at each side of the truck and each comprises a lever 95 which is fulcrumed at 96 on the channel beam 90, an arm 97 which is pivoted at 98 to the lever 95, an air-cylinder 99 slidably mounted on beam 90, and rod 100 pivoted to the cylinder 99, and at 101 to the upper end of lever 95 of one of the locking devices, a piston 102 in cylinder 99 provided with a stem 103 to which a rod 104 is pivotally connected at 105 and which is pivotally connected to the lever 95 of the other locking device. When air is admitted to one end of cylinder 99, rods 100 and 104 will be drawn together to shift levers 95 so that their lower ends will abut against the inner sides of the rails *a* and arms 97 will be pried against the outer sides of the rails. A spring 106 is applied to piston 102 to shift rods 100 and 104, to release the locking devices when air is exhausted from cylinder 99.

The locking devices are automatically controlled to cause them to engage the rails *a* when beam 44 is lowered and to release the rails during the upstroke of said beam. This control comprises a valve, generally designated 115, which is supported on one of the sills 20 and comprises a casing 117 provided with an inlet chamber for compressed air to which a flexible pipe 118 from a compressed air supply tank is connected; a flexible pipe 119 connecting the outlet chamber in the casing to cylinder 99; and a valve 120 which is adapted to cut off communication between the inlet and outlet chambers and provided with an upstanding stem 121 which projects above the casing 117 and is adapted to be engaged and released during the movements of beam 44. A spring 123 urges valve member 120 to its closed position. An exhaust port 122 is provided in casing 117 for exhausting air from cylinder 99 through pipe 119 when valve member 120 is closed to release the locking devices. Valve member 120 in its open position cuts off communication between the outlet chamber and exhaust port 122 while valve member 120 is open.

When the beam 44 is in its raised position and the members 34 and 35 are disposed above the roadbed, valve member 120 will be closed to cut off the delivery of compressed air to cylinder 99 and studs 93 will hold the bar 91 raised. During initial lowering movement of beam 44, studs 93, engaging the upper ends of slots 94 in bars 91 will allow said bars to drop until said bars are arrested by stops 91^a and the locking devices are positioned to grip the rails *a*. During the continued lowering movement of beam 44, studs 93 will travel downwardly in slots 94 and section 50 of the lifting beam will engage stem 121 and open valve member 120 to admit air to the cylinder 99 and operate the locking devices to engage the rails *a* and retain the truck against movement along the rails

during the tie-spacing operation. During the initial raising movement of beam 44 after a tie-spacing operation, studs 93 will travel upwardly in slots 94 until the beam 44 has released valve member 120 to cut off the delivery of compressed air to cylinder 99 and exhaust air therefrom. The locking devices will then be released by the relative movements of piston 102 and cylinder 99. During continued upward movement of beam 44, studs 93 will engage the upper ends of slots 94 and lift bars 91, beam 90 and the locking devices above track level for transportation of a truck along the track. This exemplifies devices for locking the truck on the rails which are automatically controlled to become operative when the lifting beam 44 and the members 34 and 35 are lowered with the beam to rail-engaging position.

The operation will be as follows: The truck will be movable along the track while the lifting beam 44 is raised, and held in its raised position by compressed air in the lower end of cylinder 75. The tie-engaging members and the locking devices will then be positioned above track level. Members 34 and 35 will be held apart by springs 88. The truck will be spotted on the rails in the position where the axis of pin 68 and the center of the desired correct position of the tie are vertically aligned. When the machine has thus been spotted, air under pressure will be admitted to the upper end of cylinder 75 and exhausted from its lower end to cause piston 76 and arm 79 to lower the beam 44 and force the lower ends of the members 34 and 35 into the ballast with their abutments 39 at the proper level for engaging the sides of the tie. During the initial lowering movement of beam 44, bars 91 and channel beam 90 will be lowered until the locking devices are lowered into position for engaging the track rails. When the stem 121 of valve 115 is engaged by beam 44 valve member 120 will be opened to cause air to flow from pipe 118 through pipe 119 to the cylinder 99. Piston 102 will then be shifted in cylinder 99 and operate rods 100 and 104 to cause the track rails *a* to be gripped between the levers 95 and arms 97. The truck will then be locked against movement over the track rails. During the downward movement of beam 44 the lower ends of the gripping members 34 and 35 will be forced into the ballast with their abutments 39 at the proper level for engaging the sides of a tie. When the members 34 and 35 have been lowered to this position, air will be admitted to one end of each cylinder 84 to operate piston 86 to equidistantly and positively rock the members 34 and 35 toward each other until the tie is engaged by both of said members. During this movement of said members the tie will be forced into position where its transverse center will be vertically aligned with the axis of pivot pin 68. When a tie under the rails is not properly spaced from adjoining ties or is misaligned transversely of the track, the tie-engaging members will shift the tie to its centralized position in vertical alignment with the axis of pivot pin 68. This insures the desired or correct spacing between the ties. For example, after a tie has been misplaced in the ballast to the position indicated by dotted lines in Fig. 1, the lower end of the tie-engaging members while spread apart will be lowered into the ballast as indicated by dotted lines in said figure, air will be admitted into each cylinder 84 to force said members together into the position illustrated in full lines where the tie will be located in its correct centralized position between adjacent ties. In this operation one of the said members will engage the tie and force it towards said position until it is arrested by the coacting member. This correct placement of the tie will occur when it has been displaced to either side of the center between adjacent ties or is not transversely aligned with adjacent ties. The tie-engaging members at both ends of the tie during their operation will position the tie so it will be transversely aligned with, and correctly spaced from adjacent ties.

In some instances it is desired to spike the rail on a correctly positioned tie. The beam 44 will then be raised by delivering additional air into the lower end of cylinder 75 to cause the hooks 40 on the gripper members to engage the underside of the tie between them, so that the tie will be held against the bottom of the rail and spikes can be driven into the tie. After each tie-spacing operation has been completed, air will be exhausted from cylinder 84 and spring 88 will operate toggle links 62 and 63 to spread apart the tie-engaging members so that their lower ends will release the tie and be free to be withdrawn upwardly from the ballast. Beam 44

will then be raised by air delivered into the lower end of cylinder 75 to lift the gripping members to clear the track. During the upstroke of beam 44 studs 93 will engage the upper ends of slots 94 and lift bars 91 and beam 90 after the stem 121 of valve member 120 has been released to cut off the supply of air to cylinder 99 and open exhaust port 122 to exhaust air from cylinder 99 and release the locking devices from the track rails, so that the truck will be free for transportation along the track for a succeeding operation.

The invention is not to be understood as restricted to the details set forth since these may be modified within the scope of the appended claims without departing from the spirit and scope of the invention.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. A machine for spacing railway ties under the rails of a railway track, comprising: a portable truck adapted to travel on a track; a lifting structure movably supported on the truck; means for raising and lowering the structure; coacting members supported on the structure for engaging opposite sides of the tie, provided with lower ends adapted to enter the ballast; means for locking the truck on the rails, said locking means comprising a valve controlled by the raising and lowering movement of the structure and a pair of pivoted members operatively controlled by said valve, said pivoted members being disposed on opposite sides of said track and movable transversely relative to each other in response to actuation of said valve; and means for shifting said members and laterally forcing the tie between them into a predetermined spaced relation to adjacent ties and relatively to the position of the truck on the track.

2. A machine for spacing railway ties under the rails of a railway track, comprising: a portable truck adapted to travel on a track; a lifting structure pivotally supported on the truck; means for raising and lowering the structure; coacting members supported on the structure for engaging opposite sides of the tie, provided with lower ends adapted to enter the ballast; means for locking the truck on the rails comprising a valve actuated by vertical movement of said lifting structure, a rod connected to operate said valve, a lever pivoted to said rod, and an arm pivoted to said lever, said lever and said arm being movable transversely relative to each other to engage opposite edges of said track when said rod is moved in one direction by said valve, and being disengaged therefrom by movement of said rod in the opposite direction; and means for shifting said members together and laterally forcing the tie between them into a predetermined spaced relation to adjacent ties and relatively to the position of the truck on the track.

3. A machine for spacing railway ties under the rails of a railway track, comprising: a portable truck adapted to travel on a track; a lifting beam pivotally supported on the truck; means for raising and lowering the beam; coacting members supported on the beam for engaging opposite sides of the tie provided with lower ends adapted to enter the ballast; means for locking the truck on the rails, said locking means comprising a valve actuated by vertical movement of said lifting beam, a rod connected to operate said valve, a lever pivoted to said rod, and an arm pivoted to said lever, said lever and arm being engageable with, and disengageable from, opposite edges of said track in response to movement of said rod; and means for shifting said members together and laterally forcing the tie between them into a predetermined spaced relation to adjacent ties and relatively to the position of the truck on the track.

4. In combination, a truck adapted to travel on a track, a lifting beam supported on the truck, and means locking said truck on the track when said lifting beam is moved to a predetermined low position, said means comprising a valve having a stem engaging said beam movable in response to vertical movement of said beam to control said valve, and a pair of members engageable with opposite sides of said track and operatively connected to said valve, whereby actuation of said valve moves said members transversely relative to said track.

5. That improvement in spacing ties in a roadbed under the rails of a railway track which comprises: securing in a predetermined spot along the track, a truck equipped with power operable members for moving a tie which has been displaced longitudinally of the track or angularly in the roadbed, lowering the members into the

roadbed at the sides of the displaced tie and close to and between the adjacent ties, and equidistantly shifting by power the members together and relatively to the truck, while their lower ends are in the ballast, and forcing the displaced tie laterally until it is positioned substantially mid-way between adjacent ties and transversely of the rails while the truck remains stationary.

6. That improvement in spacing ties in a roadbed under the rails of a railway track which comprises securing in a predetermined spot along the track, a truck equipped with power operable members for moving a tie which has been displaced longitudinally of the track or angularly in the roadbed, lowering the members into the roadbed at the sides of the displaced tie and close to and between the adjacent ties, and equidistantly and positively shifting by power the members together and relatively to the truck, while their lower ends are in the ballast and thereby forcing the displaced tie laterally until it is positioned substantially mid-way between adjacent ties and transversely of the rails while the truck remains stationary.

7. A machine for spacing railway ties in the ballast under the rails of a railway track, comprising: a portable truck adapted to travel along the track; means for locking the truck against travel along the track; a lifting beam on the truck; a pair of coacting members pivotally mounted on the beam, over each end of a tie, said members having lower ends adapted to penetrate ballast and being movable apart to enter ballast adjacent opposite sides of areas between which there is an intermediate tie and movable toward each other to engage the intermediate tie, if misplaced, and movable relatively to said truck to move the tie in its central position between adjacent ties and in parallel relation to the transverse plane of the track; power-operated mechanism for lowering the beam to force the lower ends of the members into the ballast; means between the beam and the members for equalizing the pivotal movement of the members; and power operated apparatus for shifting the members so their lower ends will force the intermediate beam substantially horizontally into said central position and parallel relation.

8. A machine for spacing railway ties in the ballast under the rails of a railway track, comprising: a portable truck adapted to travel on the track; means for locking the truck against travel along the track; a lifting beam pivoted on the truck; mechanism for raising and lowering the beam; a pair of coacting members supported on the beam over each end of a tie outwardly of the rails, each pair of members having lower ends adapted to penetrate ballast and being movable apart to enter the ballast adjacent opposite sides of areas between which there is an intermediate tie and movable toward each other to engage the intermediate tie if misplaced and movable relatively to said truck to move the tie into its central position between adjacent ties and in parallel relation to the transverse plane of the track, a toggle linkage between the beam and each pair of members for equalizing the movement of the lower ends of said members; and power operated apparatus for shifting the lower ends of the members substantially horizontally and forcing the intermediate tie into said central position and parallel relation.

9. A machine for spacing railway ties in the ballast under the rails of a railway track, comprising: a portable truck adapted to travel on the track; means for locking the truck against travel along the track; coacting members supported on the truck above the ties, having lower ends adapted to penetrate ballast, movable apart to enter the ballast adjacent opposite sides of areas between which there is an intermediate tie, and movable toward each other to engage a misplaced intermediate tie and movable relatively to said truck to move the tie into its central position between adjacent ties and in parallel relation to the transverse plane of the rails; means for raising and lowering the members; and power operated apparatus for substantially horizontally and positively shifting the lower ends of the members and forcing the intermediate tie into said central position and parallel relation in the ballast.

10. A machine for spacing railway ties in the ballast under the rails of a railway track, comprising: a portable truck adapted to travel on the track; means for locking the truck against travel along the track; a pair of coacting members supported on the truck above each end of the tie outwardly of the rails, each pair of members having

lower ends adapted to penetrate ballast, movable apart to enter the ballast adjacent opposite sides of areas between which there is an intermediate tie and movable toward each other to engage a displaced intermediate tie and movable relatively to said truck to move the tie into its central position between adjacent ties and in parallel relation to the transverse plane of the rails; means for raising and lowering said members; and power operated apparatus for horizontally and simultaneously shifting the lower ends of both pairs of members and forcing the intermediate tie into said central position and parallel relation in the ballast.

11. A machine for spacing railway ties in the ballast under the rails of a railway track, comprising: a portable truck adapted to travel on the track; means for locking the truck against travel along the track; a pair of coacting members pivotally supported on eccentric axes on the truck above each end of the tie outwardly of the rails, each pair of members having lower ends adapted to penetrate ballast, movable apart to enter the ballast adjacent opposite sides of areas between which there is an intermediate tie and movable toward each other to engage a displaced intermediate tie and movable relatively to said truck to move the tie into its central position between adjacent ties and in parallel relation to the transverse plane of the rails; means for raising and lowering said members; and power operated apparatus for horizontally and simultaneously shifting the lower ends of both pairs of members and forcing the intermediate tie into said central position and parallel relation in the ballast.

12. A machine for spacing railway ties in the ballast under the rails of a railway track, comprising: a portable truck adapted to travel on the track; means for locking the truck against travel along the track; a pair of coacting members supported on the truck above each end of the tie outwardly of the rails, each pair of members having lower ends adapted to penetrate ballast and being movable apart to enter the ballast adjacent opposite sides of areas between which there is an intermediate tie and movable

toward each other to engage a displaced intermediate tie and movable relatively to said truck to move the tie into its central position between adjacent ties and in parallel relation to the transverse plane of the rails; means for raising and lowering said members; and power operated apparatus for imparting positive equalized substantially horizontal movement to the lower ends of both pairs of members and forcing the intermediate tie into said position and relation in the ballast.

13. A machine for spacing railway ties in the ballast under the rails of a railway track, comprising: a portable truck adapted to travel on the track; means for locking the truck against travel along the track; a pair of coacting members supported on the truck above each end of the tie outwardly of the rails; means for raising and lowering said members; each pair of members having lower ends adapted to penetrate ballast and being movable apart to enter the ballast adjacent opposite sides of areas between which there is an intermediate tie and movable relatively to said truck and movable toward each other to engage a misplaced intermediate tie to move the tie into its central position between adjacent ties and in parallel relation to the transverse plane of the rails; and power operated apparatus for shifting substantially horizontally and equidistantly the lower ends of the members and forcing the intermediate tie into said central position and parallel relation in the ballast.

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