July 28, 1953 K. KERSHAW 2,646,632

BALLAST REMOVING MACHINE

Filed July 11, 1947 4 Sheets-Sheet 1

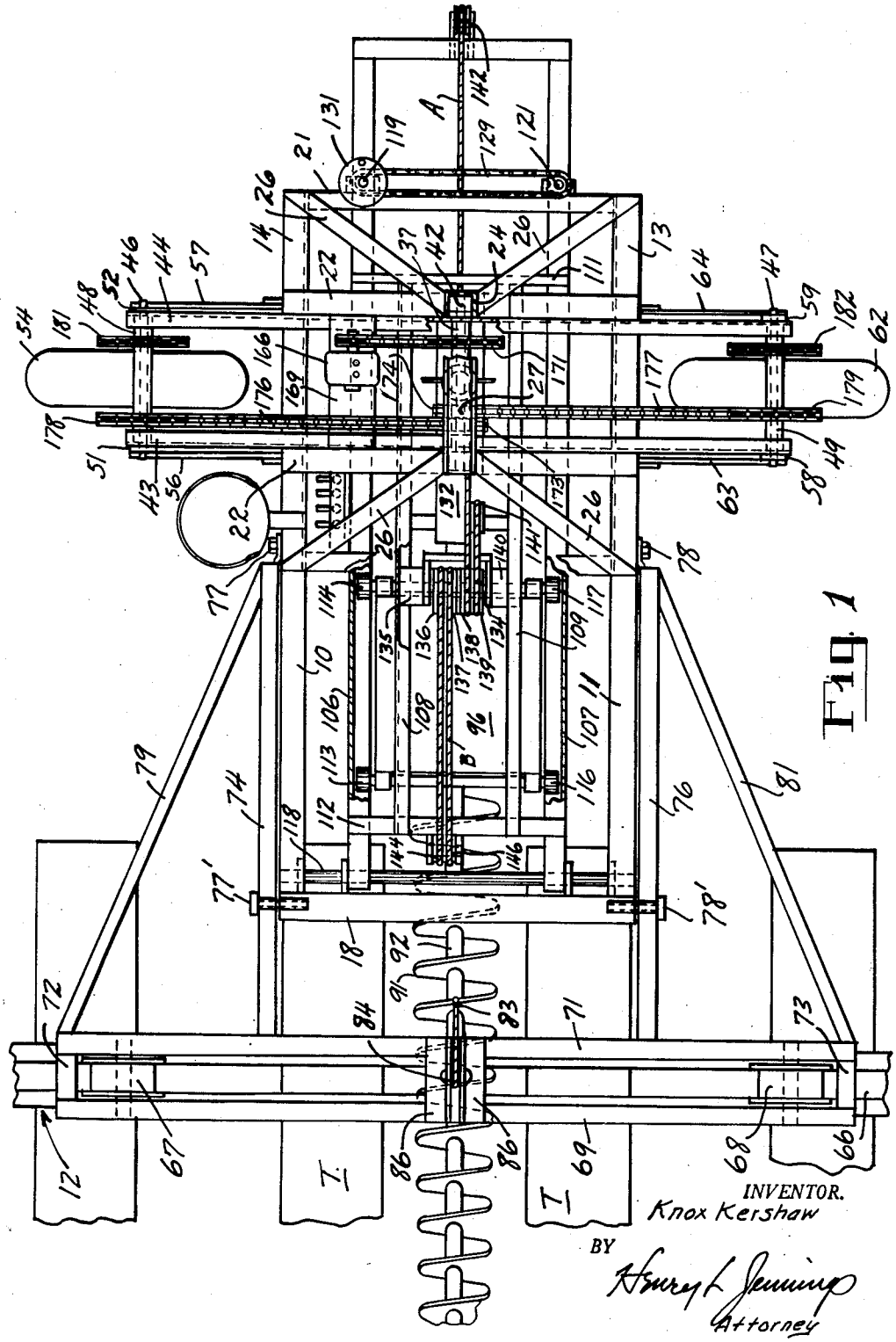


Fig. 1

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BALLAST REMOVING MACHINE

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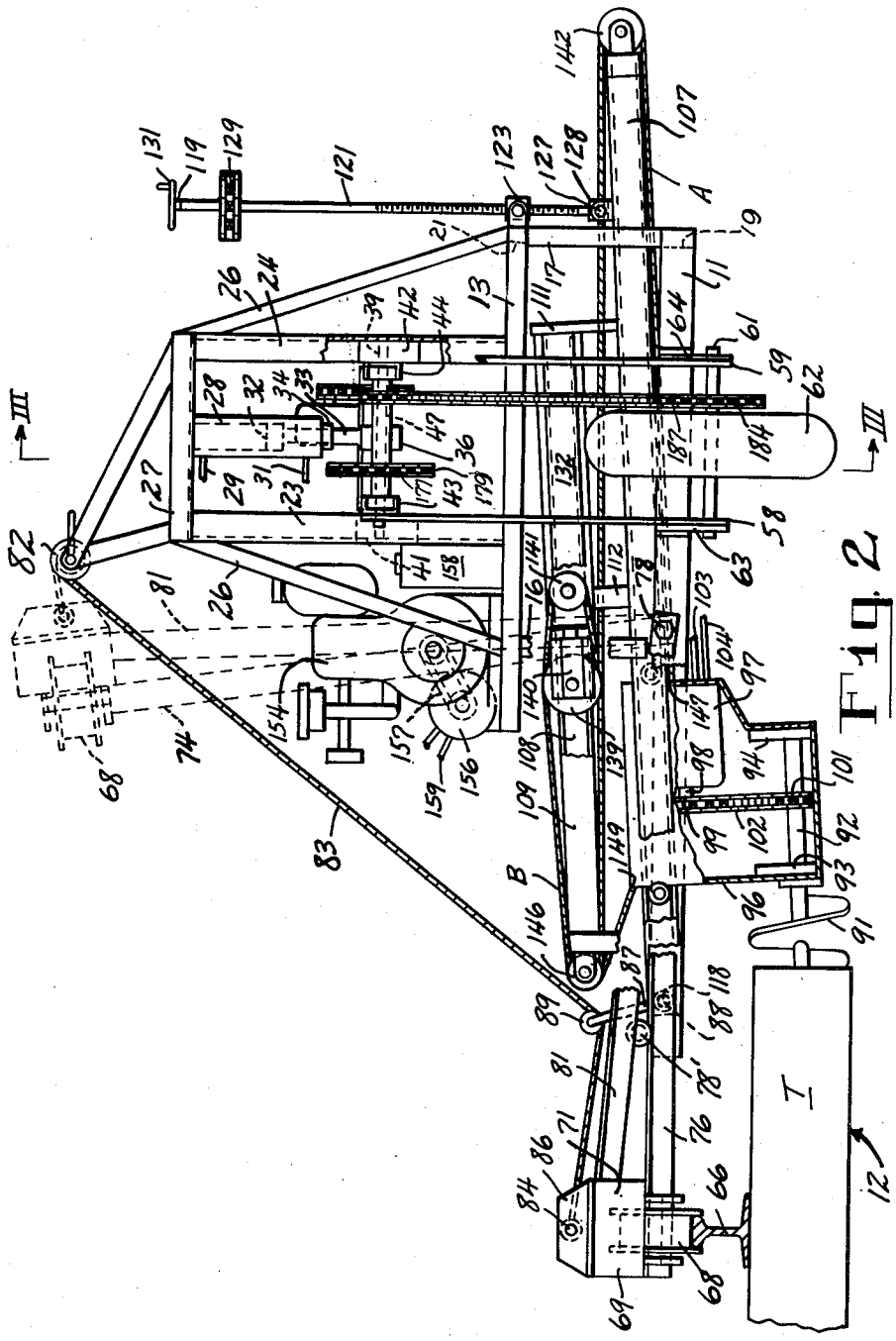


Fig. 2

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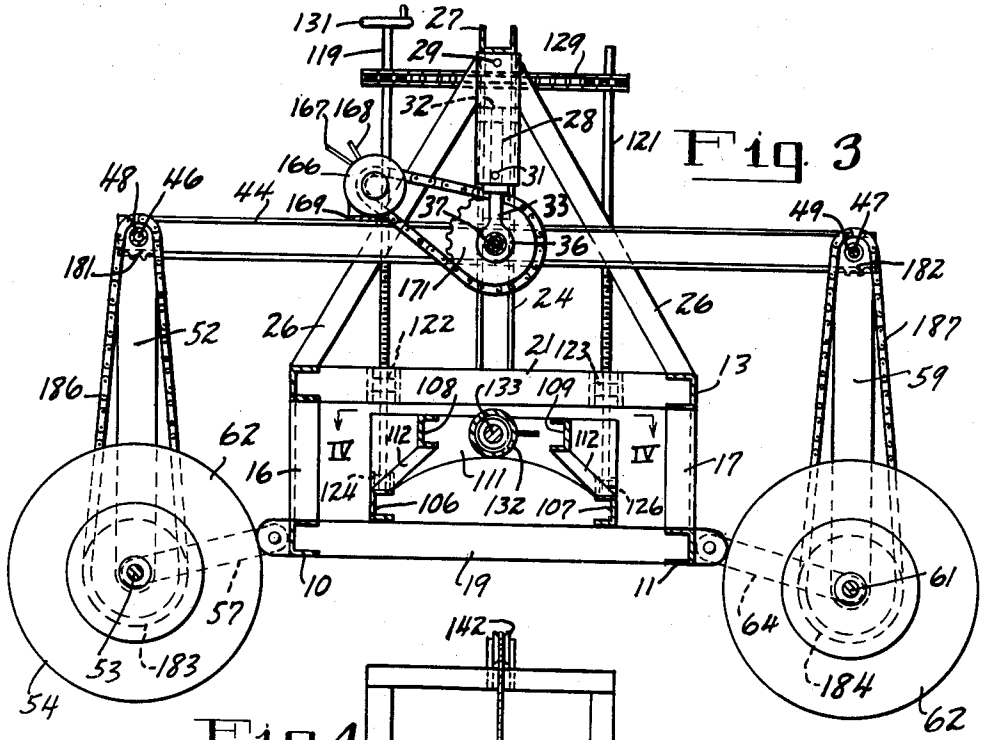


Fig. 3

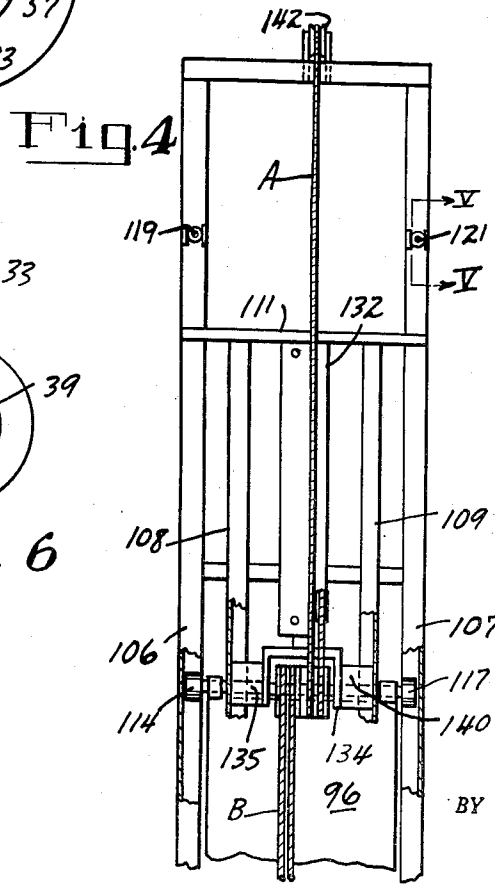


Fig. 4

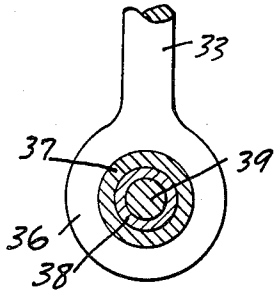


Fig. 6

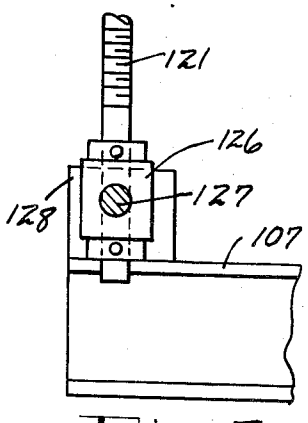


Fig. 5

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BALLAST REMOVING MACHINE

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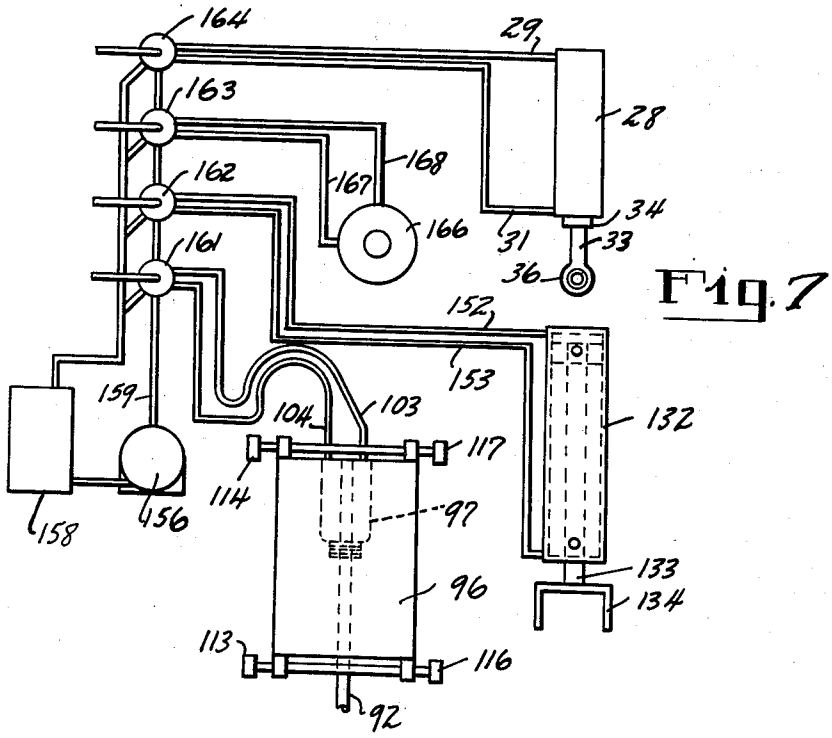


Fig. 7

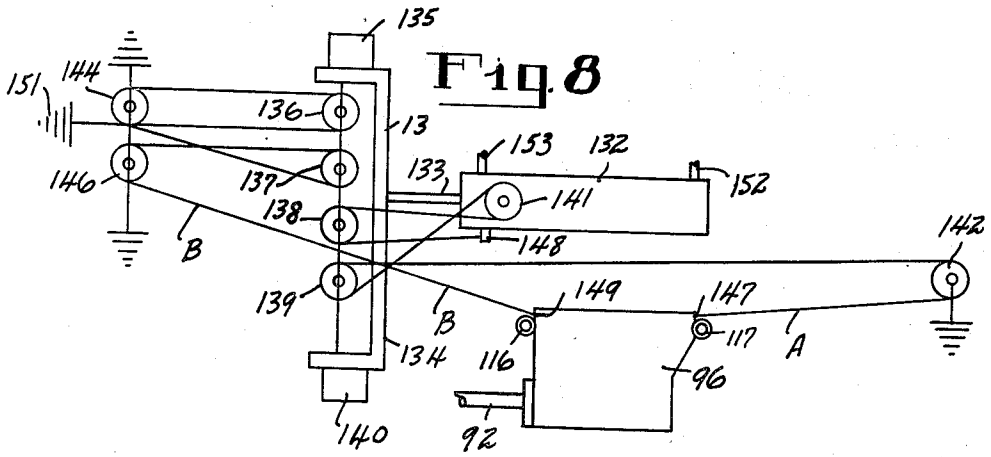


Fig. 8

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BALLAST REMOVING MACHINE

Knox Kershaw, Birmingham, Ala.

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7 Claims. (Cl. 37—104)

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This invention relates to apparatus for removing ballast from between the cross ties in a railroad track preparatory to putting in new ties, relaying of rails and the like, and has for an object the provision of apparatus of the character designated which shall be adapted to operate from the side of the track without interfering with traffic thereon.

Another object of my invention is to provide a railroad track maintenance apparatus which shall include a self-propelled tool mounting carriage having its principal supporting wheels disposed to move alongside the track and with auxiliary flanged supporting and guiding wheels adapted to move along one rail of the track together with means to raise the flanged wheels off the rail and out of the way of passing trains.

A further object of my invention is to provide apparatus for removing ballast from between the cross ties in a railroad track which shall be self-propelled, and supported principally on the roadway alongside the track, and which shall include means for compensating for the irregularities in the roadway along which it is propelled.

A still further object of my invention is to provide apparatus for removing ballast from between the cross ties of a railroad track which shall embody a reciprocating auger together with means for changing the angle of inclination of the auger with respect to the horizontal.

A still further object of my invention is to provide apparatus for removing ballast from between the cross ties in a railroad track which shall be simple of design and operation, economical of manufacture, and which shall embody that flexibility of operation necessary to insure rapid and efficient work.

In the previously filed application of myself and Dennis M. Praytor, relating to Track Stripping Machine and which issued as Patent No. 2,547,596, we have shown, described, and claimed apparatus including a carriage mounted to move on the rails of a railroad track and embodying a motor driven reciprocating auger disposed to enter between the cross ties and remove ballast therefrom. While such apparatus has proved successful in operation, it must necessarily be moved out of the way for the passage of trains over the line where it operates which, where there is a frequent passage of trains, entails a great loss of time. It accordingly became desirable to provide apparatus capable of operating alongside the track so that it would not interfere with the passing of trains and would not have to cease operation for an undue length of

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time to permit the passage of trains. I have accordingly devised the apparatus herein disclosed in which the carriage is supported and propelled on the ground alongside the railroad track and which includes means for compensating for unevenness in the ground. Various track working tools may be mounted on the carriage; in the example shown, a reciprocating auger is employed, similar to that disclosed and claimed in the aforesaid previously filed application, and means are provided for raising and lowering the frame of the machine with respect to the auger and to change the angle of inclination of the auger with respect to the horizontal. I have thus provided flexibility of operation which permits rapid and efficient work.

Apparatus embodying features of my invention is illustrated in the accompanying drawings, forming a part of this application, in which:

Fig. 1 is a plan view of the apparatus with parts removed and broken away for clarity of illustration;

Fig. 2 is a side elevation, partly in section, and with parts broken away;

Fig. 3 is a sectional view taken along the line III—III of Fig. 2;

Fig. 4 is a sectional view taken along the line IV—IV of Fig. 3;

Fig. 5 is a sectional detail view of one of the elevating screws for the auger frame, taken along the line V—V of Fig. 4;

Fig. 6 is a detail sectional view of the connecting rod employed with the frame elevating cylinder and the shaft for the elevating cylinder;

Fig. 7 is a piping diagram showing the means for supplying fluid under pressure to the cylinders and to the motor with my improved apparatus; and

Fig. 8 is a diagrammatic view of the cable and sheave arrangement employed for reciprocating the auger carriage.

Referring to the drawings for a better understanding of my invention, my improved apparatus comprises a main frame composed of longitudinal members 10 and 11 extending in a direction transverse to the railroad track, indicated generally by the numeral 12. Also forming a part of the main frame are a pair of shorter longitudinal members 13 and 14 which are mounted above the members 10 and 11 and which are joined to the latter by means of vertically extending frame members 16 and 17. The lower longitudinal members 10 and 11 are joined together by means of cross pieces 18 and 19 and the upper members 13 and 14 by cross pieces 21

and 22. Extending upwardly from the cross pieces 21 and 22 are a pair of vertical channels 23 and 24 with the flanges thereof turned inwards and facing each other as shown in Fig. 1 of the drawing. The vertical members 23 and 24 are supported by diagonal braces 26, a suitable number being employed, and which are joined at their upper ends to the vertical members and at their lower ends to the shorter, upper frame members 13 and 14. Extending across the top of the superstructure just described and joining the vertical channels 23 and 24, and the diagonal braces 26, is an upper cross beam 27.

Supported by the upper cross beam 27 and extending downwardly therefrom is hydraulic cylinder 28 to which fluid may be supplied at its opposite ends by means of conduits 29 and 31. The cylinder 28 is provided with a piston 32 and a piston rod 33 which passes through a stuffing box 34 at the lower end thereof. On the lower end of the piston rod 33 is an enlarged end 36 forming a bearing for a hollow shaft 37. Mounted within the hollow shaft 37 is a bushing 38 forming an inner bearing for a pin 39. See Fig. 6. Mounted on the outer ends of the pin 39 are shoes or gibs 41 and 42 which are mounted to slide in the channels 23 and 24, the latter forming guides therefor.

Pivotally mounted to rock on the pin 39, are a pair of walking beam members 43 and 44, which are joined together at their ends by pins 46 and 47, to form a walking beam. Mounted on the pins 46 and 47 to rotate thereon, between the walking beam members 43 and 44 are hollow shafts 48 and 49. Depending from the ends of the pin 46 are a pair of vertical links 51 and 52 in the lower ends of which is journaled an axle 53 upon which is mounted a pneumatic tired wheel 54. The axle 53 is connected to the lower longitudinal frame member 10 by means of links 56 and 57. Similarly, at the opposite ends of the walking beam members are mounted depending links 58 and 59 on the ends of the pin 47. Journaled at the lower ends of the links 58 and 59 is the axle 61 of a pneumatic tired wheel 62, which axle is joined to the lower frame member 11 by means of links 63 and 64.

The opposite end of the frame from that just described is supported from the rail 66 of the railroad track by means of a pair of flanged wheels 67 and 68 which are journaled in a pair of wheel supporting members 69 and 71, joined together at their ends by means of transverse members 72 and 73. The wheel supporting members 69 and 71 are pivotally connected to the main frame of the apparatus by means of a pair of boom members 74 and 76, which are connected at their outer ends to the longitudinally extending frame members 10 and 11 by means of bolts 77 and 78. The boom members 74 and 76 are also detachably connected to the cross piece 18 joining the longitudinally extending frame members 10 and 11 by means of pins 77' and 78' which pass through the members 74 and 76 into suitable sockets formed of lengths of pipe secured to the member 18, as indicated in Fig. 1. The boom members 74 and 76 are braced by means of diagonal braces 79 and 81 which are connected to the opposite ends of the wheel support 71 and to the inner ends of the boom members 74 and 76.

Whenever it is desired to remove the flanged wheels and their supporting frame from the rail 66 to permit passage of a train, the pins 77' and 78' are withdrawn and the boom members 74 and 76 are swung about their pivots 77 and 78 by means of a windlass 82 mounted on top of the main frame as shown in Fig. 2. A cable 83 operated by the windlass is connected at its outer end to the wheel supporting members 69 and 71 by a pin 84 which extends through angle bars 86 secured to the wheel support. When the flanged wheels 67 and 68 are raised out of the way, as shown in dotted lines, Fig. 2, the ends of the longitudinal frame members 10 and 11 adjacent the railroad track 12 rest on the outer ends of the cross ties in the clear of passing trains. At 87, I show a hook-shaped member which is pivotally mounted adjacent the ends of the longitudinal frame members 10 and 11 as shown at 88 in Fig. 2. On the upper end of the hook shaped member is mounted a roller 89. Whenever it is desired to connect the boom members 74 and 76 to the cross piece 18 of the longitudinal frame members, after the flanged wheels 67 and 68 have again been lowered, the cable 83 is passed under the roller 89, as shown in Fig. 2 of the drawing, and the windlass 82 is operated to raise the end of the main frame relative to the boom members 74 and 76 until the pins 77' and 78' can again be inserted in the sockets provided in the cross piece 18, whereupon the boom members are again rigidly connected to the main frame.

At 91 I show an auger comprising a helicoidal flight mounted on a shaft 92 and supported from bearings 93 and 94, mounted in a carriage 96. The auger shaft 92 is driven by a hydraulic motor 97 having a shaft 98 with a sprocket 99 thereon. The sprocket 99 is connected to a sprocket 101 mounted on the shaft 92 by means of a chain 102. At 103 and 104 are shown the inlet and outlet conduit for the hydraulic motor 97.

The auger carriage 96 is supported in a rectangular sub-frame comprised of lower channels 106 and 107 extending parallel to the main longitudinal frame members 10 and 11. The sub-frame members 106 and 107, as shown in Fig. 3 of the drawing, are channels with their flanges inturned.

The sub-frame also includes upper, shorter channel members 108 and 109 mounted with their flanges inturned. The members 108 and 109 are joined with the members 106 and 107 at one end by means of a plate 111 and at the other end by means of short structural members 112. Supporting rollers 113, 114, 116, and 117 are mounted at the corners of the auger carriage and travel in the inturned channels 106 and 107 to support the carriage 96.

The ends of the sub-frame members 106 and 107, adjacent the railroad track 12, are pivotally connected to the longitudinal frame members 10 and 11 of the main frame by means of a pin 118 which extends across and through both frames as shown in Fig. 1 of the drawing. The outer ends of the sub-frame members 106 and 107 are supported from the main frame members 13 and 14 by means of a pair of adjusting screws 119 and 121 which pass through nuts 122 and 123 pivotally mounted on the end frame member 21, which joins the upper main frame members 13 and 14. The screws 119 and 121 continue downwardly and are connected at their lower ends to sleeves 124 and 126 pivotally mounted by means of trunnions 127 extending into plates 128 welded or otherwise suitably secured to the sub-frame members 106 and 107. The upper ends of the screws 119 and 121 are connected by means of sprockets and a sprocket chain 129 so as to be operated in unison as by means of a suitable hand wheel 131 mounted on the upper end of the screw 119. By the means

just described, the angular relation of the sub-frame and auger, with respect to the main frame and to the horizontal may be varied.

Mounted on the plate 111 which joins the sub-frame members together at one end thereof, is a hydraulic cylinder 132 having a piston and piston rod 133 therein. On the outer end of the piston rod 133 is a yoke 134 in which are journaled four sheaves 136, 137, 138, and 139. See Fig. 8. On the sides of the yoke 134 are shoes 135 and 140 which slide between the inturned flanges of the upper frame members 108 and 109 to guide the movement of the yoke. On the side of the cylinder 132 is a relatively fixed sheave 141 and mounted on the rear end on a bar connecting the sub-frame members 106 and 107 is a relatively fixed sheave 142. At the end of the sub-frame adjacent the railroad track 12 are two relatively fixed sheaves 144 and 146. A cable A is connected at 147 to the outer end of the auger carriage 96 and passes around the fixed sheave 142, thence around the movable sheave 139, mounted in the yoke 134, thence around the fixed pulley 141 mounted on the side of the cylinder 132, thence around the movable sheave 138 and then to an anchor 148 on the side of the cylinder 132. A second cable B is connected at 149 to the other end of the auger carriage 96 and passes first around the fixed sheave 146 thence around the movable sheave 137, thence around the fixed sheave 144, thence around the movable sheave 136 and has its outer end secured to an anchor 151 positioned on a bar which connects the forward ends of the sub-frame members 108 and 109. Fluid under pressure is supplied to the cylinder 132 through connections 152 and 153 to reciprocate the piston therein and the yoke 134. It will be seen from the foregoing description, that for every unit of movement of the yoke 134, the auger carriage 96 will be moved four units. By the means just described, the auger carriage may be reciprocated from one end to the other of its frame, the supporting rollers 113, 114, 116, and 117 cooperating with the channel members 106 and 107 to guide it in its reciprocatory movement.

Power for generating the hydraulic pressure required to operate the hydraulic devices described is derived from an internal combustion engine 154 which drives a hydraulic pump 156 through a sprocket and chain drive 157. Fluid for the operation of the pump is stored in a reservoir 158 and fluid under pressure is delivered from the pump 156 through a pipe 159 to valves 161, 162, 163, and 164. In Fig. 7 the arrangement of the tubing and valves is shown diagrammatically. For obvious reasons the tubing employed for conveying pressure is preferably flexible. The valve 164 controls the admission and return of fluid to the cylinder 28 through the tubes 29 and 31. The valve 162 controls the admission and return of fluid to the cylinder 132 through the tubes 152 and 153. The valve 161 controls the admission and return of fluid to the hydraulic motor 97 for driving the auger 91.

The apparatus is propelled along the side of the railroad track by means of a hydraulic motor 166 to which fluid is admitted through tubes 167 and 168 controlled by valve 163. The motor 166 is mounted on a cross plate 169 spanning the walking beam members 43 and 44. It drives the hollow shaft 37 extending between the walking beam members by means of a sprocket 171 mounted on the shaft. Also mounted on the hollow shaft 37 are sprockets 173 and 174 with chains 176 and 177 thereon passing over sprockets 178 and 179

mounted respectively on the hollow shafts 48 and 49 which span the outer ends of the walking beam members 43 and 44. Mounted on the shafts 48 and 49, respectively, are sprockets 181 and 182 which drive respectively sprockets 183 and 184 on the axles 51 and 53 respectively through chains 186 and 187.

From the foregoing description, the operation of my improved ballast removing apparatus will be readily understood. With the apparatus disposed as shown in Figs. 1 and 2 of the drawing, the boom members 74 and 76 are rigidly connected to the main frame members by means of the pins 77' and 78'. The auger 91 is entered between a pair of cross ties T beneath the rail 66 and is driven by means of the hydraulic motor 97. At the same time, it is reciprocated by means of the hydraulic cylinder 132 and the system of cables and sheaves shown in Fig. 8 to enter the auger between the ties and retract it therefrom to remove the ballast. When the ballast has been removed from between a pair of ties, the apparatus is moved to the next space by operation of the hydraulic motor 166 as just described and the stripping operation is repeated. The mounting of the wheels 62 and 54 at the ends of the walking beam members allows them to adapt themselves to irregularities in the ground. At the same time the elevation of the main frame with respect to the supporting wheels 62 and 54 may be varied by means of the hydraulic cylinder 28. Further adjustment of the sub-frame to the main frame may be accomplished by the screws 119 and 121. When it is desired to remove the wheels 67 and 68 out of the way of passing trains, the auger is retracted from between the cross ties, the pins 77' and 78' are retracted, and the windlass 82 is operated to raise the boom members and wheels out of the way. The cable is freed of the roller 89 in this operation.

It will be understood that track working tools other than the ballast removing auger herein disclosed may be employed with my improved apparatus and broadly, my invention covers a carriage of the character described upon which track working tools may be mounted and operated out of the way of passing trains.

While I have shown my invention in but one form, it will be obvious to those skilled in the art that it is not so limited, but is susceptible of various changes and modifications, without departing from the spirit thereof, and I desire, therefore, that only such limitations shall be placed thereupon as are specifically set forth in the appended claims.

What I claim is:

1. In apparatus for removing ballast from between the cross ties in a railroad track including, a main frame disposed alongside the railroad track, a hydraulic cylinder and plunger therefor vertically disposed in the main frame, and a reciprocable auger operatively connected to the main frame and disposed to enter the spaces between the cross ties and remove ballast therefrom, the combination of a walking beam pivotally mounted between its ends on the plunger to be raised and lowered thereby, a pair of supporting wheels mounted on axles disposed to rest on the roadway alongside the track and depending from the ends of the walking beam, links pivotally connected at either end to the main frame and to the wheel axles, and driving means for the supporting wheels.

2. In apparatus for removing ballast from between the cross ties in a railroad track, including

a main frame disposed alongside the railroad track, supporting wheels for the main frame and a reciprocable auger operatively connected thereto, the combination of a hydraulic cylinder and plunger therefor vertically disposed in the main frame, a walking beam pivotally mounted between its ends on the plunger to be raised and lowered thereby, said supporting wheels being disposed to rest on the roadway alongside the track and depending from the ends of the walking beam, driving means for the supporting wheels, a sub-frame for the auger pivotally mounted at one end thereof to the main frame, guide means included in the sub-frame and directed toward the railroad track, a carriage for the auger mounted to reciprocate in the guide means, and adjusting means coacting between the other end of the sub-frame and the main frame to vary the angle of the sub-frame with respect to the main frame.

3. Apparatus as set forth in claim 2 in which a hydraulic cylinder and piston is mounted in the sub-frame and is operatively connected to the auger carriage to reciprocate it.

4. Apparatus as set forth in claim 2 in which a hydraulic cylinder and piston is mounted in the sub-frame and is connected to the auger carriage by pulleys and cables to reciprocate the carriage and to afford a movement of the carriage which is a multiple of the unit of movement of the piston.

5. In apparatus for removing ballast from between the cross ties in a railroad track, a main frame disposed alongside the railroad track, supporting wheels for the main frame and a reciprocable auger operatively connected thereto and disposed to enter the spaces between the cross ties and remove ballast therefrom, the combination of a hydraulic cylinder and plunger therefor vertically disposed in the main frame, a walking beam pivotally mounted between its ends on the plunger to be raised and lowered thereby, said supporting wheels being disposed to rest on the roadway alongside the track and depending from the ends of the walking beam, driving means for the supporting wheels, a pair of flanged wheels mounted to rest on the rail of the track adjacent the main frame and including structural members lying alongside of and pivotally connected to the main frame, detachable means for rigidly connecting the structural members to the main frame, and means for swinging the structural members about their pivots to remove the flanged wheels from the rail when the detachable means are withdrawn.

6. In apparatus for removing ballast from between the cross ties in a railroad track including a main frame disposed alongside the railroad track and a reciprocable auger operatively connected to the main frame and disposed to enter the spaces between the cross ties and remove ballast therefrom, the combination of a sub-frame pivotally mounted in the main frame and in which the auger is mounted for reciprocation, adjusting means coacting between the main frame and the sub-frame and varying the angular relation between the main frame and the sub-frame comprising mechanism constructed and arranged to rock the sub-frame vertically about its pivot points, a pair of supporting wheels connected with the main frame and disposed to rest on the roadway alongside the track, and adjusting means coacting between the main frame and said supporting wheels adapted to raise and lower the main frame with respect to said supporting wheels.

7. Apparatus as set forth in claim 6 in which a walking beam extends parallel to the railroad track and is pivotally connected to the main frame and the supporting wheels adapted to rest on the roadway are mounted respectively at opposite ends of said walking beam.

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References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
494,368	Decker	Mar. 28, 1893
1,151,561	Bollinger	Aug. 31, 1915
2,174,997	Ronk	Oct. 3, 1939
2,381,425	Deal et al.	Aug. 7, 1945
2,416,241	Stratton	Feb. 18, 1947
2,449,714	Praytor et al.	Sept. 21, 1948
2,474,471	Dolan, II	June 28, 1949
2,547,596	Praytor et al.	Apr. 3, 1951