Dec. 14, 1965 J. D. HOLLEY ETAL 3,222,803

BALLAST REMOVING APPARATUS

Filed Feb. 24, 1964 2 Sheets-Sheet 1

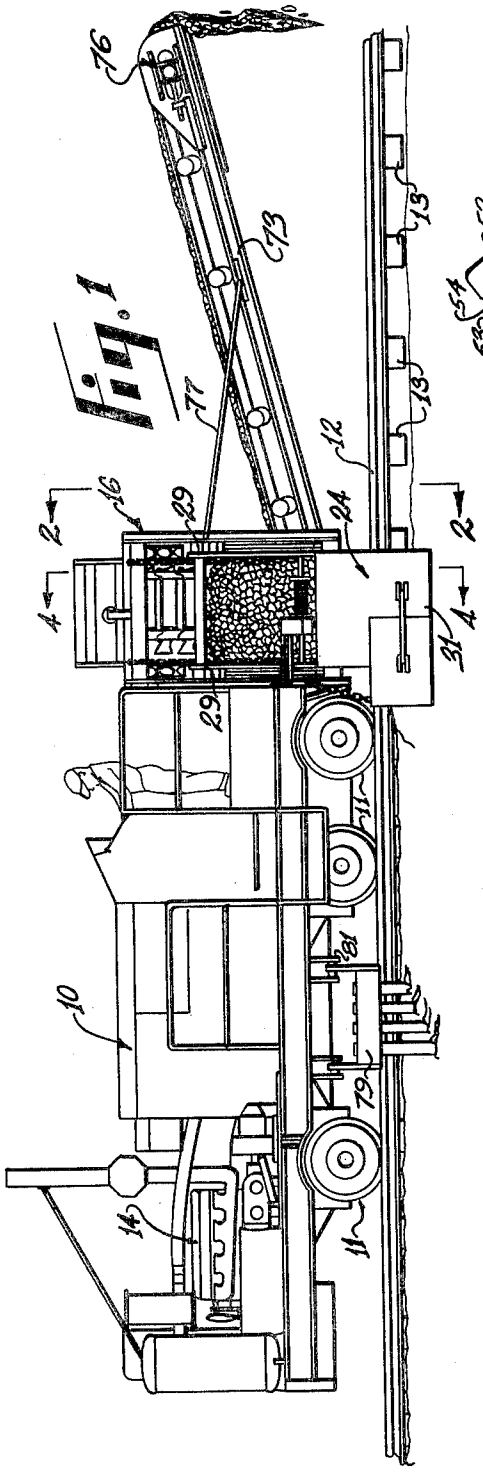

Fig. 1

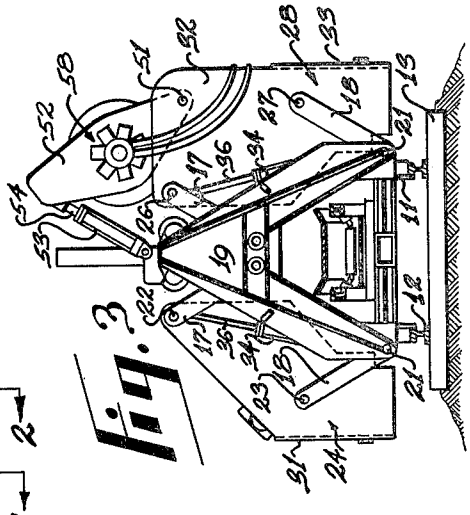

Fig. 3

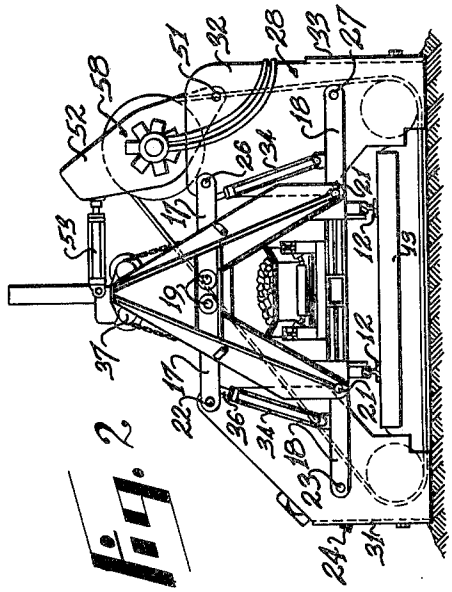

Fig. 2

INVENTOR.
John D. Holley &
BY Ernest E. Bode
Jennings, Carter & Thompson
Attorneys

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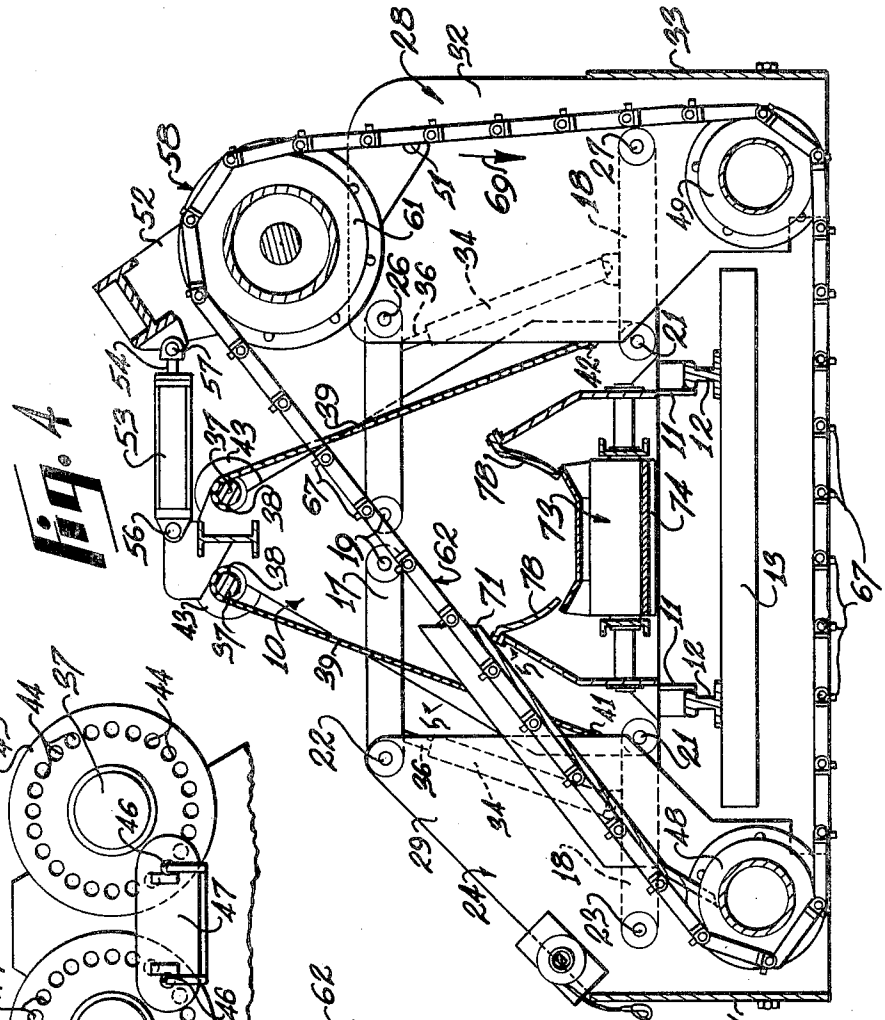

Fig. 4

Fig. 7

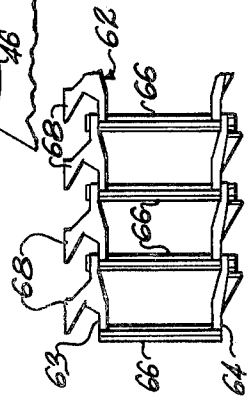

Fig. 6

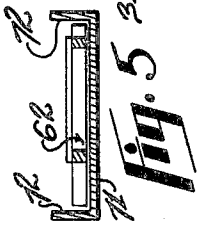

Fig. 5

INVENTOR.
John D. Holley &
BY Ernest E. Bode
Jennings, Carter & Thompson
Attorneys

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BALLAST REMOVING APPARATUS

John D. Holley and Ernest E. Bode, Montgomery, Ala., assignors to Kershaw Manufacturing Company, Inc., a corporation of Alabama

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This invention relates to apparatus for removing ballast from beneath a railroad track and more particularly to a chain loading undercutter which shall include a rotating endless ballast removing unit mounted on a railroad vehicle for rotation in a vertical plane transversely of the rails with the lower run of the endless unit extending beneath the crossties and under both rails of the railroad track.

An object of our invention is to provide ballast removing apparatus of the character designated wherein the endless ballast removing unit is provided with an upwardly and inwardly inclined run, together with a slide member mounted along the undersurface of the upwardly inclined run whereby materials removed from beneath the crossties are conveyed upwardly and inwardly of the endless unit and then discharged intermediate the ends of the upwardly inclined run.

A more specific object of our invention is to provide a chain loading undercutter for removing ballast from beneath the crossties of a railroad track of the character designated wherein a conveyor unit is mounted transversely of the endless ballast removing unit in position for the receiving end thereof to be within the confines of and receive ballast discharged by the endless ballast removing unit.

A further object of our invention is to provide apparatus for removing ballast from beneath the crossties of a railroad track in which improved means is employed to hold the lower run of an endless ballast removing unit at selected positions relative to the crossties whereby a predetermined and accurate undercut is made.

A still further object of our invention is to provide apparatus for removing ballast of the character designated which shall be simple of construction, economical of manufacture, and one which is adapted to operate in a continuous manner to remove ballast as the apparatus is moved along a railroad track.

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

FIG. 1 is a side elevational view showing the apparatus in operation;

FIG. 2 is a sectional view taken generally along the line 2—2 of FIG. 1;

FIG. 3 is a view corresponding to FIG. 2 showing the apparatus in inoperative position;

FIG. 4 is an enlarged sectional view taken generally along the line 4—4 of FIG. 1;

FIG. 5 is a sectional view taken generally along the line 5—5 of FIG. 4 showing the upwardly inclined slide which is associated with the upwardly inclined run of the endless ballast removing unit;

FIG. 6 is an enlarged fragmental view showing a portion of the lower run of the endless ballast removing unit; and,

FIG. 7 is an enlarged, fragmental view showing the means for holding the endless ballast removing unit at selected positions relative to the crossties of the railroad track.

Referring now to the drawings for a better understanding of our invention, we show a vehicle frame 10 which is supported by flanged wheels 11 for riding on

rails 12 of a railroad track. The rails 12 are supported by longitudinally spaced cross ties 13 in the usual manner. The vehicle is propelled by a suitable power unit, such as a diesel engine 14 mounted on the frame 10. The diesel engine 14 also is employed to drive suitable compressors which supply fluid under pressure to the various parts of the apparatus to be described hereinafter. In view of the fact that such means for supplying fluid under pressure to various fluid pressure operated motors, cylinders and the like is well understood in the art, no further description thereof is deemed necessary.

The ballast removal unit is indicated generally by the numeral 16 and is mounted rearwardly of the rearmost wheels 11 whereby the weight of the vehicle frame 10 is not supported by the portion of the rails which is directly over the area where the ballast is being removed from beneath the crossties.

A pair of vertically spaced parallel links 17 and 18 are pivotally mounted adjacent the inner ends thereof by pivot pins 19 and 21, respectively, to opposite sides of the main vehicle frame 10 whereby the links extend transversely of the main frame. Pivotally connected to the outer ends of the pairs of links 17 and 18 at one side of the main frame 10, by suitable pivot pins 22 and 23 is a supporting frame 24. In like manner, pivotally connected to the outer ends of the links 17 and 18 at the opposite side of the main frame 10, by suitable pivot pins 26 and 27 is a supporting frame 28. The supporting frame 24 is provided with side plates 29 which are connected to each other by a vertical outer plate 31. In like manner, the supporting frame 28 comprises vertical side plates 32 which are connected to each other by a vertical outer plate 33.

To raise and lower the supporting frames 24 and 28, fluid pressure operated cylinders 34 are interposed between each pair of vertically spaced links 17 and 18, as shown in FIGS. 2 and 3. That is, the lower ends of the fluid pressure operated cylinders 34 are pivotally connected to the links 18 while the outer ends of piston rods 36 for the cylinders 34 are pivotally connected to the links 17. As shown in FIG. 2, the lower end of the cylinders 34 are connected to the links 18 adjacent the pivot pins 21 while the ends of the piston rods 36 are pivotally connected to the links 17 adjacent the pins 22 and 26. Accordingly, upon introducing fluid under pressure into the cylinder 34 whereby the piston rod 36 is moved outwardly, the outer ends of the arms 17 are raised whereby the supporting frames 24 and 28, as the case may be, are raised. On the other hand, upon exhausting fluid from the cylinders 34, the outer ends of the links 17 are lowered whereupon the supporting frames 24 and 28 are lowered.

To hold the supporting frames 24 and 28 in selected positions relative to the crossties 13, elongated rotatable members 37 are mounted for rotation at opposite sides of the vehicle frame 10 adjacent the top thereof, as shown in FIGS. 2 and 4. Secured to each of the elongated rotatable members 37 as at 38 is one end of a flexible member, such as a chain 39. The other or lower ends of chains 39 are secured to the supporting frames 24 and 28 as at 41 and 42, respectively. To hold the elongated rotatable members 37 in selected positions, a disc-like member 43 is secured to the outer end of each of the elongated members 37, as shown in FIG. 7. A plurality of angularly spaced openings 44 are provided in the disc-like members 43 in position to receive inwardly projecting detents or pins 46 carried by a latch member 47. Accordingly, by lifting the detents 46 from the openings 44, the disc-like members 43 are free to be rotated to any selected position to thereby raise or lower

the chains 39 whereupon the effective length of the chains may be varied to thereby lock the supporting frames 24 and 28 at selected elevations relative to the crossties 13.

Mounted adjacent the lower outer ends of each of the supporting frames 24 and 28 are sprockets 48 and 49, respectively. Each sprocket 48 and 49 is mounted on its supporting frame whereby the lower supporting surface thereof is adapted to extend lower than the bottom surface of the crossties and beyond the ends of the crossties when the supporting frames 24 and 28 are in the lowered or working position, as shown in FIG. 4. Pivotally mounted adjacent the upper end of the supporting frame 28 by means of a suitable pivot pin 51 is a movable frame 52. The uppermost end of the movable frame 52 is operatively connected to the main vehicle frame 10 by a fluid pressure operated cylinder 53 having a piston rod 54. That is, the cylinder 53 is pivotally connected to the frame 10 by a suitable pivot connection 56 while the end of the piston rod 54 is connected to the movable frame 52 by a suitable pivot connection 57. Mounted on the movable frame 52 is a power unit 58, which may be in the form of a fluid pressure operated motor or motors. The power unit 58 is provided with a drive shaft 59 which carries a sprocket 61.

Passing around the sprockets 48, 49 and 61 is a link chain 62 having parallel sides 63 and 64 which are supported in spaced relation to each other by spaced apart cross members 66 as shown in FIG. 6. The cross members 66 are provided with projections 67 which are in position to engage and drag ballast from beneath the crossties when the apparatus is in working position. Ballast engaging tools 68 are carried by the forward side of the link chain 62 facing the direction of movement of the vehicle frame 10. The ballast engaging tools 68 project outwardly and forwardly, as shown in FIG. 6, whereby upon forward movement of the vehicle frame 10 the moving tools engage ballast to thus remove the same from beneath the crossties. It will be noted that the endless chain 62 moves in the direction of the arrow 69 whereby the ballast is pulled toward the left, as viewed in FIG. 4.

As shown in FIG. 4, the endless chain 62 passes from the sprocket 48 in an upwardly and inwardly inclined direction to the sprocket 61 whereby the endless chain is provided with an upwardly and inwardly inclined run between the sprockets 48 and 61. Also, it will be seen that the run of the endless chain 62 between the sprockets 49 and 48 extends in a generally horizontal direction.

Mounted subjacent the lower portion of the upwardly inclined run of the endless chain 62, as shown in FIG. 4, is an upwardly inclined slide 71. As shown in FIG. 5, the upwardly inclined slide 71 is provided with upstanding side members 72 which are disposed at opposite sides of the endless chain 62 while the lower surface of the chain 62 engages the bottom of the inclined slide 71. As shown in FIGS. 1 through 4 the vertical outer plate 31 is connected to the vertical side plates 29 to define with the upwardly and inwardly inclined slide 71 a bottomless bin into which the ballast is drawn by the chain 62. Ballast is thus delivered continuously into the bottom of the bin by the chain 62 whereupon it builds up to a point above the lower end of the inclined slide 71 and then falls into the space between the spaced apart cross members 66 of the chain 62. The ballast materials are than conveyed upwardly along the slide 71 by the spaced apart cross members 66. The bottom edges of the side plate 29 and outer plate 31, shown in FIG. 4 of the drawing, engage the ground to restrain movement of the ballast outwardly thereof as the frame 24 is moved forward along the ground. Accordingly, any materials dragged upwardly by the upwardly and inwardly inclined run of the endless chain 62 slides along the inclined slide 71 until it reaches the upper end thereof.

Extending transversely of the ballast removing chain 62 is a conveyor unit 73. The receiving end of the conveyor unit 73 extends within the confines of the endless chain 62 whereby it is in position to receive the materials discharged adjacent the uppermost end of the slide 71. The conveyor unit 73 is shown as comprising an endless belt 74 which passes around a head pulley and a tail pulley in the usual manner and is supported intermediate the ends thereof by idler pulleys in a manner well understood in the art. The conveyor unit 73 is preferably propelled by a power unit indicated generally at 76 which is carried adjacent the free end of the conveyor unit, as shown in FIG. 1. The power unit may be propelled by any suitable means, such as by motors which are operated by fluid under pressure. To support the conveyor unit 73 at selected elevations, suitable diagonal supports 77 are provided. Suitable deflector members 78 may be provided at opposite sides of the conveyor unit 73, as shown in FIG. 4.

Preferably, a scarifier assembly 79 is mounted forwardly of the ballast removing unit 16 on each side of the vehicle frame 10 for loosening the ballast and removing the same outwardly from the ends of the crossties 13. The scarifier assembly is pivotally mounted to the vehicle frame as at 81 whereby it may be moved into and out of operating position in a manner well understood in the art.

From the foregoing description, the operation of our improved apparatus for removing ballast from beneath a railroad track will be readily understood. The vehicle frame 10 is positioned on the rails 12 where it is desired to remove ballast from beneath the crossties. To place the apparatus in working position from non-working position, the link chain 62 is removed from the sprockets and ballast is dug out, by hand or other suitable means, from beneath the crossties at the position where it is desired to begin the ballast removing operation. After a path has been cleared in the ballast under a track, the chain is disconnected at one of its links by removal of a link pin thereof in the usual manner. The chain is then passed under the crossties and is positioned around the sprockets 48, 49 and 61 and the link pin is then reinserted to thus provide an endless chain unit 62 having a lower horizontal run and an upwardly and inwardly inclined run.

The supporting frames 24 and 28 are moved to selected positions whereby the lower supporting surfaces of the sprockets 48 and 49 are at the proper elevation relative to the crossties by actuating the fluid pressure operated cylinders 34. That is, by extending the piston rods 36, the links 17 and 18 are moved upwardly due to the fact that the lower end of each cylinder 34 is connected to the link 18 adjacent the pivot point 21 whereas the upper end of the piston rod 36 is connected to the link 17 adjacent the pivot pin 22 or 26, as the case may be. Accordingly, the differential in leverage causes the links 17 and 18 to be raised upon extending the piston rod 36. Also, by mounting the cylinder 34 intermediate the links 17 and 18 rather than pivotally connecting one end of the cylinder to the main frame 10, we provide an actuating member which requires a minimum of space. That is, the fluid pressure operated cylinder 34 is relatively short due to the fact that it is mounted between the two links which are moved about their pivot points.

The proper tension is placed on the endless chain 62 by actuating the cylinder 53 whereby the movable frame 52 is moved toward or away from the vehicle frame 10 to thereby tighten or loosen the endless chain.

Prior to movement of the apparatus along the rails 12, an inspection is preferably made of the crossties whereby the spikes may be removed from the crossties which have become deteriorated and require removal. Accordingly, as the ballast removing undercutter moves subjacent these crossties, they are removed along with the ballast. As the ballast is drawn upwardly by the upwardly inclined run

of the endless chain, the upwardly inclined slide 71 supports the ballast whereby it is discharged adjacent the upper end of the slide onto the receiving end of the conveyor unit 73. The ballast discharged at the discharge end of the conveyor unit 73 may be delivered to a reclaimer unit which is moved along the rails 12 in position to receive the ballast. Accordingly, the ballast may be reclaimed and then placed back in position beneath the crossties by a single pass of the apparatus over the rails.

From the foregoing, it will be seen that we have devised improved apparatus for removing ballast from beneath the crossties of a railroad track. By providing an endless ballast removal unit having an upwardly inclined run, together with an upwardly inclined slide subjacent the inclined run of the ballast removing unit, the ballast removed from beneath the crossties is continuously pulled upwardly and then discharged intermediate the ends of the inclined run. By providing a conveyor unit having its receiving end within the confines of the endless ballast removing unit and subjacent the discharge end of the upwardly inclined slide, the ballast thus removed is continuously transferred to any desired location, thereby eliminating the necessity of having to rehandle the ballast prior to transferring it to a reclaimer unit or the like. Furthermore, by providing a supporting frame at each side of the vehicle frame which is supported at selected elevations by parallel link members, together with a fluid pressure operated unit interposed between the link members, our apparatus is compact and requires actuating cylinders of a minimum length.

While we have shown our 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 we desire, therefore, that only such limitations shall be placed thereupon as are specifically set forth in the appended claims.

What we claim is:

1. Apparatus for removing ballast from beneath the crossties of a railroad track comprising:

(a) a vehicle frame supported by wheels for riding on the rails of a railroad track,

(b) an endless chain ballast removing unit having spaced apart cross members and mounted on said frame for rotation in a vertical plane transversely of the vehicle frame,

(c) said endless unit having a lower run extending beneath the crossties under both rails of the railroad track and an upwardly and inwardly inclined run extending over said crossties,

(d) an upwardly inclined slide member positioned within the confines of said endless unit and extending inwardly of and along the under surface of said inclined run from a point adjacent the lower end of said inclined run to a point intermediate the ends of said inclined run to support ballast as it is pulled upwardly by the spaced apart cross members of said inclined run and discharge the ballast intermediate said ends of the inclined run, and

(e) a conveyor unit mounted transversely of and within the confines of said endless ballast removing unit in position to receive the ballast discharged from said slide member.

2. Apparatus for removing ballast from beneath the crossties of a railroad track comprising:

(a) a vehicle frame supported by wheels for riding on the rails of a railroad track,

(b) a pair of vertically spaced parallel links pivotally mounted adjacent the inner ends thereof on each side of the main frame and extending transversely thereof,

(c) a supporting frame pivotally mounted on the outer ends of each of said pair of links,

(d) a sprocket mounted adjacent the lower outer end of each of said supporting frames and having a supporting surface adapted to extend lower than the bottom surface of the crossties and beyond the ends of the crossties,

(e) an upper sprocket mounted adjacent the upper end of one of said supporting frames,

(f) an endless chain ballast removing unit having spaced apart cross members and surrounding said sprockets for rotation in a vertical plane transversely of the vehicle frame,

(g) said endless unit having a lower run extending beneath the crossties under both rails of the railroad track and an upwardly and inwardly inclined run extending over said crossties,

(h) an upwardly inclined slide member positioned within the confines of said endless unit and extending inwardly of and along the under surface of said inclined run from a point adjacent the lower end of said inclined run to a point intermediate the ends of said inclined run to support ballast as it is pulled upwardly by the spaced apart cross members of said inclined run and discharge the ballast intermediate said ends of the inclined run, and

(i) a conveyor unit mounted transversely of and within the confines of said endless ballast removing unit in position to receive the ballast discharged intermediate said ends of the inclined run.

3. Apparatus for removing ballast as defined in claim 2 in which a fluid pressure operated means is mounted between the links of each pair of links in position to move said links about their pivot points whereby each supporting frame is raised and lowered to selected positions.

4. Apparatus for removing ballast as defined in claim 2 in which said upper sprocket is mounted on a movable frame pivotally supported by said one supporting frame and power means is interposed between said movable frame and said vehicle frame to move said upper sprocket relative to the sprockets mounted adjacent the lower outer end of each supporting frame whereby the tension on said endless unit is variable.

5. Apparatus for removing ballast as defined in claim 4 in which the power means comprises a fluid pressure operated unit having one element thereof connected to said vehicle frame and another element thereof connected to said movable frame.

6. Apparatus for removing ballast as defined in claim 2 in which each supporting frame is held at selected elevations by means comprising:

(a) a rotatable member carried by an upper portion of said vehicle frame,

(b) a flexible member connected adjacent its upper end to said rotatable member,

(c) means connecting the lower end of said flexible member to a supporting frame, and

(d) means to hold said rotatable member in selected positions.

7. Apparatus for removing ballast as defined in claim 2 in which the endless unit comprises:

(a) a link chain having parallel sides spaced from each other,

(b) said cross members extending between said parallel sides in position to engage and drag ballast from beneath the crossties and over said inclined slide when the apparatus is in working position, and

(c) ballast engaging tools carried by the forward side of the link chain facing the direction of movement of the vehicle frame.

8. Apparatus for removing ballast as defined in claim 7 in which the ballast engaging tools extend forwardly and outwardly of said forward side of the link chain.

9. Apparatus for removing ballast as defined in claim 2 in which the sides of the inclined slide extend upwardly

alongside the outer sides of said endless unit to maintain materials thereon until they reach the uppermost end of said inclined slide.

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ARTHUR L. LA POINT, *Primary Examiner.*

EUGENE G. BOTZ, *Examiner.*

R. A. BERTSCH, *Assistant Examiner.*