Aug. 18, 1959 F. D. CAMPBELL 2,899,759

DUAL SPEED RAILROAD BALLAST CLEANER

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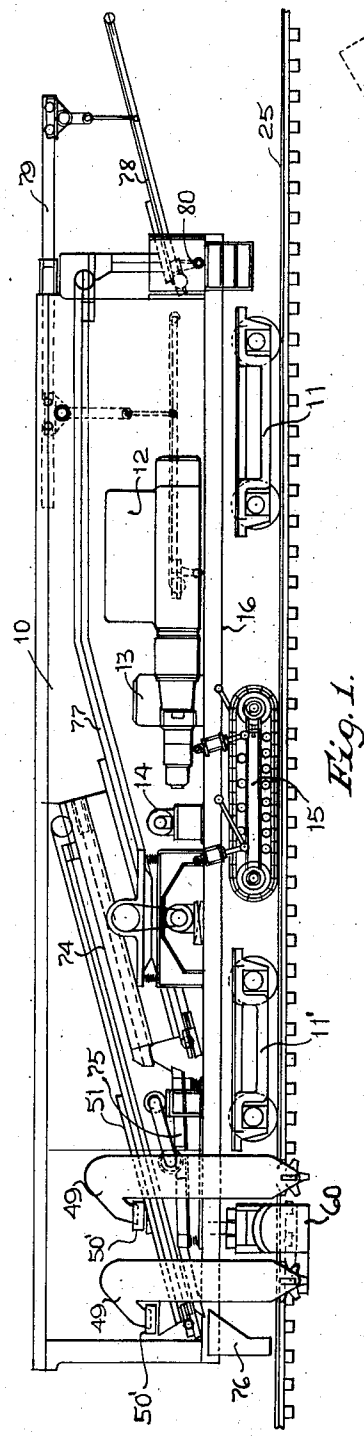


Fig. 1.

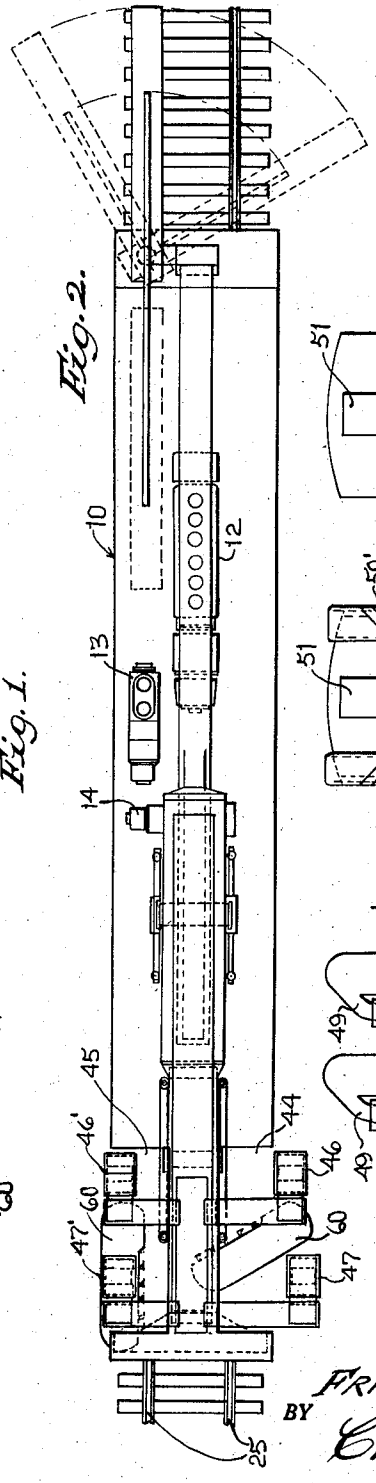


Fig. 2.

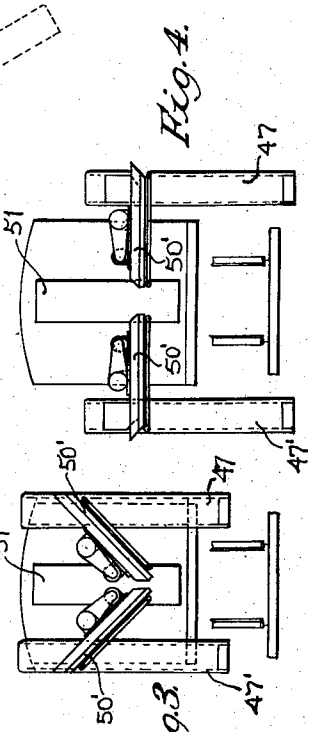


Fig. 4.

Fig. 3

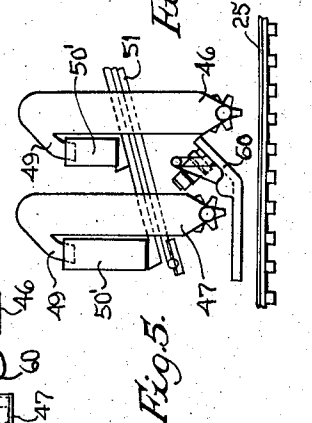


Fig. 5.

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DUAL SPEED RAILROAD BALLAST CLEANER

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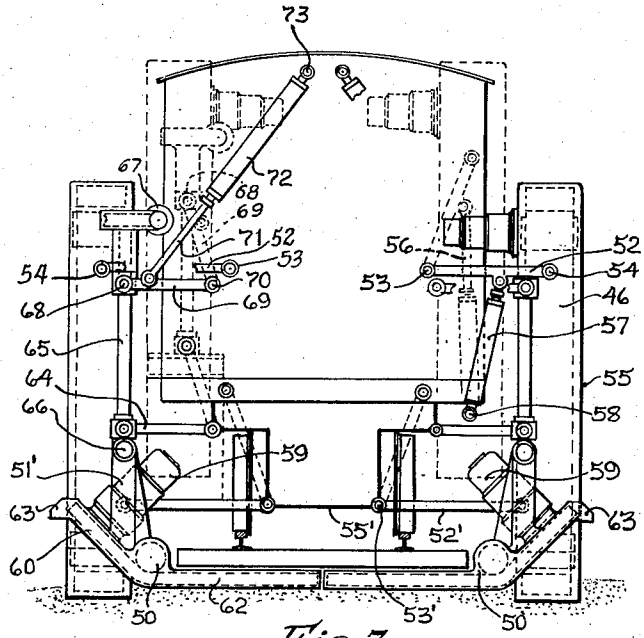
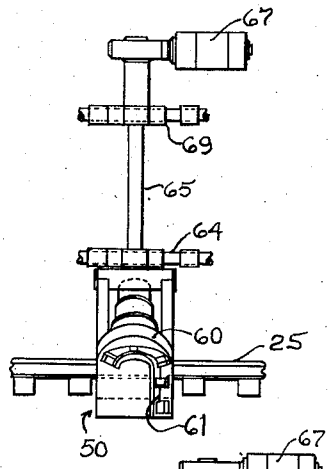


Fig. 7.

Fig. 8.



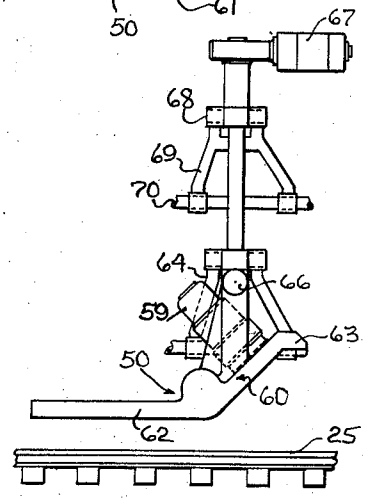


Fig. 9.

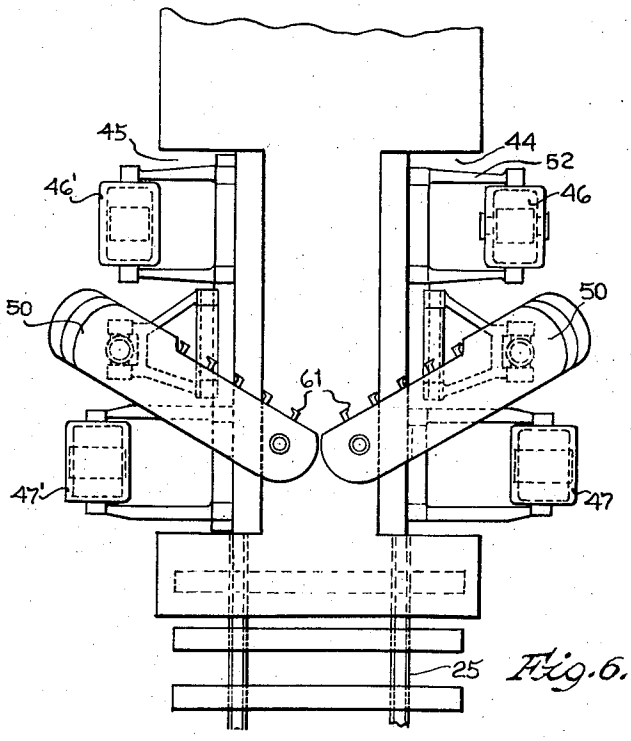


Fig. 6.

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DUAL SPEED RAILROAD BALLAST CLEANER

Filed Feb. 18, 1954 6 Sheets-Sheet 3

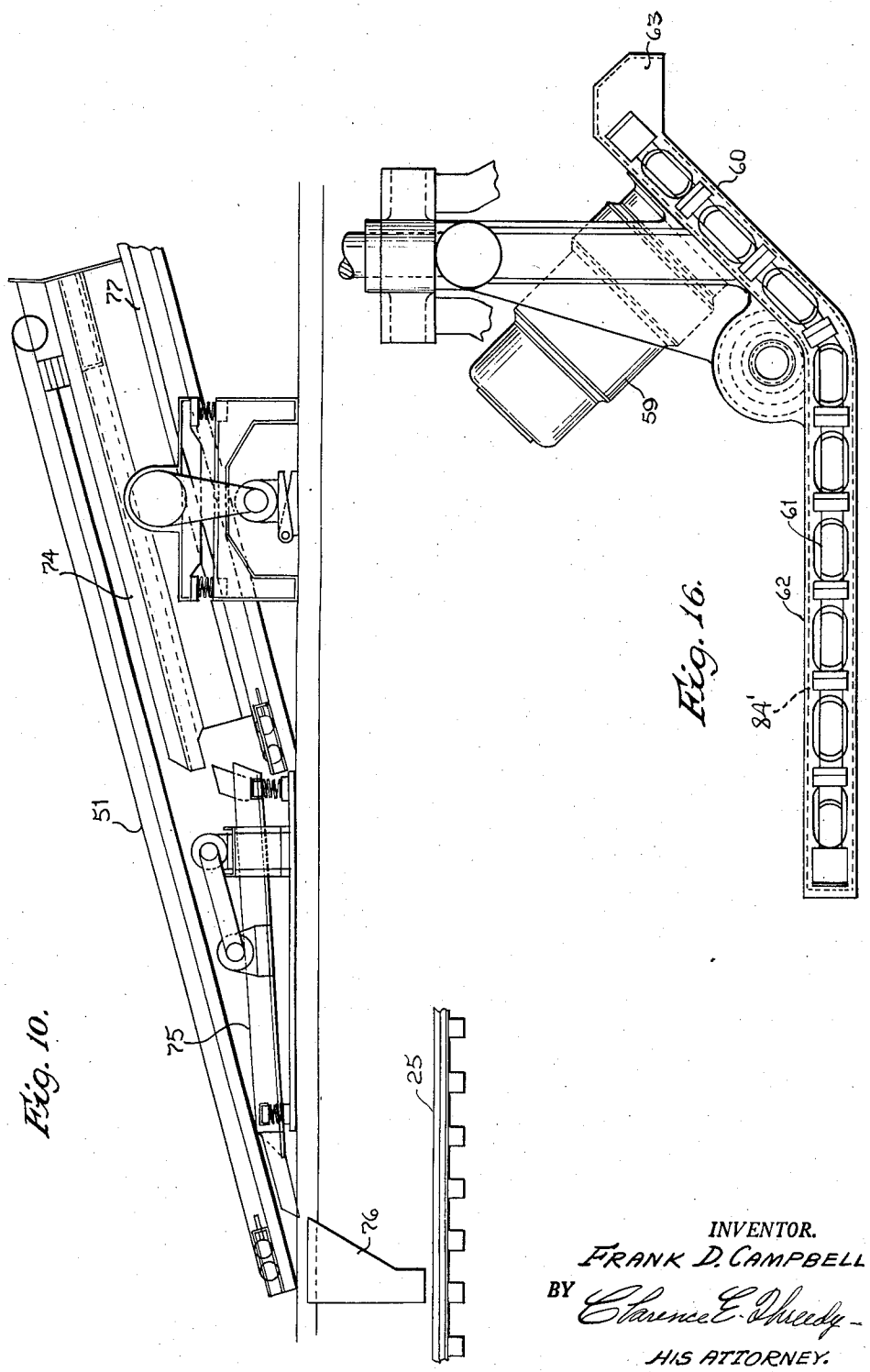


Fig. 16.

Fig. 10.

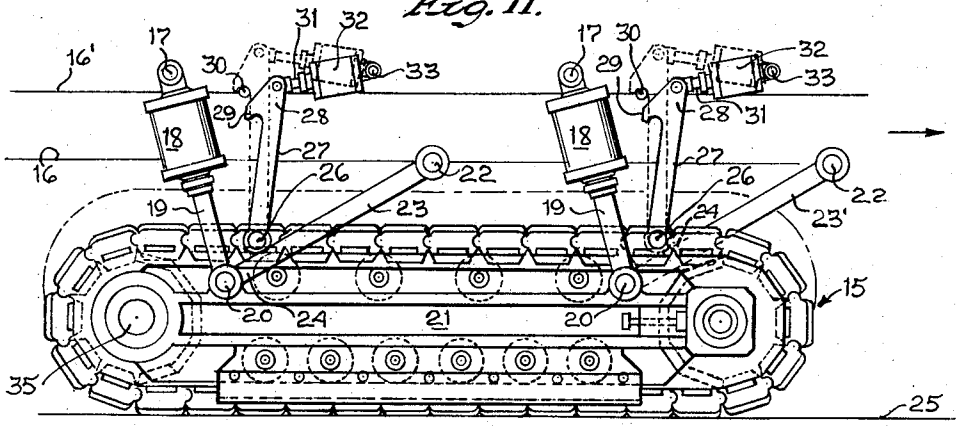
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Aug. 18, 1959 F. D. CAMPBELL 2,899,759

DUAL SPEED RAILROAD BALLAST CLEANER

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Fig. 11.



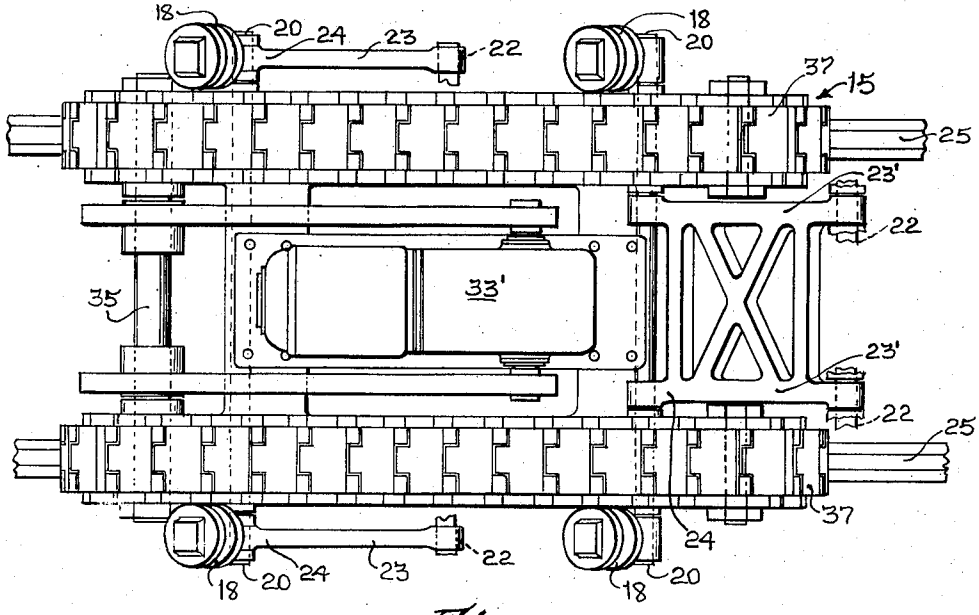


Fig. 12.

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DUAL SPEED RAILROAD BALLAST CLEANER

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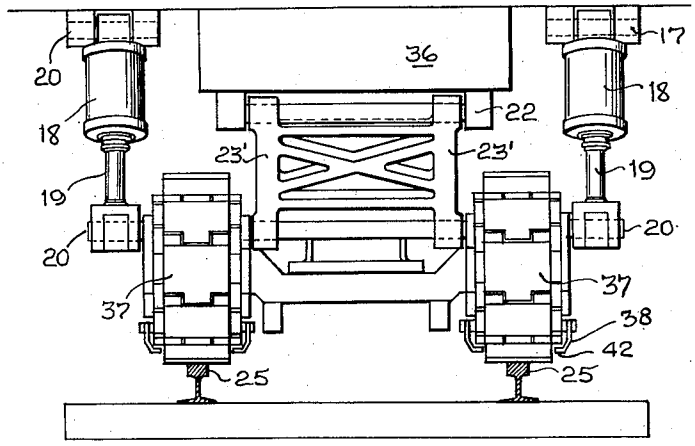


Fig. 13.

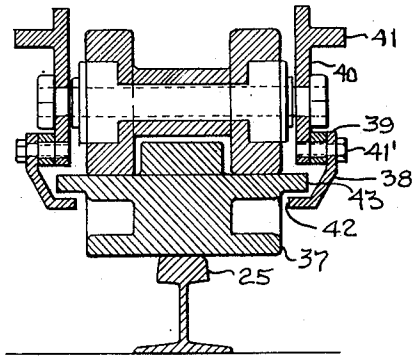


Fig. 15

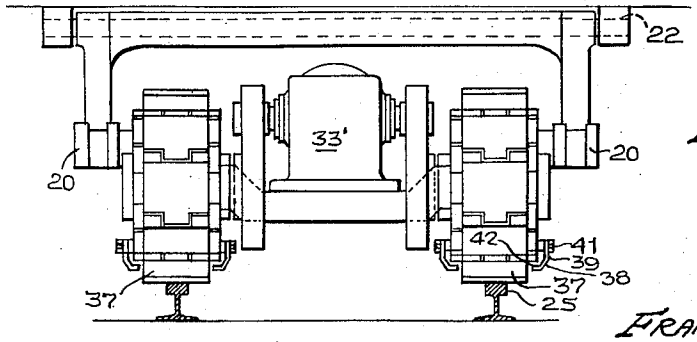


Fig. 14.

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DUAL SPEED RAILROAD BALLAST CLEANER

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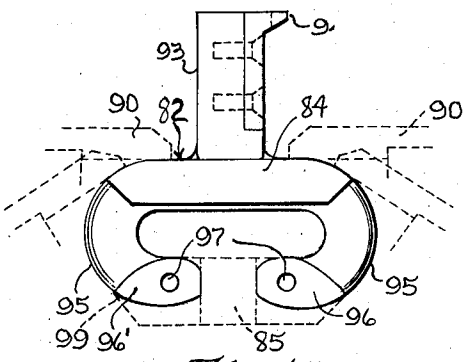


Fig. 17.

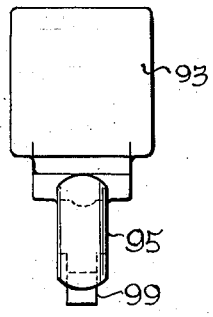


Fig. 18.

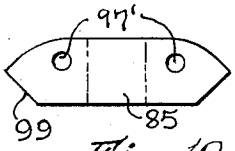


Fig. 19.

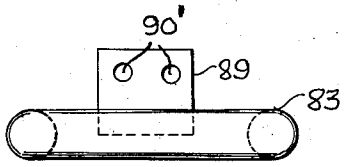


Fig. 21.

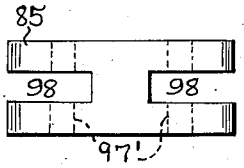


Fig. 20.

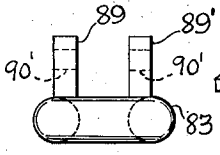


Fig. 22.

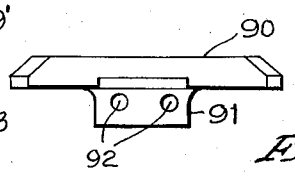


Fig. 23.

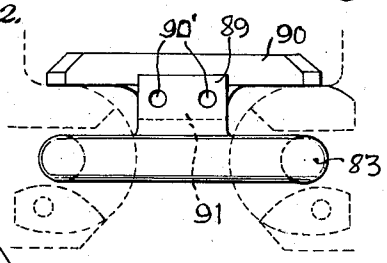


Fig. 24.

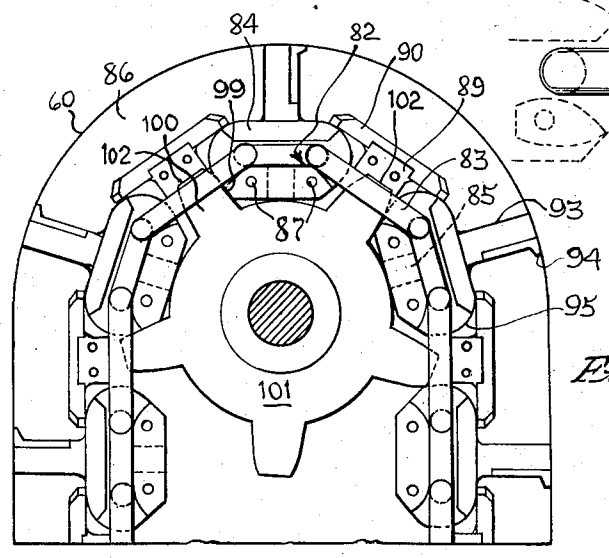


Fig. 25.

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United States Patent Office 2,899,759 Patented Aug. 18, 1959

2,899,759

DUAL SPEED RAILROAD BALLAST CLEANER

Frank D. Campbell, Chicago, Ill.

Application February 18, 1954, Serial No. 411,106

11 Claims. (Cl. 37—104)

This invention relates to certain new and useful improvements in dual speed railroad ballast cleaner and has for its principal object a device of this character whereby the railroad bed and shoulders of a standard railroad right-of-way may be cleaned efficiently in a single operation.

Another important object of my invention is the provision in a device of this character of dual propulsion mechanisms, one of which will propel the vehicle at a high rate of speed and the other mechanism employed for propelling the vehicle for a slow regulated rate of speed.

Still another object of my invention is the provision in a device of this character of a retractable slow speed tractor unit.

Another object of my invention is the provision in a device of this character of an arrangement of supporting structures for the slow speed tractor unit which will afford the maximum traction with the tracks when the unit is in projected position with respect thereto.

Another object of my invention is the provision in a device of this character of an endless shoe for said tractor which employs a method of reduced catenary strain when said unit is retracted.

Still another and equally important object of my invention is the provision in a device of the character of an excavator carried by the vehicle whereby the ballast of the road bed, i.e. under the ties of the track, may be excavated to the shoulders.

Another object of my invention is the provision in a device of this character of a structural arrangement whereby said excavator may be pivoted into a longitudinal plane parallel to said vehicle and out of engagement with the ballast of the track when the vehicle is about to be moved at high speeds over the track.

Still another and equally important object of my invention is the provision in a device of this character of bucket elevators cooperating with the excavators for elevating the removed ballast from the shoulders of the track bed for depositing the ballast onto a screen mechanism.

Still another object of my invention is the provision in a device of the character of a structural arrangement for raising the elevators out of engagement with the ballast and positioning the elevators into recesses provided in the vehicle's side walls when said vehicle is desired to be moved at high speed over the track.

Other objects will appear hereinafter.

The invention consists in the novel combination and arrangement of parts to be hereinafter described and claimed.

The invention will be best understood by reference to the accompanying drawings showing the preferred form of construction, and in which:

Fig. 1 is a side elevational detail view of my proposed invention;

Fig. 2 is a top plan view of the same;

Fig. 3 is a fragmentary sectional detail view of the

elevators as employed in my invention in a raised or inoperative position;

Fig. 4 is a similar view but disclosing the elevators in a lowered or operative position;

Fig. 5 is a side fragmentary detail view of the elevators as employed in my invention showing their positions with respect to each other;

Fig. 6 is a bottom fragmentary detail view of the excavators as employed in my invention;

Fig. 7 is a sectional detail view of the operating mechanism employed in connection with the elevators and excavators of my invention;

Fig. 8 is a fragmentary detail view of the operating mechanism of the excavator, showing the excavator in an operative position;

Fig. 9 is a view similar to Fig. 8 with the excavator in an inoperative position;

Fig. 10 is a side elevational view of the proposed conveying system as employed in my invention;

Fig. 11 is a detail view in side elevation showing my self-propelling tractor unit;

Fig. 12 is a top plan view of my tractor unit;

Fig. 13 is a front elevational view of the tractor unit;

Fig. 14 is a rear elevational view of my tractor unit;

Fig. 15 is a fragmentary sectional view showing my improved arrangement of parts whereby the catenary strain of the endless shoe of my tractor unit is reduced;

Fig. 16 is a side sectional view of the excavator and its housing;

Fig. 17 is a detail sectional view of a specific cutter link as employed in the cutting chain of my excavator;

Fig. 18 is a rear view of the cutter link shown in Fig. 17;

Fig. 19 is a perspective view of a removable connecting shoe for the cutter link shown in Fig. 17;

Fig. 20 is a top plan view of the shoe shown in Fig. 19;

Fig. 21 is an elevational view of a closed connecting link as employed in my excavator cutting chain;

Fig. 22 is an end view of the same;

Fig. 23 is an elevational view of a cap plate used in conjunction with the closed link;

Fig. 24 is an elevational view of the closed link with the cap thereon; and

Fig. 25 is a plan sectional detail view of the excavator cutting chain and spoke driving mechanism therefor.

Applicant's invention is concerned with mobile machinery for cleaning and conditioning ballast materials in railway trackage. For a safe and substantial road bed for a railway track, the ballast materials consisting of broken lime stone, gravel or mill slag, must be maintained in an open state so that water may drain off. Airborne dust, cinders and powdering of the ballast, under vibrating load action of trains in motion thereon tend to fill the voids in the ballast and prevent proper drainage.

The practical method of cleaning is to pick-up the ballast material, screen out the waste portions and return the reclaimable material to the road bed.

In Fig. 1 I have disclosed a railroad vehicle **10** which forms a mobile housing for my invention. This vehicle **10** is provided with a pair of standard railroad wheel trucks **11** and **11'**, having a standard suspension and connection to the vehicle **10**. The foreward truck **11** has electrical operative connection with a diesel engine-generator **12** positioned within the housing **10** for the purpose of propelling the vehicle **10** at a required high speed over the track. The vehicle **10** also houses an air compressor **13** and a hydraulic pump **14**, of standard types and well known in the art and the purpose and function of which will be hereinafter described.

Positioned between the wheel trucks **11** and **11'** and substantially in the center of the vehicle **10** is a track-

engaging self-propelling endless shoe tractor unit 15. This tractor unit 15 is retractably connected to the underside 16 of the vehicle 10. A more thorough understanding of the retracting mechanism will be had upon a study of Figs. 11 through 15. The endless shoe tractor unit 15 is of a partially conventional and well known construction but as employed here it is provided with improvements which adapt themselves to its specific use in my invention.

Pivotally secured as at 17 to the top side of the floor 16 of the vehicle 10 and projecting through the floor, are two pairs of hydraulically operated cylinders 18. These cylinders 18 are equipped with reciprocating pistons 19 (Fig. 13). These pistons have their free ends pivotally connected as at 20 to the supporting structure 21 of the unit 15. Pivotally secured as at 22 to the underside 16 of the vehicle 10 is a pair of rigid supporting arms 23 and 23'. These arms 23 and 23' have their free ends 24 pivotally connected to a transversely supporting structure of the unit 15 at the same point of connection as do the piston rods 19. These arms 23 and 23', together with the pistons 19, serve to maintain the unit 15 in a horizontal position with respect to the rail heads 25 of the track, and to maintain equalized frictional traction when the unit 15 is lowered into contact with the rail heads 25.

Pivotally attached to these arms 23 and 23' as at 26, are coupler members 27. The free ends 28 of these members 27 are formed to provide hooks 29, which project through the underside 16 of the vehicle 10 and which are adapted to hold onto fixed rods 30 carried by the vehicle 10. These hooks 29 are connected to the free ends of piston rods 31 of hydraulically operated cylinders 32, which cylinders 32 are in turn pivotally connected as at 33 to the vehicle 10. These hooks 29 serve both as safety devices to hold the unit 15 in suspension and to operate as unlocking means when the unit 15 is projected into contact with the rail heads 25. It should be noted that as the vehicle 10 is moved in the direction of the arrow (Fig. 11), the angularity of the rigid arms 23 and 23' will cooperate to create additional pressure on the rail heads 25. In maintaining this pressure the tractor unit 15 may successfully overcome all minor resistances and obstructions or traction loss which might be created by adverse weather conditions. The propulsion motor 33' for this tractor unit is shown in its preferred position in Fig. 14. This motor 33', which may be either electrical or hydraulic, is desirably geared down to a slow speed and provided with a driving chain connected to the rear drive axle 35 of the tractor unit 15.

Referring now to Figs. 12 and 13, it should be noted that the arms 23' are of a one-piece assembly and are connected to a depending portion 36 of the vehicle 10, and connected to the unit 15 between the endless shoe tracks. The arms 23, as shown in Fig. 14, are connected to the outer side of the unit 15 and the underside 16 of the vehicle 10 as is clearly shown in Fig. 11.

The endless shoe 37 and the spool-type rollers of the tractor unit 15, as well as the motor 33' which has direct drive to each shoe 37, are preferably of any standard and well known construction and are only improved by me in the specific above-noted respects.

With respect to the tractor unit 15, it has developed that as it becomes necessary to raise the tractor shoe 37 off the rail heads 25, the tread of the shoe 37 will normally sag. To prevent this, I have provided a removable lifting bar 38 attached as at 39 to a depending flange 40 of the supporting structure 41 by suitable means such as screws 41'. The lifting bar 38, as viewed in Fig. 15, is tapered downwardly and inwardly with respect to the shoe 37. At its free end 42, the bar 38 is bent laterally to project under and in spaced relation to laterally extending lugs 43, which are formed as an integral part of the shoe 37. It is readily apparent that with my construction, when the unit 15 is raised, the tapered portion 42 will engage the lugs 43 of the shoe 37 and prevent any appreciable amount of sag or catenary strain.

At the rear of the vehicle 10, there is provided in each of its side walls a pair of recesses 44 and 45. The forward portion of the recesses 44 and 45 house a pair of retractable bucket elevators 46 and 46' of a standard well known construction. These elevators, for clarity's sake, will be termed "the forward or primary elevators." As such, it is the function of these elevators to elevate materials or ballast positioned beyond the ends of the railroad ties, herein referred to as the road bed shoulders. Positioned within the rear portion of the recesses 44 and 45 are the secondary elevators 47 and 47', which elevators are of the same well known construction as the elevators 46 and 46', but which have a different purpose which will be hereinafter described.

The elevators 46 and 46' and 47 and 47' are each equipped with depositing funnels 49 through which the elevated ballast is deposited upon a series of conveyers 50'. As these conveyers 50' are all of the same construction and have like modes of operation, I will, for brevity's sake, describe the arrangement and operation of only one.

Referring to Fig. 10, there is shown a vibrating trough conveyer over which is an inclined belt conveyer 51. It is into this conveyor 51 that the elevated ballast passes from the conveyers 50' which are operatively positioned with respect to the depositing funnels 49. Each vibrating conveyer is supplied operating power from an electric motor which has operative connection to the main electrical plant within the housing 10. It is readily apparent that the ballast elevated by the bucket elevators will be deposited upon the conveyers 50' which in turn will deposit the ballast upon the main belt conveyer 51 and from whence to any desired disposition.

The primary, as well as the secondary elevators, are adapted to be raised into the recesses or lowered to operating position by the following novel arrangement of parts.

By reason of the similarities between the construction and operation of these elevators, I will describe but one. Referring to Fig. 7, it is shown that the elevator 46 is pivotally attached to the frame structure of the vehicle 10 by a supporting bracket 52'. This bracket 52 is pivotally connected to the vehicle 10 at a point 53. The other end of the bracket is connected as at 54 to a point which is near the top of the elevator's outer housing 55. Pivotally connected to this bracket 52 and extending downwardly therefrom is a piston rod 56 of a hydraulic cylinder 57. This cylinder 57 is pivotally connected as at 58 to the vehicle 10 within the recess 44. This hydraulic cylinder 57, as well as all other hydraulic cylinders employed herein, is operated off the hydraulic pump 14 carried within the vehicle 10. When the piston rod 56 is extended from the cylinder 57, it will pivot the bracket 52 about its pivotal connection, which in turn will raise the elevator 46 into the recess 44. Near the bottom of each elevator housing 55 are secondary supporting bars 52' having one end pivotally attached as at 53' to a depending portion 55' of the underside 16 of the vehicle 10, while their opposite ends are pivotally attached to the housing 55. It should be noted, however, that the secondary elevators 47 and 47', as shown in Fig. 6, when in operating position, will extend farther out with respect to the side of the vehicle 10 than do the primary elevators 46 and 46'. This for the reason that the secondary elevators 47 and 47' are designed to perform upon the ballast which is deposited upon the shoulder by an excavator 50.

Intended to be employed in the operation of my device are two excavators 50. These excavators 50 are movably mounted on the supporting structure of the vehicle 10 between the primary elevators 46 and 46' and the secondary elevators 47 and 47'.

To secure the excavators 50 to the vehicle 10, I provide a supporting structure 51'. In cooperation with

the structure 51', I provide support arms 64 pivotally connected at one end to the under structure of the vehicle 10 within the recesses 44 and 45 thereof, with the other end of the arms 64 pivotally attached to a vertical shaft 65 carried by the excavators 50.

Each excavator 50 comprises a power unit 59 preferably electric and operating off the main electric plant 12, an inclined housing 60, a cutter chain 61, a partial covering 62 for the cutter 61, and a discharge chute 63 all of which are shown in Fig. 16.

The shafts 65 are fixedly secured to the excavators 50 as at 66 and have their other ends geared to motors 67. The motors are employed to rotate the shafts 65 and the excavators 50 about a vertical axis, thus permitting the cutters 61 to be displaced from operating position, i.e. from beneath the tracks 25 to a point parallel to the vehicle 10.

Pivotally connected as at 68 to a portion of the housing of the motor 67 which housing also provides a cover for a portion of the shaft 65, are arms 69. The free ends of these arms 69 are pivotally attached to the vehicle 10 as at 70. Between these points of connection there are pivotally attached the free ends of piston rods 71 of hydraulic cylinders 72 which cylinders 72 are fixedly supported at 73 to the vehicle 10. The cylinders 72 upon retraction of the piston rods 71 will pivot the excavators 50 upwardly from engagement with the ballast, as viewed in Figs. 5 and 9, to an inoperative position. In such a raised or inoperative position, the cutters 61 will extend rearwardly and be positioned beneath the secondary elevators 47 and 47'. When the elevators and the excavators are raised into their inoperative position and the tractor unit 15 is retracted, the vehicle 10 will have the normal railway car clearance on each side thereof so that trains may pass on either side or it may in such a position travel at necessary high speeds along the track to a siding if necessary in order to leave clear the right-of-way upon which it is working.

The desired operation of the whole mechanized ballast excavator is as follows: The vehicle 10 under its own power may travel to the point of desired operation. There the tractor unit 15 will be lowered upon the rail heads 25, the primary elevators 46 and 46' will be lowered to clear the ballast off the shoulders, the excavators 50 will be lowered and pivoted upon their vertical axes, while at the same time, the cutters 61 will undercut the track 25, depositing the ballast so excavated upon the cleared shoulder, where the secondary elevators 47 and 47' upon being lowered will remove the ballast there deposited, onto the conveyer belt 51.

The ballast from all the elevators are made to pass to the conveyer system 50' from which they are dropped onto the belt conveyer 51. The belt conveyer carries the ballast to a vibrating screen 74 located within the vehicle 10 as viewed in Fig. 10. There the ballast is screened and the large particles of the ballast retained and deposited onto a vibrating trough magazine conveyer 75 from which it is distributed from a chute 76 carried at the rear of the vehicle 10. The undersize elements screened from the ballast are carried on a secondary belt conveyer 77 to a forward part of the vehicle 10, at which point they are delivered to a portable swivel belt conveyer 78 for discharging to the exterior of the vehicle 10. This portable belt conveyer 78 is retractable out of and into the vehicle 10 by means of an overhead rail 79 and caster undersupport 80 as viewed in Figs. 1 and 2 so that it, like the elevators and excavators, may be positioned in an inoperative position with respect to the vehicle 10.

The excavators 50 as employed in my device are fashioned with the cutter chain 61 which is of a novel construction especially designed for use in my invention. As the chain 61 is engaged in cutting and carrying the ballast from under the tracks, its points of pivotal connection must be protected from fouling. For accomplishing this purpose, I provide the excavating chain 61, which is shown in Figs. 16 and 25 and illustrated in detail in Figs. 17 to 24. As the chain 61 must have articulation in two planes, it is necessary that there be provided unique pivotal connection of the chain links to afford such movement. To do so I employ alternate open links 82 and closed links 83. A broad-faced guide section 84 acts as a support as it rides in a track 84' in the housing 60. Such an arrangement prevents twisting action of the cutter chain 61 which it is excavating. The openings in the links 82 are closed by a removable shoe 85, which supports the link in its lateral pressure against the backing track section 86 in the housing 60. This removable shoe 85 is secured in the openings of the link 82 by two stationary and nonflexing pins 87 held in position by spring rings of any well known construction. The closed links 83 are formed as a round section with two lugs 89 and 89' extending laterally on its upper side and which provide means for attaching a protective cap 90. The lugs 89 and 89' are provided with transverse openings 90'. The cap 90 has a depending lug 91 having transversely extending bores 92 formed therein registering with the openings 90' and providing connection with the lugs 89 and 89'. In construction the underside of the cap 90 rests upon the upper end of the guide section 84 of the links 82. Thus the chain will flex in making a vertical turn without permitting an opening to develop between the links.

The broad faced guide section 84 comprises an integral broad-faced tooth 93 with removable cutting attachments 94 having a serrated edge, as shown in Fig. 17.

The guide section 84 also has hook portions 95 at each end which are round in section and terminate into two milled sections 96 and 96' with bored holes 97 extending transversely therethrough. The shoe 85 is provided as shown in Fig. 20 with grooves 98 at its end portions, which grooves 98 are adapted to receive the milled portions 96 and 96' of the hook portions 95 of the sections 84 and to be attached thereto by a pin inserted through the openings 97 and 97'.

With such a construction as hereinbefore described the chain 61 may move in a horizontal plane and at one point pivot vertically while completing a circular route at the same time.

The chain 61 at its inner side within the housing 60 presents a surface 99 which is part of the hook portion 95 of the link 82 to be engaged by the spoke 100 of the drive wheel 101 of the motor 59. The ends 102 of the spokes 100 will protrude up into the center of the closed links 83 between the lugs 89 and 89' as shown in Fig. 25. This affords direct power drive to both links of the chain 61.

While I have illustrated and described the preferred form of construction for carrying my invention into effect, this is capable of variation and modification without departing from the spirit of the invention. I, therefore, do not wish to be limited to the precise details of construction set forth, but desire to avail myself of such variations and modifications as come within the scope of the appended claims.

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

1. A self-propelling ballast cleaner for railways comprising a railway vehicle, means within said vehicle for propelling the same at relatively high speeds over tracks of said railway, a retractable track engaging self-propelling tractor carried beneath said vehicle for propelling said vehicle at relatively slow speed over the tracks, means carried within said vehicle for retracting said tractor from engagement with said tracks, a plurality of elevating means carried by said vehicle and adapted to elevate ballast from said tracks while said vehicle is being propelled by said tractor, means carried by said vehicle for retracting said elevators from engagement with said ballast when said vehicle moves at high speed over the tracks,

an excavator carried at one end of a vertically extending rotatable shaft pivotally carried by said vehicle, said excavator having a portion disposed in a horizontal plane and movable beneath said tracks by rotation of said shaft to excavate said ballast therefrom, said excavator having an inclined portion providing an elevated discharge chute having operative connection to said horizontal portion to receive said ballast excavated by said excavator and to discharge the same into a predetermined position with respect to certain of said elevators while said vehicle is being propelled, means for pivoting said excavator about the vertical axis of said shaft out of position from beneath said tracks to a position parallel to said vehicle, and means carried by said vehicle and cooperating with said pivoting means for retracting said excavator from engagement with said ballast after it has been pivoted about its vertical axis.

2. A self-propelling ballast cleaner for railways comprising a railway vehicle, means within said vehicle for propelling the same at relatively high speeds over tracks of said railway, a retractable track engaging self-propelling tractor carried beneath said vehicle for propelling said vehicle at relatively slow speed over the tracks, means carried within said vehicle for retracting said tractor from engagement with said tracks, a plurality of elevating means carried by said vehicle and adapted to elevate ballast from said tracks while said vehicle is being propelled by said tractor, means carried by said vehicle for retracting said elevators from engagement with said ballast when said vehicle moves at high speed over the tracks, said vehicle provided at one end with recesses into which said elevator members are positioned when in their retracted position with respect to said tracks, an excavator carried at one end of a vertically extending rotatable shaft pivotally carried by said vehicle, said excavator having a portion disposed in a horizontal plane and movable beneath said tracks by rotation of said shaft to excavate said ballast therefrom, said excavator having an inclined portion providing an elevated discharge chute having operative connection to said horizontal portion to receive said ballast excavated by said excavator and to discharge the same into a predetermined position with respect to certain of said elevators while said vehicle is being propelled, means carried by said vehicle and operatively connected to said excavator for pivoting said excavator about the vertical axis of said shaft out of position from beneath said tracks to a position parallel to said vehicle, and means carried by said vehicle and cooperating with said pivoting means for retracting said excavator from engagement with said ballast after it has been pivoted about its vertical axis.

3. A self-propelling ballast cleaner for railways comprising a railway vehicle, means within said vehicle for propelling the same at relatively high speeds over tracks of said railway, a retractable track engaging self-propelling tractor carried beneath said vehicle for propelling said vehicle at relatively slow speed over the tracks, means carried within said vehicle for retracting said tractor from engagement with said tracks, a plurality of elevating means carried by said vehicle and adapted to elevate ballast from said tracks while said vehicle is being propelled by said tractor, means carried by said vehicle for retracting said elevators from engagement with said ballast when said vehicle moves at high speed over the tracks, an excavator carried at one end of a vertically extending rotatable shaft pivotally carried by said vehicle, said excavator having a portion disposed in a horizontal plane and movable beneath said tracks by rotation of said shaft to excavate said ballast therefrom, said excavator having an inclined portion providing an elevated discharge chute having operative connection to said horizontal portion for receiving said ballast excavated by said excavator and to discharge the same into a predetermined position with respect to certain of said elevators while said vehicle is being propelled, means carried by said vehicle and operatively connected to said excavator for pivoting said excavator about the vertical axis of said shaft out of position from beneath said tracks to a position parallel to said vehicle, and means carried by said vehicle and cooperating with said pivoting means for retracting said excavator from engagement with said ballast after it has been pivoted about its vertical axis.

4. A ballast cleaner for railways comprising a railway vehicle, means within said vehicle for propelling the same at relatively high speeds over the railway tracks, means external of said vehicle for propelling the same at relatively slow speeds over said tracks, said last-named means including a retractable endless shoe tractor, means carried within said vehicle for retracting said tractor from engagement with said tracks, a pair of retractable elevator members on either side of said vehicle and adapted to elevate ballast from said tracks while said vehicle is being propelled by said tractor, means carried by said vehicle for retracting said elevator members from engagement with said ballast when said vehicle is moved at high speeds over said tracks, a plurality of chain excavators each caried at one end of a vertically extending rotatable shaft pivotally carried by said vehicle, each of said excavators having a portion disposed in a horizontal plane and movable beneath said tracks by rotation of said shaft to excavate said ballast therefrom, each of said excavators having an inclined portion providing an elevated discharge chute having operative connection to said horizontal portion to receive said ballast excavated by said excavators and to discharge the same into a predetermined position with respect to certain of said elevators while said vehicle is being propelled, one elevator member of each pair on either side of said vehicle being adapted to elevate ballast from an area immediately in front of said excavators with the remaining elevator member of each pair adapted to elevate ballast excavated by said excavators, means carried by said vehicle and operatively connected to said excavators for pivoting each of said excavators about the vertical axis of its respective shaft from beneath said tracks to a position parallel of said vehicle, and means carried by said vehicle and cooperating with said pivoting means for retracting said excavators from engagement with said ballast when said vehicle is moved at high speeds over said tracks.

5. A ballast cleaner for railways comprising a railway vehicle, means within said vehicle for propelling the same at relatively high speeds over railway tracks, means external of said vehicle for propelling the same at relatively slow speeds over said tracks, said last-named means including a retractable endless shoe tractor, means carried within said vehicle for retracting said tractor from engagement with said tracks, a pair of retractable elevator members on either side of said vehicle and adapted to elevate ballast from said tracks while said vehicle is being propelled by said tractor, means carried by said vehicle for retracting said elevator members from engagement with said ballast, said vehicle provided at one end with recesses into which said elevator members are positioned when in their retracted position with respect to said tracks, a plurality of chain excavators each carried at one end of a vertically extending rotatable shaft pivotally carried by said vehicle, said excavators having a portion disposed in a horizontal plane and movable beneath said tracks by rotation of said shaft to excavate said ballast therefrom, said excavators having an inclined portion providing an elevated discharge chute having operative connection to said horizontal portion to receive said ballast excavated by said excavators and to discharge the same into a predetermined position with respect to certain of said elevators while said vehicle is being propelled, one elevator member of each pair on either side of said vehicle being adapted to elevate ballast from an area immediately in front of said excavators with the remaining elevator member of each pair adapt-

ed to elevate ballast excavated by said excavators, means carried by said vehicle and operatively connected to said excavators for pivoting each of said excavators about the vertical axis of its respective shaft from beneath said tracks to a position parallel to said vehicle and means carried by said vehicle and cooperating with said pivoting means for retracting said excavators from engagement with said ballast when said vehicle is moved at high speeds over said tracks.

6. A ballast cleaner for railways comprising a railway vehicle, means within said vehicle for propelling the same at relatively high speeds over the railway tracks, means external of said vehicle for propelling the same at relatively slow speed over said tracks, said last-named means including a retractable endless shoe tractor, means carried within said vehicle for retracting said tractor from engagement with said tracks, a pair of retractable bucket elevators on either side of said vehicle and adapted to elevate ballast from said tracks while said vehicle is being propelled over said tracks by said tractor, means carried by said vehicle for retracting said bucket elevators from engagement with said ballast when said vehicle is moved at high speeds over said tracks, a plurality of chain excavators each carried at one end of a vertically extending rotatable shaft pivotally carried by said vehicle, each of said excavators having a portion disposed in a horizontal plane and movable beneath said tracks by rotation of said shaft to excavate said ballast therefrom, each of said excavators having an inclined portion providing an elevated discharge chute having operative connection to said horizontal portion to receive said ballast excavated by said excavators and to discharge the same into a predetermined position with respect to certain of said elevators while said vehicle is being propelled, one bucket elevator of each pair on either side of said vehicle being adapted to elevate ballast from an area immediately in front of said excavators with the remaining bucket elevators of each pair adapted to elevate ballast excavated by said excavators, means carried by said vehicle and operatively connected to said excavators for pivoting each of said excavators about the vertical axis of its respective shaft from beneath said tracks to a position parallel to said vehicle, and means carried by said vehicle and cooperating with said pivoting means for retracting said excavators from engagement with said ballast when said vehicle is moved at high speeds over said tracks.

7. A ballast cleaner for railways comprising a railway vehicle, means within said vehicle for propelling the same at relatively high speeds over railway tracks, means external of said vehicle for propelling the same at relatively slow speeds over said tracks, said last-named means including a retractable endless shoe tractor, means carried within said vehicle for retracting said tractor from engagement with said tracks, a pair of retractable elevator members on either side of said vehicle and adapted to elevate ballast from said tracks while said vehicle is being propelled by said tractor, means carried by said vehicle for retracting said elevator members from engagement with said ballast when said vehicle is moved at high speeds over said tracks, a plurality of chain excavators each carried at one end of a vertically extending rotatable shaft pivotally carried by said vehicle, each of said excavators having a portion disposed in a horizontal plane and movable beneath said tracks by rotation of said shaft to excavate said ballast therefrom, each of said excavators having an inclined portion providing an elevated discharge chute having operative connection to said horizontal portion to receive said ballast excavated by said excavators and to discharge the same into a predetermined position with respect to certain of said elevators while said vehicle is being propelled, one elevator member of each pair on either side of said vehicle being adapted to elevate ballast from an area immediately in front of said chain excavators with the remaining elevator member of each pair adapted to elevate ballast excavated by said chain excavators, means carried by said vehicle and operatively connected to said excavators, for pivoting each of said chain excavators about the vertical axis of its respective shaft from beneath said tracks to a position parallel to said vehicle, and means carried by said vehicle and cooperating with said pivoting means for retracting said chain excavators from engagement with said ballast when said vehicle is moved at high speeds over said tracks.

8. A ballast cleaner for railways comprising a railway vehicle, means for propelling the vehicle over tracks of said railway, a plurality of elevating means carried by said vehicle and adapted to elevate ballast from said tracks, means carried by said vehicle for retracting said elevators from engagement with said ballast when said vehicle moves over the tracks, an excavator carried at one end of a vertically extending rotatable shaft pivotally carried by said vehicle, said excavator having a portion disposed in a horizontal plane and movable beneath said tracks by rotation of said shaft to excavate said ballast therefrom, said excavator having an inclined portion providing an elevated discharge chute having operative connection to said horizontal portion to receive said ballast excavated by said excavator and to discharge the same into a predetermined position with respect to certain of said elevators while said vehicle is being propelled, means carried by said vehicle and operatively connected to said excavator for pivoting said excavator about the vertical axis of said shaft and out of position from beneath said tracks to a position parallel to said vehicle, and hydraulic means carried by said vehicle and cooperating with said pivoting means for retracting said excavator from engagement with said ballast after it has been pivoted about its vertical axis.

9. A ballast cleaner for railways comprising a railway vehicle, means for propelling the same over railway tracks, a pair of retractable bucket elevators on either side of said vehicle and adapted to elevate ballast from said tracks while said vehicle is being propelled over said tracks, hydraulic means carried by said vehicle for retracting said bucket elevators from engagement with said ballast, a plurality of chain excavators each carried at one end of a vertically extending rotatable shaft pivotally carried by said vehicle, each of said excavators having a portion disposed in a horizontal plane and movable beneath said tracks by rotation of said shaft to excavate said ballast therefrom, said excavators having an inclined portion providing an elevated discharge chute having operative connection to said horizontal portion for receiving said ballast excavated by said excavators and to discharge the same into a predetermined position with respect to certain of said elevators while said vehicle is being propelled, one bucket elevator of each pair on either side of said vehicle being adapted to elevate ballast from an area immediately in front of said excavators with the remaining bucket elevators of each pair adapted to elevate ballast excavated by said excavators, hydraulic means carried by said vehicle and operatively connected to said excavators for pivoting each of said excavators about the vertical axis of its respective shaft from beneath said tracks to a position parallel to said vehicle, and means carried by said vehicle and cooperating with said pivoting means for retracting said excavators from engagement with said ballast.

10. In apparatus for removing ballast from beneath the crossties of a railroad track, a vehicle having wheels for supporting the same from the rails, upstanding frame members on the vehicle, parallelogram linkage pivotally connected adjacent its inner end to the upstanding frame members and extending over a side of the vehicle, means for raising and lowering the outer end of the linkage, a vertically disposed ballast tool supporting column on the outer end of the linkage, an elongated horizontally disposed undertrack ballast removing tool mounted adjacent the lower end of the column, means to pivot the tool from non-working position removed from beneath the cross ties

to working position therebeneath, and power means operatively connected to the ballast removing tool for driving the same.

11. In apparatus for removing ballast from beneath the crossties of a railroad track, a vehicle having wheels for supporting the same from the rails, supporting frame members on the vehicle, a pair of vertically spaced parallel links pivotally connected adjacent the inner ends thereof to said supporting frame members and extending laterally from said vehicle, means for raising and lowering the outer ends of said parallel links, a vertically disposed ballast tool supporting column pivotally supported adjacent the outer ends of said parallel links, an elongated horizontally disposed undertrack ballast removing tool mounted adjacent the lower end of said column, means for pivoting said tool from a non-working position removed from beneath the crossties to a working position therebeneath, and power means operatively connected to and driving said ballast removing tool while in working position.

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