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3,019,536

RAILWAY BALLAST EQUIPMENT

Filed July 19, 1957

3 Sheets-Sheet 1

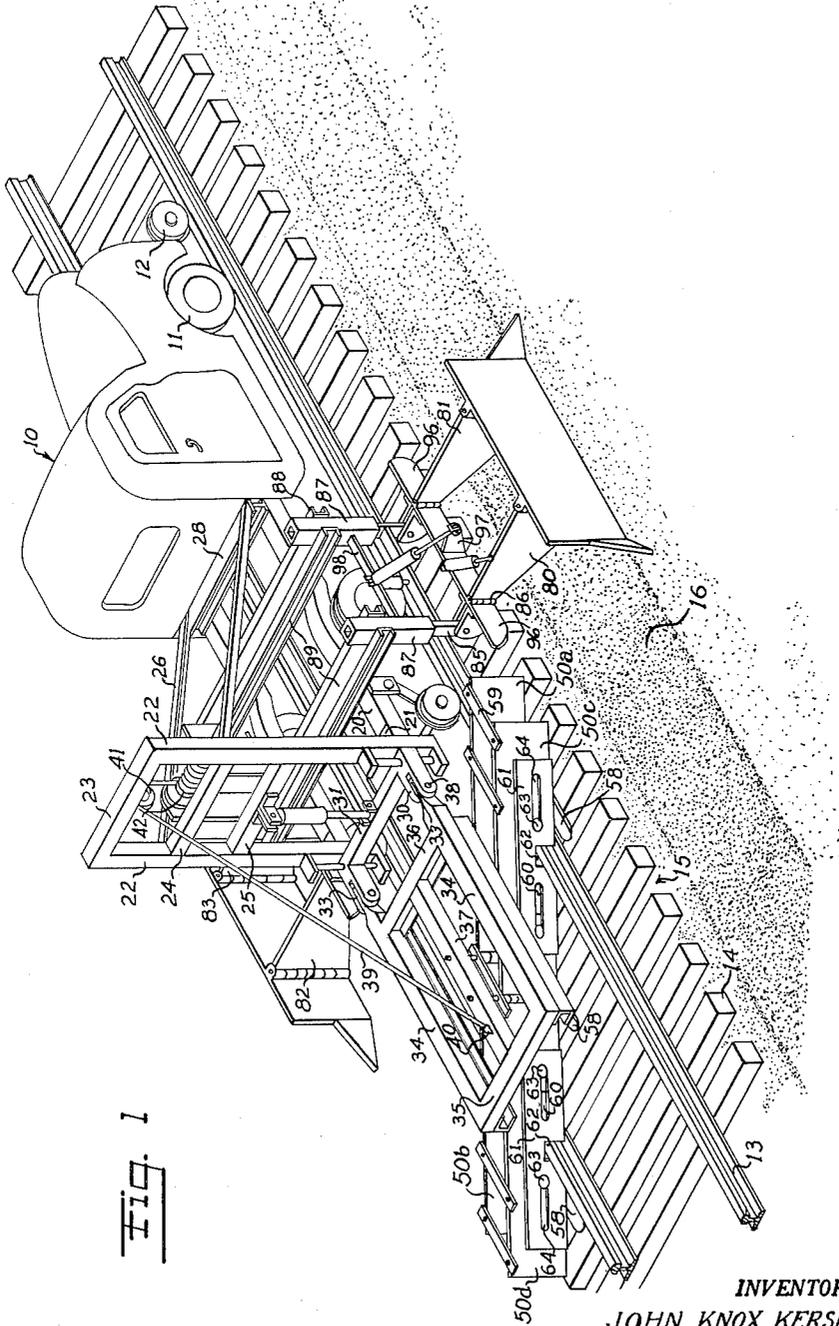
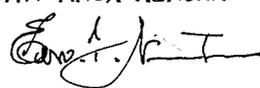


Fig. 1

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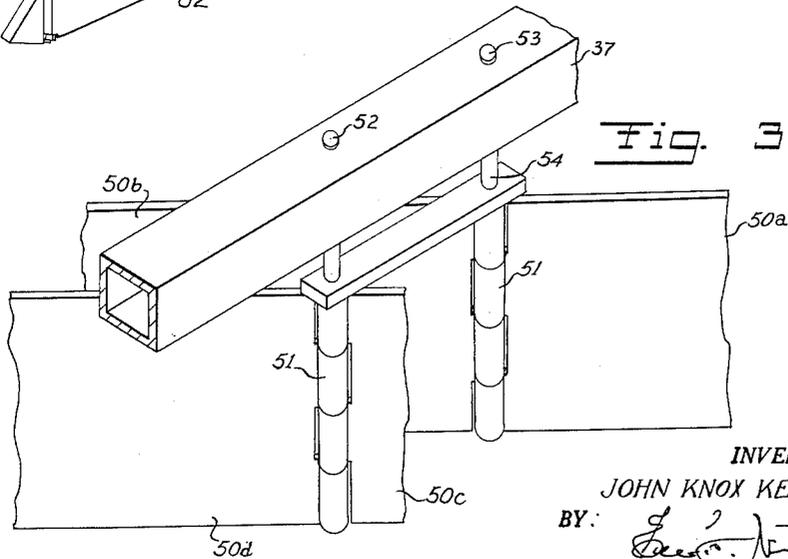
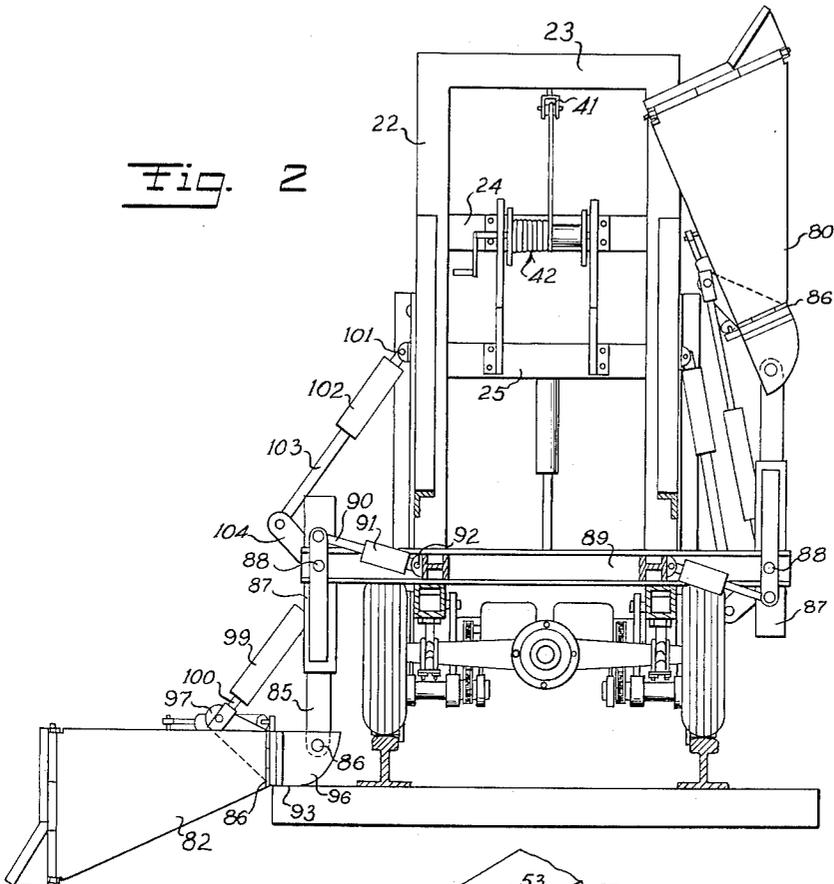
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3 Sheets-Sheet 2



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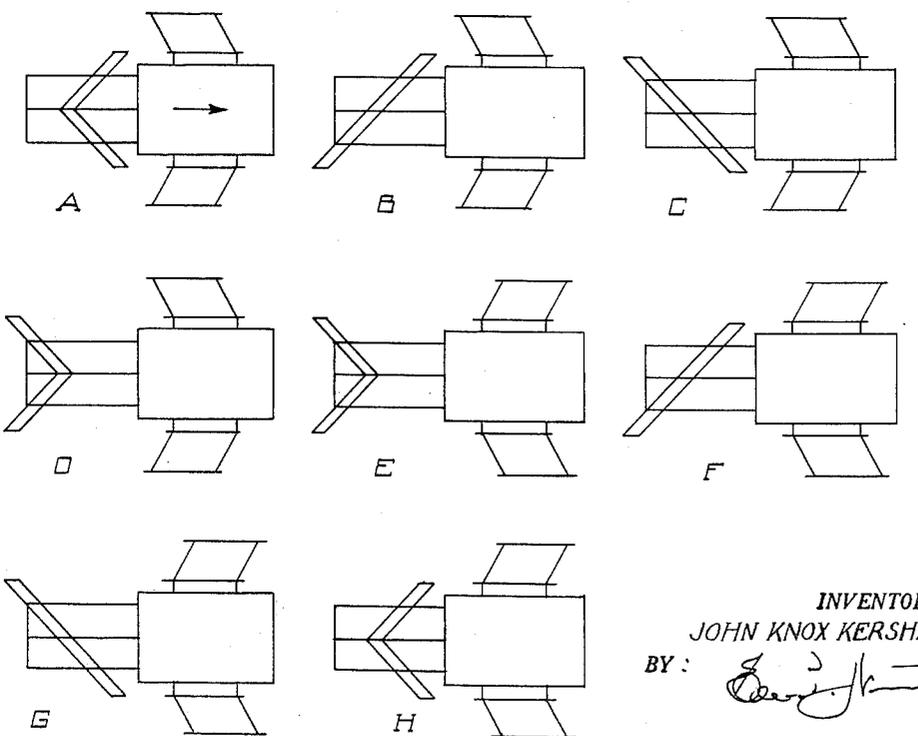
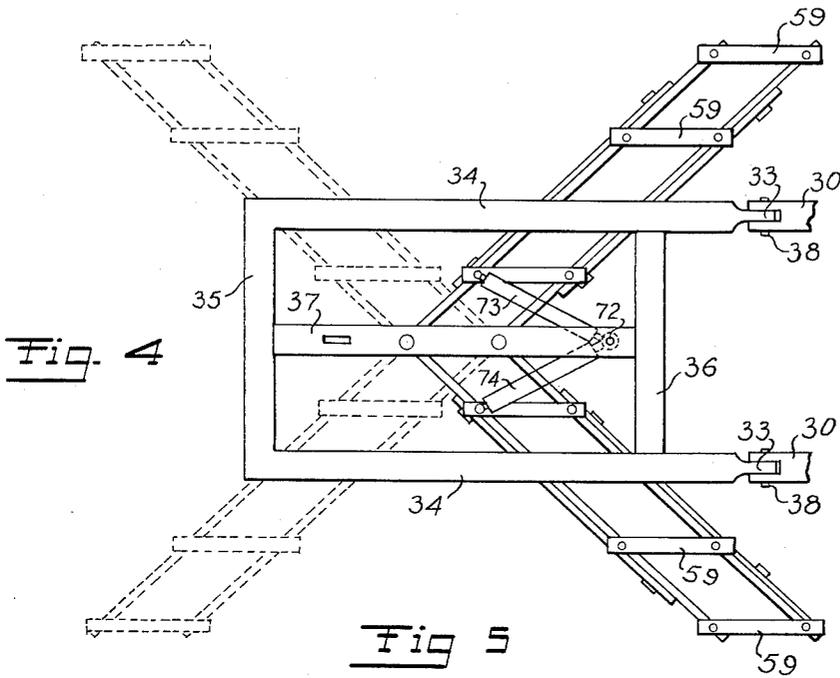
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RAILWAY BALLAST EQUIPMENT

Filed July 19, 1957

3 Sheets-Sheet 3



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RAILWAY BALLAST EQUIPMENT

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6 Claims. (Cl. 37-104)

This invention relates to railway ballast equipment and is particularly concerned with a mobile unit for the distribution, rearrangement, and grading of the ballast or like roadbed material of a railway roadbed. The invention is particularly concerned with means for the equally effective forward or reverse operation of a ballast manipulating device and means whereby a wide variety of operations may be effected by a single instrumentality, as well as means for grading the lateral edges of the roadbed.

Many and various types of railway ballast handling equipment have been designed, constructed and successfully employed over many years. For the most part, however, such devices have been in the form of plow type equipment in which an elongate generally horizontal plow blade has been propelled in a single operative direction. Other equipment has been provided of a similar nature for the grading and distribution of ballast gravel or other roadbed material at the lateral edges of the roadbed to maintain a desired slope or grade. As with the first mentioned equipment, these lateral edge grader devices are also usually characterized by a blade of fixed angularity operative upon propulsion in only one direction. In the present construction, a blade mechanism is provided which may be operable to shift, locate, and grade ballast material upon movement of the supporting vehicle in either forward or reverse direction. The present invention also provides for a multiplicity of angular relationships of the component parts of the blade whereby any one of a wide variety of angularly related dispositions of the blade elements may be accomplished for specific and variable types of manipulation of the ballast in both forward and reversed directions of movement of the carrier. The invention further provides a cooperating independently controllable edge grader for operation on the lateral edges of the roadbed. An important feature of the present invention is the provision of means whereby the blade assembly as well as the lateral edge grader units may be elevated to a vertical position fully free of the track or roadbed whereby the devices may be propelled at normal railway speeds from one location of use to another. The invention also provides for the simple, effective, efficient and automatic control of the various elements of the assembly by hydraulic means whereby time and labor are expeditiously economized. While the specific construction and arrangement of elements as here presented, by way of illustration, may be variously modified in accordance with varying requirements, an important feature of the invention is the provision of means whereby the assembly may be attached to and removed from a universal mobile power unit, particularly a unit of the type disclosed in my copending application entitled "Road and Rail Vehicle," which application is filed on even date herewith.

From the foregoing it will be seen that it is among the primary objects of the present invention to provide a novel, simple and improved effective and efficient means for distributing, adjusting and grading ballast or like material of a railway roadbed.

A further object of the present invention is to provide a ballast manipulating apparatus which is effective and efficient in both directions of travel with respect to the roadbed over which it is operating.

Another object of the present invention is to provide, in a device of the character described, a blade assembly involving individual blade elements which may be variously adjusted both as a unit with respect to the railway bed, and as individual component parts with respect to one another.

The objects of the invention also include that of providing, in combination with railway roadway ballast manipulating blades, cooperating but independently operable means for establishing and maintaining a lateral edge topography of the adjacent roadway sides.

It is also an object of the present invention to provide ballast manipulating means and lateral edge grade apparatus which may be elevated to a position fully free of the roadway ties and rails to permit the transportation of the equipment at relatively high speeds to and from the locale of operation.

It is a further object of the present invention to provide equipment, of the character defined, which may be fully and readily controlled through power mechanism such as an hydraulic system to the end that time and labor may be conserved.

An important feature of the invention is also to provide in combination with a ballast grading blade of a railway construction maintenance equipment of slidable means engageable over the rail to permit the effective areas of the blade to be disposed in various angular positions and to permit change of the angularity of the blade while the blades are in operative position.

Numerous other objects, features, and advantages of the invention will be apparent from a consideration of the following specification taken in conjunction with the accompanying drawings, in which:

FIG. 1 is an isometric view of one preferred embodiment of the invention.

FIG. 2 is a vertical sectional view of the device shown in FIG. 1.

FIG. 3 is a detail view of the blade mounting assembly.

FIG. 4 is a top plan view of the ballast manipulating assembly.

FIG. 5 is a series of schematic sketches, A to H, inclusive, of various blade relationships.

Referring now more particularly to FIG. 1 of the drawings, it will be seen that the mechanism of the present form of the invention is adapted to be mounted upon and propelled by a universal power unit of the type disclosed in my aforementioned copending application. This unit involves a generally conventional automotive type of truck indicated by the numeral 10 and equipped with conventional roadway wheels 11 and supplemental independently driven and independently adjustable flanged rail wheels 12 adapted to engage the usual rails 13 of a railway. The rails 13 are supported on the usual ties 14 and ballast material, such as gravel, is indicated at 15 as disposed between the ties and extending laterally therefrom to a lateral side bank 16. With respect to the vehicle 10, it will be found by reference to the above mentioned copending application that such vehicle provides for a travel of the apparatus on a roadway when the manipulating blades and the side scraper are positioned in vertical position to permit relatively high speed travel from one rail section to another. It will also be understood that upon location of the vehicle on the rails, the flanged wheels 12 may be lowered to engage the rails. The vehicle provides for variation in elevation of the rail wheels to provide simultaneously tractive effect of all wheels when so desired. It is also to be understood that the vehicle provides motive power preferably in the form of a pump unit which may supply pressure to the various hydraulic instrumentalities for the manipulation of the blades and side graders of the present invention as when desired.

For purpose of illustrating, the many possible ways in which the apparatus of the present invention may be secured to and supported from a vehicle of the general type disclosed in my prior application, is exemplified by a construction in which the side rails 20 of the chassis of the vehicle 10 are provided with brackets 21 adapted to support a vertical frame, the vertical side frame members 22 of which extend perpendicularly from the rails 20. The members 22 are joined at the top by an end beam 23 and are intermediately braced by an upper intermediate transverse beam 24 and a lower intermediate transverse beam 25. For securing the upright standard in position, inclined braces 26 are provided extending from a base bar 28 adjacent the rear wall of the cab of the truck.

It will be understood that the standards 22, brace beams 26 and the cross beam 28 may be removably applied to the truck 10 if so desired. The truck 10 is designed as a universal maintenance repair unit to which may be applied various types of equipment and/or which may act as a tractor for drawing equipment supported by the rails independently of the truck. It will also be understood that the truck is equipped to provide power means for the operation of various instrumentalities, preferably by way of a pump or like hydraulic pressure device actuated by the internal combustion engine of the truck.

Rearwardly extending from the standards 22, there is provided a generally U-shaped element, the legs 30 of which extend rearwardly preferably in alignment with the side rails 20 of the truck chassis. The legs 30 are joined centrally by a transverse base 31 mounted between the standards 22. The outward extremities of the legs 30 are furcated as at 32 to receive therein, for pivotal mounting, the reduced inner end 33 of longitudinal side beams 34 of a generally rectangular scraper blade carrier. The outer rear end of the carrier is provided with a terminal cross beam 35 parallel with an inner cross beam 36 adjacent the ends 33. The carrier is further provided with a central longitudinal beam 37. The inner ends 33 are supported between the furcations 32 of the members 30 by pivot pins 38 and a cable 39 engages the central longitudinal beam 37 adjacent its outer end as at 40 and extends upwardly therefrom over a pulley 41 mounted to extend downwardly from the central portion of the cross beam 23 and thence to a reel device exemplified by the winch 42 mounted on the upper transverse bar 24 of the vertical frame. By this arrangement it will be seen that the scraper blade supporting structure with its attached scrapers may be lowered to the horizontal operative position as shown in FIG. 1 or may be raised by operation of the winch 42 to a vertical position thereby lifting the blade assembly free from engagement with the roadbed to permit a free travel of the truck 10 either on the rails 13 or on a roadway when the rail wheels 12 are lifted from engagement with the rails.

The scraper blade elements themselves are four individual elements indicated in FIG. 1 as right and left hand forward blades 50a and 50b and companion right and left rear blade elements 50c and 50d, respectively. The elements 50a and 50b are pivotally joined at the center of the device below the central longitudinal rail 37 by interdigitated cylindrical hinge protrusions 51, as are the blade elements 50c and 50d. The two pairs of hinge elements 51 are united, and the interjoined edges of the blade elements supported by forward and rear vertical pivot bolts 52 and 53, respectively, each mounted through the longitudinal central beam 37 and depend therebelow. Spacers 54 are provided to mount the blade elements at an appropriate horizontal spaced location below the beams 34 and 37. The mounting includes longitudinally extending upper and lower bearing plates 55 and 56 between which the inner ends of the blade elements are mounted. For maintaining the appropriate

horizontal position of the lower scraping edges of the blades in position with respect to the roadbed, the lower end of the bolts 52 and 53 are engaged by a central longitudinally extending runner 58 which may bear against the ties and/or the ballast to insure a proper vertical location of the blades.

The outer ends of the right hand blades 50a and 50c and the outer end of the left hand blades 50b and 50d are joined through pivotal connection with brace and spacer bars 59, the arrangement being such that each pair of blades is always maintained in a parallelogram relation maintained by the spaced inner pivotal connection thereof on the bolts 52 and 53 and the equal spaced relation at the outer ends by the pivotally mounted spacer bars 59.

It will of course be understood that the angular relation of the blades with respect to the rails and to their supporting structure may be varied as in a manner herein to be set forth in detail. In order to provide for the angular shifting of the blades while they are in their horizontal position in operative position with respect to the roadbed, the lower central face of each blade is cut away as indicated at 60. Over such cutaway portion there is mounted a freely movable transversely slidable auxiliary scraper blade 61 provided with a cut out 62 adapted to receive the rails 13 therein. The auxiliary blade 60 is mounted for free transverse movement on pins 63 extending through elongate apertures 64. Thus, when the blades are in operative horizontal position as indicated in FIG. 1, a change in the angularity thereof with respect to the supporting frame structure will be permitted without disengagement with the rails 13, since in such movement the auxiliary blade 60 will be moved with respect to its supporting blade by engagement with the rails permitting free angular movement without interfering with the operative location of the blades.

For pivotally moving the scraper blades with either the blades 50a and 50b moving together as a unit and in a single plane, while the blades 50c and 50d moving in a similar manner or to effect an angular movement of blades 50a and 50c with respect to the blades 50b and 50d, right and left hand hydraulic cylinders 73 and 74 are provided. The inner ends of the cylinders 73 and 74 are pivotally mounted at a fixed point 72 on the central beam 37, while the outer ends of their pistons are pivotally engaged with the inner ends of the rear blades 50c and 50d, respectively. When both blades 50c and 50d are in trailing angularity with respect to the truck 10 (see sketch D of FIG. 5), the cylinders and pistons are in their fully extended position. As pressure is applied to the cylinders to retract the pistons, the blades 50c and 50d will be pivoted to swing forwardly toward the truck til they achieve a desired forward angularity as indicated in sketches A and H of FIG. 5. Since the blades 50a and 50b are joined with the blades 50c and 50d to maintain uniform parallel relation, the movement is a parallelogramic motion. It will, of course, be understood that from the forward angularity indicated in sketch F, a pressure applied to the cylinders in a reverse direction will return the blades to the trailing position of sketch D. Since the blades 50c and 50d are operated by independent cylinders 70 and 71, it will of course be understood that the movements of the blade elements 50a and 50c may be independent of the movement of the blades 50b and 50d. From the position of sketch D, the right hand blades 50a and 50c may be moved forwardly toward the truck to provide for alignment of the blade 50a with the blade 50b and the blade 50c with the blade 50d as indicated in sketches C and G. Similarly, if the blades 50a and 50c are retained in the trailing position, as in sketches B and F, while the left hand blade elements 50b and 50d are drawn forwardly by their cylinders, the blades will assume a common plane with the blades 50a and 50b in an alignment as are the blades 50c and 50d, the total angularity of the blade being reversed from

that depicted in sketches C and G. It will be seen by this arrangement that the blades may be arranged in a forwardly directed trailing plow like arrangement as shown in sketches D and E or in a trailing reverse plow like arrangement of sketches B and H. Also the blades may be arranged with the blades 50a and 50b in a single direction for shifting ballast to the left in a forward travel of the truck as in sketches C and G or to the right in the arrangement of sketches B and F. From the foregoing, it will be seen that the parallel blade arrangement of the present invention provides for the disposition of the blades in either forward or reverse plow like arrangement or as a transversely angular continuous blade arrangement for shifting the ballast from either one side of the roadbed to the other. As hereinbefore noted, it will be seen that the shifting of the angularity of the blades may be accomplished while the blades are in operative position and engaging the rails by virtue of the sliding auxiliary blade.

In considering this feature of the invention, it will be understood that the cylinders 70 and 71 may be independently operated by hydraulic control system which system is preferably energized through a pump actuated by the internal combustion engine of the truck. The control system by which the cylinders may be individually or simultaneously actuated in either forward or reverse direction may be one well known to those versed in the art. It will be understood that while the invention as here disclosed is actuated by hydraulic means for the various instrumentalities, the invention contemplates modification by which such instrumentalities may be actuated by either mechanical or electrical means. It is further understood that the control systems, by which either hydraulic, mechanical or electrical means may be employed to selectively operate various instrumentalities as desired, is within the skill of those familiar with the operation of such instrumentalities and the present invention. However, a control system by which these mechanisms may be suitably actuated from a control position constitutes the subject matter of my copending application Serial No. 673,047, filed July 19, 1957, to which reference may be had for illustration of one particular control system applicable to the present invention.

As heretofore mentioned, the present invention in addition to the horizontally operating blades 50a, 50b, 50c and 50d further provides means for manipulating ballast and dressing the road bed beyond the ties and beyond the extremities of the aforementioned blades. Such means comprise lateral pairs of forward and rear grading wings. The right hand pair of wings of FIG. 1 being indicated by the numerals 80 and 81, while the companion left hand wings are indicated by the numerals 82 and 83. The inner ends of the wings are pivotally mounted as at 86 on longitudinally extension plates 96 received by vertically floating standards 85. The upper ends of the standards are slidable within guides 87 which are pivotally mounted as at 88 to transverse supporting beams 89. The upper end of the guide members 87 extend upwardly beyond the pivot point 88 to receive and engage the piston 90 of control cylinders 91 which in turn are pivotally mounted as at 92 to the sides of the vehicle chassis. As indicated at 93 the longitudinal plates 96 are formed with an inwardly extending head adapted to rest upon the railway ties so as to provide for the appropriate vertical location of the wings. By virtue of the sliding disposition of the standards 85 in the slides 87, a free motion of the wings is permitted to accommodate variations in the roadbed level.

Pivotal movement of the wings 82 and 83 is provided by means of cylinders 99 from which extends the pistons 100. The inner end of the cylinder being mounted on the bars 98 while the pistons 100 are engaged with the plate 97. Thus, as the piston 100 is retracted within the cylinder 99, the wing arrangement will be urged upwardly, pivoting about pivot 86, while an opposite outward move-

ment of the piston 100 will pivot the wings downwardly. When, as and if desired, the side wing assemblies may be raised to vertical position free of the roadbed so as to facilitate relatively high speed travel of the vehicle. For such purpose supporting brackets 101 are provided upon which there are mounted cylinders 102, the pistons 103 of which engages arms 104 carried between the pivoted slides 87. The arrangement is such that when the cylinders 91 draw in the pistons 90, the slide members 87 will be drawn to a horizontal position lifting the ends 93 and therewith the wing assemblies. This action moves arm 104 past top dead center to an inwardly inclined position past pivot 88. Raising thereafter is completed by extending piston 103 so as to force arm 104 downwardly as shown to the right in FIG. 2.

From the foregoing, it will be seen that the present invention provides a novel, simple and improved structural arrangement for a wide variety of operations on ballast and roadbed materials. It will be understood that many possible dispositions of the blades are such as to accomplish many and different manipulations of the material. Thus, by reference to the sketches of FIG. 5, it will be seen that in sketch A with the travel of the truck to the right as indicated by the arrow and with the wings rearwardly inclined, the blades form as a V with the apex extending rearwardly, excess ballast at the side of the roadbeds will be diverted outwardly by the wings while ballast over the ties will be gathered inwardly toward the center of the roadbed. In sketch B it will be seen that the adjustment of the wings is such that in similar travel any excess gravel supplied over the ties will be diverted by the blades toward the right hand side of the roadbed. In sketch C the blade arrangement will divert the excess gravel over the ties to the left hand side of the roadbed and in sketch D the excess ballast will be evenly diverted to the two sides. The arrangement of wings and blades of sketch E of FIG. 5 with the vehicle travelling to the right as indicated by the arrow provides for the gathering in of excess gravel by the wings toward the ties and the equal distribution of material over the ties by the forwardly pointed type of arrangement of the blades.

Similarly, in sketch F the wings will gather in excess material which will be diverted to the right hand side of the roadbed beyond the ties while in sketch G such material will be diverted to the left. By the arrangement of sketch H, it will be seen that excess material will be gathered in by the wings to be diverted over the ties and that the reversed plow-like relation of the blades will gather such material inwardly toward the center of the ties. It will thus be obvious that in the various arrangements possible, excess ballast material may be moved from one side of the roadbed to another or it may be gathered from the sides for diversion toward the center of the roadbed or spread from the center toward lateral edges of the roadbed.

From the foregoing, it will be understood that the present invention provides a unit which will accomplish a wide variety of roadbed material manipulations but one which provides actuation in either forward or reverse direction of the vehicle and one which provides for the elevation of all instrumentalities from operatively contacting the roadbed to vertical inoperative position thereabove to permit unimpeded travel of the vehicle either on a highway or on the rails.

In considering the invention, it will be noted that all manipulations are by means of power so as to eliminate in so far as possible manual labor. In carrying out the invention, numerous changes, modifications and the full use of equivalents may be resorted to without departing from the spirit or scope of the invention as defined in the appended claims.

I claim:

1. Railway ballast equipment including a supporting structure, right and left hand pairs of pivotally interrelated ballast manipulating blades on said supporting struc-

ture, means for disposing all of said blades perpendicu-
larly of a roadbed, hydraulic power means for equally and
oppositely shifting each pair to dispose all of said blades
in parallel common vertical planes and for shifting one
pair of blades angularly with respect to the other pair of
blades to dispose said pairs of blades in vertical intersect-
ing planes, pivotally united pairs of laterally extending
ballast manipulating wings on said supporting structure,
a pivotally united interconnecting member between said
wings of each pair to maintain parallelogramatic relation
of said wings, and means for disposing said pairs of wings
in common transverse parallel planes extending across said
roadbed and in parallel planes individually vertically angu-
larly related with respect to each other, extending for-
wardly and rearwardly of the common plane which said
wings may assume, said common plane being perpendicu-
larly transverse of a roadbed.

2. Railroad ballast equipment having a prime mover,
comprising a frame member mounted on one end of said
prime mover, scraper blades carried by said frame and
adapted to extend beyond said prime mover, means con-
nected to said prime mover for raising and lowering said
frame, pivot pins extending downwardly from said frame,
said pivot pins being aligned along the central axis of said
prime mover to be disposed centrally between the rails,
right and left hand blades pivotally carried by each of said
pins and extending over said rails, means joining said left
hand blades and joining said right hand blades for main-
taining said left hand blades in parallel relationship to
each other and said right hand blades in parallel relation-
ship to each other, and power means for pivoting said
left hand blades in unison about their respective pivot pins,
and power means for pivoting said right hand blades in
unison about their respective pivot pins whereby said right
hand blades and said left hand blades may be aligned and
disposed in angular relationship with respect to each other.

3. The structure defined in claim 2 including wings ex-
tending outwardly of the sides of said prime mover.

4. The structure defined in claim 2 including a first pair
of wings extending outwardly from one side of said prime
mover, a second pair of wings extending outwardly from
the other side of said prime mover, means pivotally secur-
ing the respective wings to their respective sides, means
joining said first pair of wings for maintaining the same
in parallel relationship, means joining said second pair of
wings for maintaining the same in parallel relationship
and means connected to said wings for respectively pivot-
ing said first pair of wings and said second pair of wings
through arcs from positions angling forwardly of said
prime mover to positions angling rearwardly of said prime
mover.

5. The structure defined in claim 4 including pivot
means connected to said first pair of wings for the pivot-
ing of said first pair of wings about a horizontal axis, pivot
means connected to said second pair of wings for the
pivoting of said second pair of wings about another hori-
zontal axis and power means extending from said prime
mover for respectively pivoting said wings about their
respective axes.

6. The structure defined in claim 5 wherein said means
pivotally securing the respective wings to the respective
sides includes a pair of plates horizontally hinged respec-
tively to said sides, and including lever arms extending
from the central portions of said plates, said lever arms
being operatively connected to said power means.

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