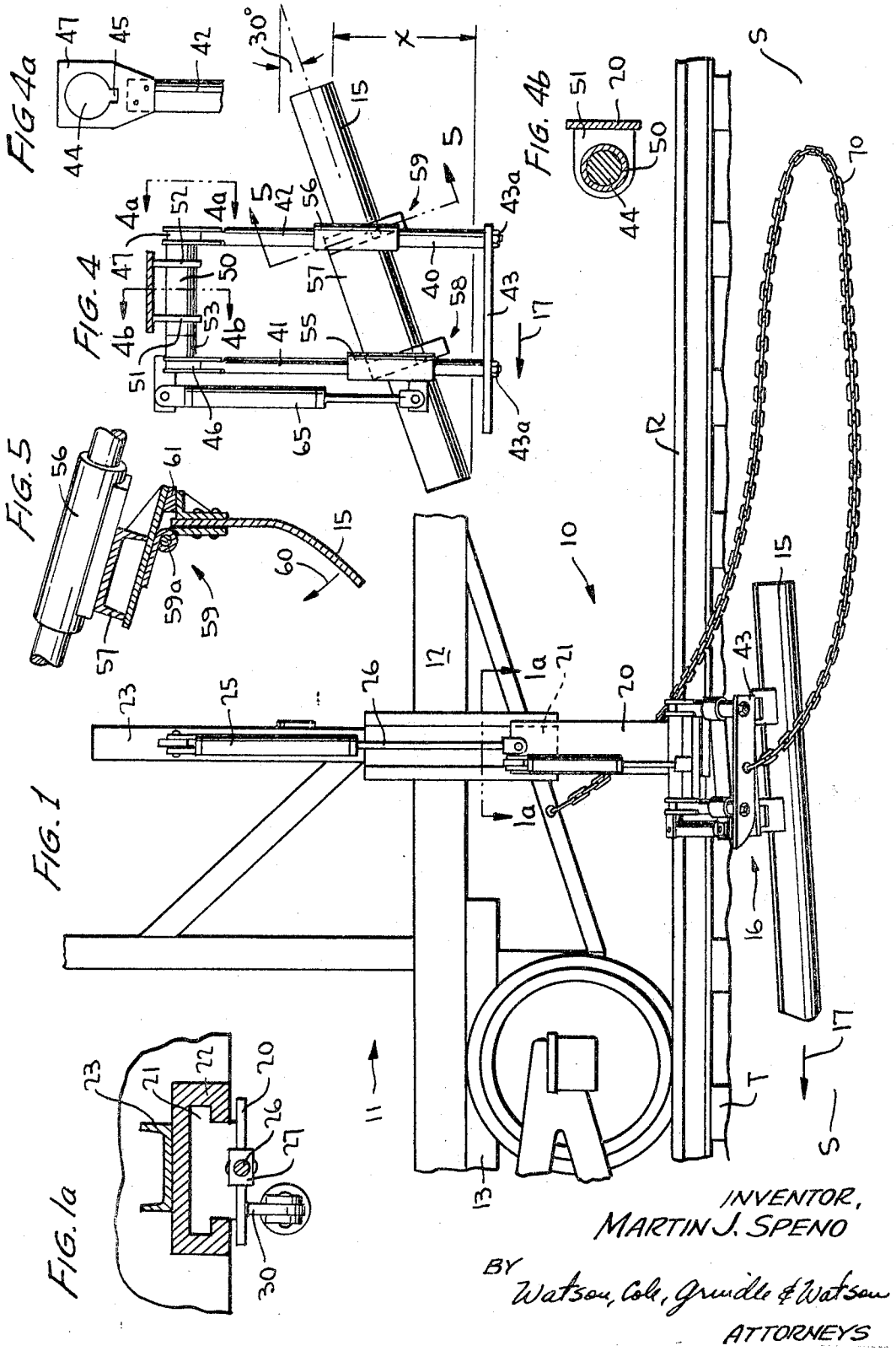
May 27, 1969 M. J. SPENO 3,445,944

SHOULDER SHAPER ASSEMBLY

Filed Jan. 10, 1967 Sheet 1 of 2



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SHOULDER SHAPER ASSEMBLY

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FIG. 2

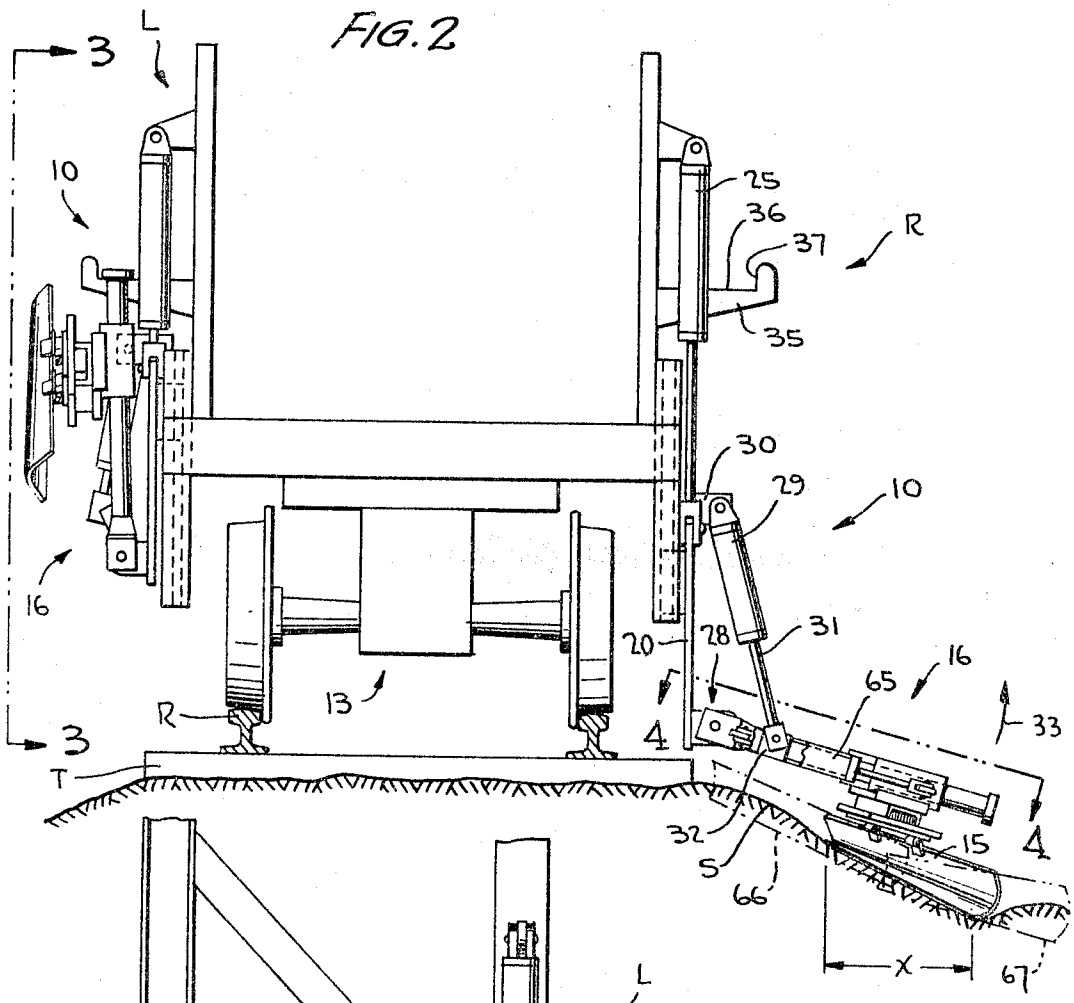
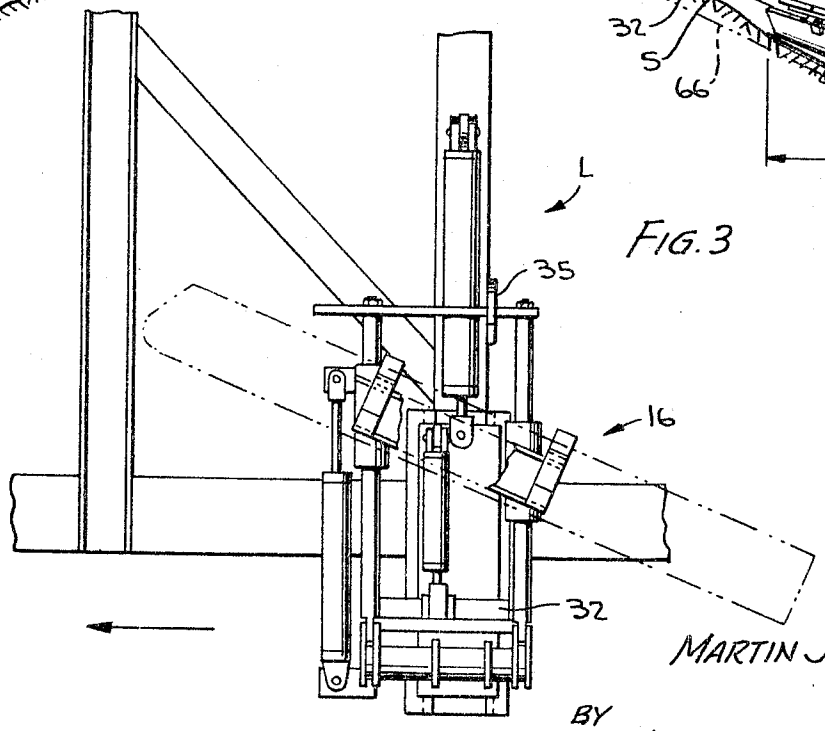


FIG. 3



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3,445,944

SHOULDER SHAPER ASSEMBLY

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8 Claims

ABSTRACT OF THE DISCLOSURE

A rail shoulder shaper carried by a car for movement along the railway track for operation on the shoulder of the roadbed. Vertically adjustable support means are carried by the car to support a wing member extending laterally and in turn carrying a blade for operation on the shoulder. The wing member is swingable about a horizontal axis under the actuation of suitable power means. Such axis is defined by a torsion resisting bar which also provides a vertical connection between the wing member and the support means.

The present invention relates to continuous railway work apparatus and, more particularly, to an improved apparatus for working the ballast along the shoulder of the roadbed as the car on which it is mounted moves along the track.

In the past there have been proposed numerous plow-like devices to serve to shape or level the ballast along the shoulder of the railway. These devices are commonly used with ballast cleaning apparatus to work the ballast after the same has been cleaned and returned to the roadbed, one such prior art device being illustrated in the patent to Bruno et al. 2,830,391, entitled "Leveler," issued Apr. 15, 1958, and assigned to the assignee of the present invention.

While these prior art devices have proven to be generally successful for their intended purpose of leveling the clean ballast into a new shoulder, they are by nature limited to a use of working the shoulder only over a limited portion thereof where the scoop of the ballast cleaning apparatus is usually deployed. In other words, these prior art levelers are capable of little or no lateral extension or adjustment along the shoulder so that the ballast closest to the ends of the ties and at the far extreme of the shoulder cannot be worked.

The ballast scoop on the most modern ballast cleaning apparatus is now designed for lateral movement toward and away from the ends of the crossties so as to be capable of removing different cross-sectional areas of ballast as desired. These scoops of necessity require the use of a leveler which is capable of extension across the whole shoulder so that the clean ballast may be worked regardless of the position at which it has been deposited. It has been proposed in the past to provide a plow device that extends across the full expanse of the shoulder to meet this need; however, these structures have proven to be particularly large and cumbersome and as a result have proven to be generally incapable of efficient movement between a raised travel position and the work position. Further, these prior structures have occupied large spaces on the railway cars and have the additional disadvantage of being expensive to fabricate.

Accordingly, it is a broad object of the present invention ot provide a shoulder shaper assembly which overcomes the shortcomings of the prior art mentioned above and thus is capable of versatile and efficient use to work a shoulder of a railway.

Another broad object of the present invention is to provide an improved shoulder shaper for operating on the ballast along selected portions of the shoulder, and

which is capable of remotely controlled and highly efficient shifting movement along the shoulder and between the working and travel positions.

Another broad object of the present invention is to provide a shoulder shaper which is characterized by simplicity and compactness of design and lightness of weight, and is inexpensive to fabricate.

In accordance with the present invention, there is provided a shoulder shaper assembly for the purpose described including a main support member to which is attached a wing member having a pair of elongated parallel guideways. A power means is provided for effecting angular adjustment of the wing member between the vertical travel position adjacent the support member and a work position extending laterally from the side of the car just above the shoulder of the railway. The guideways support slides which through power means are adjustable along the shoulder and which carry the shaper blade for operation on the selected portion of the shoulder in accordance with the adjusted position of the slides. Also, the main support member is adjustable vertically between an upper travel position and a lower travel position; the shoulder shaper assuming a generally flat folded position at a favorable center of gravity position adjacent the side sill of the car. In accordance with the invention, the carrier assembly is supported and locked in this upper travel position by a rigid rack on the car, thus relieving the hydraulic cylinders of a supporting function during this inactive mode.

In accordance with an important feature of the present invention, the guideways are interconnected at the pivot axis of the wing member by a torsion resisting bar, which effectively prevents twisting of the wing under the action of the shaper blade whereby the blade is carried on a substantially rigid carrier assembly to effectively spread the ballast along the shoulder without the need for heavy and bulky components. Furthermore, because of this torsion resisting action of the wing member, the shoulder shaper assembly is also capable of allowing added extended movement of the blade along the shoulder of the roadbed. This feature is especially desirable in that the tips of the blade may now be brought into engagement with the ends of the ties or into engagement with the outermost portions of the shoulder to scrape away deposits of mud or other accumulations of non-ballast material that might otherwise prevent proper drainage of the track.

In accordance with other aspects of the present invention, the shaper blade is hingedly mounted on its supporting slides so that it is capable of assuming a folded position when the assembly is positioned in the travel position. Further, the blade is easily replaceable to suit the particular needs of the operation being performed as determined by the cross-sectional shape of the shoulder; however, in practice, an elongated blade positioned at approximately 30° with respect to the apparatus has been found suitable for most shaping applications. Also, to perform the final dressing operation on the shoulder there is provided a relatively heavy chain connected to the outer end of the wing so as to form a drag loop to the rear of the blade during operation.

Accordingly, it is a more specific object of the present invention to provide a shoulder shaper with a wing member having spaced parallel guideways for adjustable support of the shaper blade at any operative position along the shoulder.

it is a related specific object of the present invention to provide a blade carrier assembly supported by a torsion resisting bar arrangement which resists twisting of said assembly as the blade works along the shoulder.

It is still another object of the present invention to provide a shoulder shaper unit which is retractable to a

travel position wherein it forms a compact folded structure along the side of the car in a favorable center of gravity position.

It is still another object of the present invention to provide a shoulder shaper having a supporting wing shiftable between a travel position, wherein the assembly is supported on a rigid rack so as to relieve the operating hydraulic cylinders from a support function, to a working position along the shoulder of the railway.

Still other objects and advantages of the present invention will become readily apparent to those skilled in this art from the following detailed description, wherein I have shown and described only the preferred embodiment of the invention, simply by way of illustration of the best mode contemplated by me of carrying out my invention. As will be realized, the invention is capable of other and different embodiments, and its several details are capable of modification in various obvious respects, all without departing from the invention. Accordingly, the drawings and description are to be regarded as illustrative in nature, and not as restrictive.

In the drawings:

FIGURE 1 is an overall side view of an operative embodiment of the shoulder shaper assembly of the present invention illustrating its mounted position on a railway car;

FIGURE 1*a* is a detailed cross-sectional view taken along line 1*a*—1*a* of FIGURE 1;

FIGURE 2 is a front view of the railway car illustrating left and right-hand units of the shoulder shaper assembly on the car, the left-hand unit being in the travel position and the right-hand unit being in the work position;

FIGURE 3 is a side view of the assembly of the invention positioned in the upper travel position as viewed in the direction of line 3—3 of FIGURE 2;

FIGURE 4 is a top plan view of the shaper blade and its carrier assembly as viewed in the direction of line 4—4 of FIGURE 2;

FIGURE 4*a* is a detailed view looking in the direction of line 4*a*—4*a* of FIGURE 4;

FIGURE 4*b* is a cross-sectional view taken along line 4*b*—4*b* of the same view; and

FIGURE 5 is a detailed cross-sectional view taken along the line 5—5 of FIGURE 4.

With reference now to FIGURE 1 of the drawings, there is illustrated for the purpose of disclosing the present invention, a shoulder shaper **10** mounted on the side of railway car **11**, of which only the side sill **12** and related structure and a portion of one truck **13** has been illustrated. As can be realized from viewing this figure, the truck **13** of the car **11** rides along rails R supported in a conventional manner by cross-ties T on a roadbed having an exposed and sloping shoulder S to be operated on.

The shoulder shaper **10** of the preferred embodiment includes an elongated blade **15** supported by a wing and carrier assembly **16**, which are adapted for movement along the shoulder S, as indicated by the arrow **17**, upon forward movement of the car **11** during the work operation. The wing and carrier assembly **16**, which will be described in detail later, is supported by a main support plate **20** carried by a slide block **21** (note FIGURE 1*a*) which, in turn, is slidable in a vertical direction in a C-shaped guideway **22**. The guideway **22** is fixed in any suitable manner on the car **11**; the vertical channel member **23** extending upwardly from the side sill **12**, being shown for this purpose.

A conventional double-acting hydraulic cylinder **25** is attached at its upper end to the channel member **23**, and has a reciprocable piston rod **26** carrying a yoke **27** that is attached to the upper edge of the main support plate **20** for the purpose of moving said support plate **20** between an upper travel position and a lower travel position, which positions will be explained more in detail later. It will be understood that a suitable hydraulic control circuit is, in reality, associated with the hydraulic cylinder **25** (as well as with the additional cylinders, described below) for the purpose of controlling the reciprocable movement; however, since such basic circuitry is well known and is not critical to the understanding of this invention, it is not illustrated herein.

Referring now to FIGURE 2 where left and right-hand units L, R of the shaper **10** are shown, it can be seen that the assembly **16** is pivoted to the lower end of the main support plate **20** about a pivot axis, generally designated by the reference numeral **28**. To swing the assembly **16** and the attached blade **15** between the work position, as shown by the unit R in this figure and as shown in FIGURE 1, there is provided a double-acting hydraulic cylinder **29** carried at its upper end by a laterally extending ear **30** on the main support plate **20** (note FIGURE 1*a*) and having reciprocable piston rod **31** attached to the assembly **16** by a suitable angle plate **32** (note FIGURES 2 and 3). Thus, upon proper actuation of the hydraulic cylinder **29**, the assembly **16** and the blade **15** are pivoted in a counterclockwise direction about the pivot axis **28**, as noted by arrow **33** in FIGURE 2, so as to assume a position adjacent the main support plate **20**, or what has been referred to as the lower travel position.

Preferably, during actual operation, when it is desired to raise or lower the shoulder shaper **10** to or from the upper travel position, the cylinder **25** for operating the main support plate **20** is actuated in conjunction with the cylinder **29** for angularly adjusting or pivoting the assembly **16** so that the shaper **10** of the present invention can be rapidly and directly placed in or removed from said upper travel position, illustrated by the left-hand unit L in FIGURES 2 and 3.

In this upper travel position, the assembly **16** is adapted to engage a laterally extending rack **35** which presents a horizontal supporting surface **36** as well as a vertical shoulder **37**. As will be clear, once the assembly **16** has been latched into the upper travel position in engagement with the rack **35**, the horizontal surface **36** relieves the vertical cylinder **25** from its supporting function and the vertical shoulder **37** relieves the cylinder **29** of its supporting function. This is important in that the assembly **16** with the blade **15** is securely held in the travel position without any reliance on the hydraulic system, so that in this inactive mode the hydraulic system does not need to be retained in a pressurized condition. In addition, of course, this also provides a safety factor in that the shaper **10** cannot be inadvertently released into the lowered position when it is positioned in said rack **35**.

The specific construction and design of the wing and carrier assembly **16** is of considerable importance in that it allows the blade **15** to be rigidly supported for working movement along the shoulder S while at the same time being capable of efficient adjusting movement across said shoulder S to work the different areas, as required. Specifically, as can best be seen in FIGURES 4, 4*a* and 4*b*, the assembly **16** comprises a wing member **40** consisting of a pair of spaced parallel guideways **41**, **42** which are substantially rigidly interconnected at their outer ends by a tie plate **43** and bolts **43***a*. More importantly, at the inner ends of the guideways **41**, **42** there is provided a torsion resisting shaft **44** which is provided with a key portion **45** on each end thereof; the key portions **45** being mated with sockets **46**, **47** which are, in turn, suitably welded or otherwise fixed to the guideways **41**, **42**, respectively. This arrangement resists twisting of said wing member **40** under the working action of the blade **15** and thus causes said blade **15** to form the shoulder S of substantially constant cross section in any adjusted setting of the assembly **16**.

The shaft **44** serves to form the pivot axis **28** along with its mounting sleeve **50**, which is, in turn, carried by a pair of support brackets **51**, **52** suitably attached

to the main support plate **20**. A spacer sleeve **53** is disposed between the socket **46** and the mounting sleeve **50** so that the wing member **40** is positioned slightly forward of the centerline of the main support plate **20**, which allows the favorable placement of the cylinder **29** along the centerline of the wing member **40** (note FIGURE 3) to insure a substantially constant force being placed along the full length of the blade **15** from front to back.

Mounted for sliding movement along the guideways **41**, **42** of the wing member **40** are carrier slides **55**, **56**, respectively, which are interconnected by a cross channel **57** so that said slides **55**, **56** are movable along the guideways **41**, **42** as a single carrier unit. The blade **15** is attached to the cross channel **57** by a pair of hinges, generally designated by the reference numerals **58**, **59**, at the opposite ends of the cross channel **57**. As can be seen in FIGURE 5, the hinges **58**, **59** are operative only in the direction to allow a swinging of the blade **15** toward the folded position adjacent the wing **40**, as indicated by the arrow **60** in this figure. In the other direction, a stop **61** is provided for the purpose of retaining the blade **15** in the operative plowing position against the force of the ballast as said blade **15** moves along the shoulder S. The blade **15** is easily removed from the cross channel **57** by removal of pivot plan **59***a* whereupon any other suitable shape of blade **15** may be incorporated to perform special shaping operations on the shoulder S.

The slides **55**, **56** are permanently spaced from each other in the longitudinal direction along their respective guideways **41**, **42** by attachment of the cross channel **57** so as to allow the blade **15** to assume a working angle of approximately 30° with respect to the railway track, as indicated in FIGURE 4. Thus, as the blade **15** is moved forwardly in the direction of the arrow **17** in this figure (also note FIGURE 1), a portion, designated by the reference numeral X (note FIGURES 4 and 2), of the shoulder S is worked to thus smooth out the ballast with the excess clean ballast being moved by the working angle to the rear of the blade **15** and closer to the ends of the ties T on the shoulder S, as desired.

To effect adjustable movement of the slides **55**, **56** along the guideways **41**, **42** in accordance with the present invention, a hydraulic cylinder **65** is mounted between the socket **46** and the slide **55** and this means that the portion X of the shoulder S being operated on by the blade **15** can be moved toward and away from the ends of the ties T, as required. For example, as can be seen by viewing the right-hand unit R of FIGURE 2, the cylinder **65** when retracted to its full extent is operative to position the blade **15** with its trailing tip in juxtaposition to the ends of the ties T, as denoted by the dashed line outline noted by reference numeral **66**. The position **66** is, of course, used when the ballast is being removed and cleaned immediately adjacent the ends of the ties T. Also, it should be noted that with the blade **15** extending up to the ends of the ties T, any mud which has escaped the scoop and scraper stations, which have previously passed along this point, is advantageously smoothed and distributed over the ballast to prevent the formation of deleterious water barriers.

On the other hand, the blade **15** is capable of full extension to the outer limits of the shoulder S, as indicated by the dash-dot outline **67**, whereby the ballast in these outermost regions can now be worked. With the blade **15** in this outermost position, any mud which has accumulated in this area will also be scraped away so that the full drainage of the track can be realized.

To perform a final dressing operation on the shoulder S, there is provided in accordance with the present invention a relatively heavy chain **70** which forms a loop to the rear of the blade **15** in the manner illustrated in FIGURE 1. One end of the chain **70** is preferably attached to the tie plate **43** on the wing member **40** with the other end of the chain **70** being attached at a suitable location on the frame of the car **11**, as illustrated. It will be noted that the assembly **16** can be raised to the travel position by the hydraulic cylinders **25**, **29** while the chain **70** is still attached thereto, and then by merely placing the looped end constituting the remainder of the chain **70** on the car **11**, the entire shoulder shaper **10** is ready for traveling.

From the foregoing, it should now be evident to those skilled in the art that a novel shoulder shaper **10** with definite results and advantages not present in prior art devices has been provided by the present invention. For example, the provision of the torsion resisting bar **44**, which also forms the pivot axis **28** of the blade supporting wing **40**, efficiently maintains the blade **15** in a working condition without undesirable twisting of said wing member **40** that could otherwise leave the shoulder S with an uneven cross-sectional shape. Furthermore, it is clear that the blade **15** is capable of working on any portion X of the shoulder S and that the wing and carrier assembly **16** can be rapidly shifted between the raised travel position and the lowered work position in operative engagement with the shoulder S. In the upper travel position, the provision of a rigid rack **35** insures that the blade **15** and its assembly **16** will be retained in this position until the working site is reached. Finally, the provision of the compact and lightweight construction described that can be folded flat along the side of the car **11** means that the center of gravity of the ballast cleaning apparatus upon which the shaper **10** is mounted is not adversely affected and that the profile or overhang of said shaper **10** can easily be brought well within the travel limitations of the railroads, while at the same time, being conveniently disposed for rapid deployment for operation.

In this disclosure, there is shown and described only the preferred embodiment of the invention, but, as aforementioned, it is to be understood that the invention is capable of various changes or modifications within the scope of the inventive concept as expressed by the accompanying claims.

I claim:

1. A railway shoulder shaper for use with a continuous railway work apparatus for operation on the shoulder of the roadbed comprising support means carried by said apparatus, for sliding movement along a vertical axis, power means for effecting vertical shifting movement of said support means, along said axis, a wing member pivotally connected to said support means about a horizontal axis, said wing member including a pair of elongated parallel guideways, power means for effecting angular adjustment of said wing member between a substantially vertical travel position and a work position extending laterally from said apparatus above said shoulder, a slide mounted on each of said guideways, power means for effecting adjustable movement of said slides along said wing member, a blade carried by said slides for operation on a portion of said shoulder in accordance with the adjusted position of said slides during operation in said work position, and bar means for rigidly interconnecting said guideways to resist twisting of said wing member under action of said blade.

2. The combination of claim **1** wherein said bar means includes a torsion resisting bar fixedly connected to the inner ends of said guideways and forming the pivot axis of said wing member.

3. A railway shoulder shaper for use with a continuous railway work apparatus for operation on the shoulder of the roadbed comprising support means carried by said apparatus, a wing member pivotally connected to said support means about a horizontal axis, said wing member including a pair of elongated parallel guideways, power means for effecting angular adjustment of said wing member between a substantially vertical travel position and a work position extending laterally from said

apparatus above said shoulder, a slide mounted on each of said guideways, power means for effecting adjustable movement of said slides along said wing member, a blade carried by said slides for operation on a portion of said shoulder in accordance with the adjusted position of said slides during operation in said work position, and bar means for rigidly interconnecting said guideways to resist twisting of said wing member under action of said blade, said bar means including a torsion resisting bar fixedly connected to the inner ends of said guideways and forming the pivot axis of said wing member, and a tie plate interconnecting the outer ends of said guideways opposite said torsion resisting bar and a fixed rack on said support means engageable with said tie plate to support said wing member when the same is positioned in said travel position.

4. The combination of claim 3 wherein said support means includes a vertical support guideway and a corresponding support slide carrying said torsion resisting bar, and wherein is further provided power means for effecting vertical shifting movement of said support slide to move said wing member between an upper travel position and a lower travel position, said rack being positioned to be engaged by said tie plate only in said upper travel position.

5. The combination of claim 3 wherein said torsion resisting bar is carried by a horizontally extending sleeve supported by said support means, the opposite ends of said bar being connected to the inner end of said wing whereby said wing is substantially incapable of twisting action along its longitudinal axis.

6. A railway shoulder shaper for use with a continuous railway work apparatus for operation on the shoulder of the roadbed comprising support means carried by said apparatus, a wing member pivotally connected to said support means about a horizontal axis, said wing member including a pair of elongated parallel guideways, power means for effecting angular adjustment of said wing member between a substantially vertical travel position and a work position extending laterally from said apparatus above said shoulder, a slide mounted on each of said guideways, power means for effecting adjustable movement of said slides along said wing member, a blade carried by said slides for operation on a portion of said shoulder in accordance with the adjusted position of said slides during operation in said work position, and bar means for rigidly interconnecting said guideways to resist twisting of said wing member under action of said blade, there being provided a crosspiece for interconnecting said slides so that the same move in unison along said guideways, hinge means for mounting said blade on said crosspiece, said blade being free to pivot toward said wing member into a folded position in said travel position.

7. The combination of claim 6 wherein said slides are positioned at different locations along their respective guideways whereby said crosspiece and said blade extend at an angle with respect to said shoulder in the work position.

8. A railway shoulder shaper for use with a continuous railway work apparatus for operation on the shoulder of the roadbed comprising support means carried by said apparatus, a wing member connected to said support means, a blade carried by said wing member for operation on said shoulder, said wing member being pivotally connected to said support means, said support means being slidable with respect to said apparatus along a vertical axis, said blade being slidable along said wing member, first power means for effecting angular adjustment of said wing member between a substantially vertical travel position and a work position extending laterally from said apparatus above said shoulder, second power means for effecting vertical shifting movement of said support means to move said wing member between an upper travel position and a lower travel position, third power means for effecting adjustable movement of said blade along said wing member for operation on a portion of said shoulder in accordance with the adjusted position during operation in said work position, and a relatively heavy chain connected to the outer end of said wing member, so as to form a final dressing loop on the shoulder to the rear of said blade to assist said blade in shaping said shoulder during said operation.

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94—46; 172—189, 459, 468