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METHOD AND APPARATUS FOR WORKING RAILROAD BALLAST

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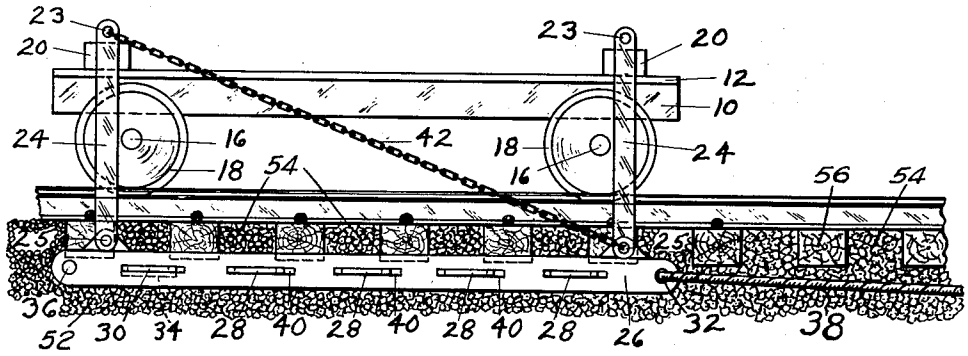


Fig. 1

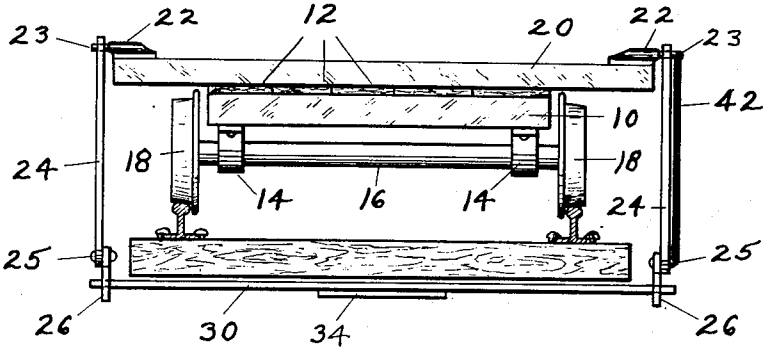


Fig. 2

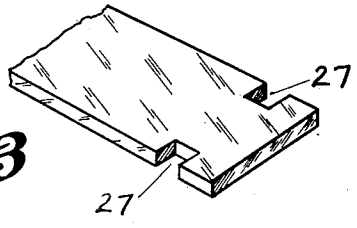


Fig. 3

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METHOD AND APPARATUS FOR WORKING RAILROAD BALLAST

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13 Claims. (Cl. 104—2)

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This invention relates to improvements in methods and apparatus that are used to apply ballast under the track on railroad rights of way. More particularly, this invention relates to improved methods and apparatus that are used to apply ballast under raised sections of track on railroad rights of way.

It is, therefore, an object of the present invention to provide improved methods and apparatus that are used to apply ballast under raised sections of railroad track.

In raising and ballasting railroad track or in reballasting railroad track, it is the almost universal practice today to initially "skeletonize" the track by removing the old ballast that is in contact with the ties, and then to ballast the track by distributing new ballast along the track and forcing the new ballast under and between the ties. The "skeletonizing" operation is desirable because the old ballast is often so fouled with dirt and clay that it will hold water and will permit that water to act on the railroad bed; and if the old ballast is not removed before the fresh ballast is added, it may intermingle with the fresh ballast and detract from the utility of the fresh ballast. The ballasting operation includes distributing the new ballast along the track by means of a hopper car, placing a jack under one of the rails of the track, placing a second jack under the other rail at a point opposite to the first jack, actuating the two jacks to lift the two rails of the track to a predetermined height above the level of the former road bed, and then applying the previously distributed ballast to the ties. While the track is being raised, measurements are made by optical or other means to make sure that the track is raised to the correct height. Once the correct track height has been obtained, the crew of men use their shovels to apply the distributed ballast to the ties.

The rails and ties of modern railway track are so heavy that it is customary to jack up the track at distances no greater than one-half of the length of a rail; and by initially distributing ballast along the track and then raising the track at such short intervals, a series of sections of loose ballast are formed. This loose ballast in these sections must be solidly and uniformly applied under, and to the sides of, the ties to prevent settling, sinking or tilting of the track when traffic is resumed. In almost all cases today, the loose ballast in each of the sections is finally applied by large crews of men with their shovels; a time-consuming operation. The present invention obviates these objections by providing a wheeled device that can be moved along a railroad track to facilitate the "skeletonizing" and ballasting of that track. It is therefore an object of the present invention to provide a wheeled device that can be moved along a railroad track to facilitate the "skeletonizing" and ballasting of that track.

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Various methods and apparatus have been proposed in the past as possible substitutes for the slow and necessarily non-uniform "skeletonizing" and ballasting work of crews of men. One method contemplates the use of heavy work cars that have track-raising sleds or bars which are initially forced under the track and are intended to engage the bottoms of the ties and force the track up from its original position. This method is objectionable for several reasons. For example the sleds or bars will have inclined faces that extend partially above and partially below the level of the bottoms of the ties and will press directly against the bottom edges of the ties and will apply side thrusts to those ties which will cause some of them to slide along the rails or will cause the ties to rotate relative to the rails. The rotation of the ties, which is known as rolling, occurs because the ties are initially subjected to upward holding forces from the spikes while being subjected to side thrust forces from the sleds or bars; those forces creating resultant turning forces on the ties. The side thrust forces are so much greater than the holding forces of the spikes that the ties are eventually pulled away from the spikes, and then the ties rotate, or roll, freely along the rails in response to the continued side thrust forces from the sleds or bars. The sliding of the ties along the rails is serious enough but the rolling of the ties is infinitely more serious. The ordinary railroad tie is seven (7) inches high and nine (9) inches wide and its diagonal is approximately eleven (11) inches long. Thus if a track raise is based on a tie height of seven (7) inches and a number of ties are rolled by the sled or bar, and they will be so rolled, the track raise will be from two (2) to four (4) inches too high. Moreover the rails will be supported at spaced points by the rolled ties and will not even be spiked to those ties; the ties having been pulled away from the spikes as the ties were rotated or rolled. In addition the leading edge of the sled or bar may ram into ties that extend a few inches below the rest of the ties; and in such cases will either splinter the tie or will halt the operation of the sled or bar. Not only is the operation of the sleds or bars objectionable from the standpoint of the injury to the ties and the undesired variations in the height of

the track raise, but it is also objectionable because the sleds or bars do not apply the new ballast. Instead they merely raise the track a short distance and let the ballast fall into place. This is a haphazard method at best and cannot provide uniform application of the ballast. Particularly is this true where the raise is relatively small as it must be with such methods and apparatus.

Another method that has been proposed, but has been determined to be impractical, uses work cars which carry jacks or other lifting devices to bend the track upwardly while ballasting devices carried by the cars either apply new ballast to or remove old ballast from the ties of the track. This method is impractical for several reasons but principally because the weight of the car securely pins down the portions of the track beneath the wheeled trucks of the car while the jacks or other lifting devices positively raise the section of track intermediate those portions of track which are under the trucks of the car. To prevent permanent injury to the track, the height of the raise must be such that the splice bars at the ends of the rails of the track will not be bent beyond their elastic limit; but this requirement limits the user of such cars to track raises of trivial value since the span of the wheeled trucks of the car is definitely limited. In addition, these methods and apparatus are further objectionable because they must either be used on a start-and-stop basis whereby each section of track must be treated individually or some form of track raising device must be provided that will provide continuous raising of the track.

The present invention obviates these objections by raising a section of track by means of jacks, tamping new ballast under the tie adjacent the jacks, jacking up and tamping additional sections of track, and then moving along the track a lightweight wheeled device that carries a removable ballast-working grid which is held below and out of contact with the ties of the track. It is therefore an object of the present invention to provide a series of raised and tamped ties and to move a ballast-working grid under the ties of the track to give uniform application of ballast under the track.

In applying ballast under the ties and rails of a section of railroad track it is necessary that the track be not "center bound." A "center bound" track is one wherein the ballast between the rails of the track is somewhat higher than the ballast beneath the rails; and in a "center bound" track the ballast between the rails can act as a fulcrum and cause tilting or seesawing of the ties as the trains pass over the track. In such instances, the roadbed will be unable to provide a smooth, even ride for the trains passing over it. This is highly objectionable and should be avoided. The present invention obviates this objection by providing a scraper bar on the ballast-working grid carried by the wheeled device, and this scraper bar provides a reduced amount of ballast immediately adjacent the centers of the ties. This reduced amount of ballast keeps the track from becoming "center bound," even though the rest of the ballast is thoroughly tamped down by the passage of trains over the track. It is, therefore, an object of the present invention to provide a scraper plate on the ballast-working grid carried by the wheeled device.

Other objects and advantages of the present invention should become apparent from an examination of the drawing and accompanying description.

In the drawing and accompanying description, a preferred embodiment of the invention is shown and described, but it is to be understood that the drawing and description are for the purpose of illustration only and do not limit the invention and that the invention will be defined by the appended claims.

In the drawing, Fig. 1 is a side elevational view of the wheeled device and the depending ballast-working grid provided by the present invention, and it shows that device and grid adjacent track which has had ballast distributed therealong, has been jacked up to the desired level, has had the ballast tamped under the jack ties, and has had the jacks removed,

Fig. 2 is an end view showing the wheeled device and ballast-working grid of Fig. 1, and

Fig. 3 is an enlarged perspective view of one end of one of the cross bars of the ballast-working grid member of Fig. 1.

Referring to the drawing in detail, the numeral **10** denotes the supporting body structure of a wheeled device that is light in weight and can easily and quickly be placed on or removed from the rails of a railroad track, the numeral **12** denotes longitudinally extending boards secured to the body structure **10**, and the numeral **14** denotes downwardly depending bearing supports that are secured to the underside of the body structure **10** and that enclose the axles **16** to which the wheels **18** are secured. Attached to the longitudinally extending boards **12** and extending transversely thereof are supports **20**. Permanently affixed to the ends of the supports **20** are bolt-carrying sleeves **22** which carry reciprocable bolts **23**. The bolts **23** have the outer ends thereof extending outwardly beyond the ends of the supports **20**. Pivoted to the bolts **23** are downwardly depending spacing arms **24**, and attached to the lower ends of the downwardly depending spacing arm **24** is a ballast-working grid. This grid includes side bars **26** and blunt-faced cross bars **28** and **30**. The ballast-working grid is secured to the downwardly depending spacing arms **24** by pivots such as bolts **25**.

Cross bars **28** and **30** differ principally in that a scraper bar **34** is attached to and carried by the cross bar **30**. The cross bars **28** and **30** are secured to the side bars **26** by interaction between the notches **27** in the ends of the cross bars **28** and **30** and the openings **40** in the side bars **26**. The openings **40** in the side bars **26** are longer than the cross bars **28** and **30** are wide, thus permitting free insertion of the cross bars into said openings and also permitting free removal of said cross bars from said openings. The notches **27** at the ends of the cross bars **28** and **30** are dimensioned so they are wider than the side bars **26** are thick, thus permitting the portions of the side bars **26** adjacent the openings **40** to fit into the notches **27**. This interaction between the notches **27** and the openings **40** of the side bars **26** securely holds the cross bars **28** and **30** in position relative to the side bars **26** to form a rigid and sturdy ballast-working grid. The side bars **26** are also provided with openings **32** and **36** at the opposite ends thereof; and these openings are intended to receive a flexible cable **38**, or other pulling means. The cross bar **30** should always be secured to the rear end of the ballast-working grid; and whenever the direction of movement of the wheeled device is to be reversed, the cross bar should be moved to the opposite end of the grid.

As indicated in Fig. 1, the cross bars **28** and **30** will be approximately two to three inches below

the lower surface of all average-size ties attached to the rails of the track. If any of the ties of the track projects down below the bottom of the rest of the ties a distance greater than the clearance between the cross bars 28 and 30 and the rest of the ties, that tie would obstruct movement of the ballast-working grid along the track. However, such ties are not to be expected with any degree of frequency and they would have been removed and replaced during the "skeletonizing" operation. A chain 42 is provided that extends from the upper left hand bolt 23 to the lower right hand pivot 25; and this chain will hold the downwardly depending spacing bars 24 at right angles to the ballast-working grid, thus preventing a shortening of the vertical distance between the top of the rail and the tops of the cross bars 28 and 30. In this way, the cross bars 28 and 30 are positively held at a constant distance from the top of the rail; thus they can provide smooth and even application of the ballast to the ties.

The bolts 23 are reciprocable in the sleeves 22 to permit separation of the spacing arms 24 from the wheeled device whenever the wheeled device must be removed from the track to permit passage of scheduled traffic. Ordinarily the bolts 23 will be in the outwardly projecting position shown in Fig. 1 and in that position the bolts extend through the openings in the upper ends of the spacing arms 24. When desired, however, the bolts 23 can be forced back into retracted position and freed from the spacing arms 24. This enables the workmen to "skeletonize" and ballast track over which normal running schedules are being maintained. In addition, this obviates the need of a locomotive and train crew to move the device to and from a siding and thus eliminates time-consuming delays occasioned by such movement.

The cross bars 28 and 30 will normally be secured to the side bars 26 of the ballast-working grid, but where desired they can be removed. This can be done by striking the side bars 26 and forcing them to move relative to the cross bars 28 and 30 until the notches 27 of the cross bars 28 and 30 are clear of the edges of the openings 40. Thereafter the side bars 26 can be removed. This permits withdrawal of the cross bars 28 and 30 from the ballast at the completion of the track ballasting operation.

The openings 40 in the side bars 26 of the ballast-working grid are preferably spaced in such a way that the centers of the various openings 40 can be made to register with the centers of the ties of the track. Where this is done, it is possible to move the ballast-working grid so the cross bars 28 and 30 are directly under the ties of the track; and where this is done and where the spacing arms 24 are rotated into horizontal positions, trains can pass over the track without injury to the ballast-working grid and without hindrance to the trains. In the absence of this spacing of the cross bars 28 and 30, the shifting of the ballast as the traffic passes along the track might permit a bending of the cross bars 28 and 30.

The ballast-working grid of the present invention is well suited for use in "skeletonizing" and in ballasting track. In the "skeletonizing" operation the track is initially raised two (2) or three (3) inches with jacks, the old ballast 52 is tamped under the ties adjacent the jacks, the workmen pass along the raised track inspecting it for ties that need to be replaced and also striking some of the ties with heavy mallets to correct the spacing between the ties or to dislodge ballast 52

bridged between or clinging to the ties, the workmen then force the cross bars 28 and 30 under the raised track and secure them to the side bars 26 to form the ballast-working grid, and then the ballast-working grid is attached to the wheeled device and to a pulling device and is moved along the track. The edges of the cross bars 28 and 30 will force their way through the relatively loose ballast 52 dislodged from between the ties and through the solid ballast 52 underneath the ties. In doing so, the edges of the bars 28 and 30 will move the ballast 52, dislodged from between the ties, into the voids created by raising the ties, and will also loosen up the thoroughly packed ballast 52 under the ties; consequently the edges of the bars 28 and 30 effect the removal of most of the ballast 52 from between the ties while effecting a general leveling of the old ballast 52. If the "skeletonizing" process is to be followed by a track raising operation, the "skeletonizing" process can be stopped; but if a track raising operation is not contemplated, the "skeletonizing" operation must include the step of shoveling out the loosened and leveled ballast 52 to permit application of the new ballast 54. While it is true that hand shoveling is time-consuming and expensive, it can be done much quicker after the passage of the ballast-working grid through the ballast 52 because that grid loosens the ballast 52 and obviates the need for using pickaxes to attack the thoroughly packed and hard-to-get-at ballast 52 under the ties. Thus, whether or not the "skeletonizing" operation is followed by a track raise, the "skeletonizing" operation is made easier and less costly by use of the present invention.

Upon the conclusion of the "skeletonizing" operation, the track must be newly ballasted, and that is done as follows: A hopper car is drawn along the track and is caused to discharge through its hoppers a predetermined depth of new ballast 54, jacks are applied under each of the two rails of the track, the rails are raised to a height equal to the desired height plus the thickness of the cross bars 28, a portion of the new ballast 54 is tightly tampered under a tie 56 adjacent the jacks, the jacks are removed and are used to raise successive sections of the track at intervals approximately equal to one half the length of a rail, the wheeled device of Fig. 1 is set on the track, the individual cross bars 28 and 30 are forced through the loose ballast 54 under the raised track in such a way that they are in the same horizontal plane so the side bars 26 can be slipped over the ends of cross bars 28 and 30, the arms 24 are secured to the wheeled device by means of the bolts 23, the chain 42 is attached as shown in Fig. 1, the cable 38 is attached to a pulling device, and then the grid and the wheeled device are pulled along relative to the track. As the side bars 26 and the wheeled device move forward, cross bars 28 and 30 tend to remain stationary because they are embedded in the loose ballast 54. This brings the edges of the openings 40 into engagement with the notches 27 of the cross bars 28 and 30; and thereafter as the side bars 26 continue to move ahead, the cross bars 28 and 30 will be moved through the ballast 54.

The ballast 54 that was discharged by the hopper car can be and preferably will be of uniform depth, and when the track is raised to the required height by the jacks some of that ballast 54 will fall down into the voids formerly occupied by the ties and rails. However, most of the ballast 54 will remain in a rather loose state in the approximate position it assumed when it fell from

the hopper car. As the blunt-faced cross bars 28 and 30 move relative to the ties and the rails, they will not tend to part the ballast 54 and slip through it but instead will tend to force the ballast 54 to move with them. In this way, ballast 54 will be carried from the space between the ties to fill the voids formed when the ties and rails were raised. Too much ballast 54 will not be moved by the grid since any excess ballast 54 will be wiped off of the tops of the cross bars 28 and 30 by the bottoms of the ties. Thus the grid will supply whatever ballast 54 is required to fill the voids under the raised ties and rails, but will not deplete the amount of ballast 54 required under or between the ties; and will provide uniform application of the new ballast 54 to the sides and bottoms of the ties. When the cross bars 28 and 30 come to the previously tamped ballast 54 under the ties adjacent the jacks, which ties are known as "jack ties," the cross bars 28 and 30 will cut directly through that previously tamped ballast 54 and will continue on. Accordingly, once the wheeled device has been set up, and once the ballast 54 has been initially distributed along the track by the hopper car, the only limitation to the continuity of the ballasting operation is the desire of the engineer to halt the ballasting at any particular point or the fact that an unballasted bridge or culvert is reached. Thereafter, the side bars 26 of the ballast-working grid can be removed and the cross bars 28 and 30 withdrawn from the ballast 54; or the ballasting operation can be repeated by applying additional ballast, additionally raising the track with jacks, and reversing the direction of movement of the wheeled device. By using the method and apparatus of the present invention, it is possible to provide track raises of from one (1) to thirteen (13) inches with one trip of the wheeled device, and to provide considerably higher raises by making more than one trip with the wheeled device.

The scraper bar 34 attached to the cross bar 30 provides a reduced amount of ballast between the rails. This keeps the track from becoming "center bound" when traffic is resumed over the ballasted track and when that traffic gradually tamps down the ballast under the ties. Thus the scraper bar 34 prevents rocking or seesawing of the tracks and also prevents breaking of the ties. As previously indicated, the scraper bar 34 should always be at the rear of the ballast-working grid; and whenever the direction of movement of the grid is reversed the bar 30 should be moved to the opposite end of the grid. If this is not done, the bar or bars 28 that follow the bar 30 will tend to make the amount of ballast between the rails more uniform and will thus detract from the protection afforded by the action of scraper bar 34.

The ballast-working grid will meet considerable resistance from the ballast as it moves through that ballast, and a large force must be exerted to move the grid and the wheeled device. This force can be provided by a power-operated windlass or winch set at some distance ahead of the wheeled device, and the windlass or winch would be moved from time to time to keep ahead of the wheeled device. The grid will usually be connected to the windlass by having long cables 38 with their near ends held in openings 32 in side bars 26 and their far ends held in openings in a cross bar, not shown, that will lie atop the rails at a point considerably ahead of the grid, and by a cable extending from the cross bar to the drum of the windlass. The rear ends of the long cables will droop down from the side bars and rest upon the sides of the right of way; the far ends of those cables rising up to the level of the tops of the rails.

In the drawing the ballast-working grid is shown with four cross bars 28 and one cross bar 30, making a total of five cross bars. It will be obvious that more or fewer cross bars can be used but the use of from one (1) to five (5) cross bars enables the grid to provide uniform distribution of the ballast. Where only one cross bar is used, that bar should have the configuration of cross bar 30 to enable the grid to keep the track from becoming "center bound." It will also be obvious that the ballast-working grid can be in one piece, as by welding the side bars to the cross bars or by machining or cutting slots or other openings in a flat plate.

The ties shown in the drawing do not have a length that corresponds to the distance between the inner faces of the rails, since the inner faces of standard gauge rails are approximately four feet and eight and one half inches apart and the ties for those rails are ordinarily eight feet long or longer. For the purposes of the drawing, shorter ties were shown but it will be understood that the cross bars 28 and 30 will be approximately one foot longer than the longest ties used on the track with which the present invention is to be used.

Whereas a preferred embodiment of the invention has been shown and described in the drawing and accompanying description, it is obvious to those skilled in the art that various changes can be made in the form of the invention without affecting the scope thereof.

What I claim is:

1. Ballast-working apparatus for use on railroad track wherein said track has had ballast distributed therealong, wherein said track has been jacked up to the desired level, and wherein the ballast under the jack ties has been tamped, such apparatus comprising a ballast-working grid which has a plurality of spaced ballast-working surfaces that are adapted to extend transversely of said railroad track and to be positioned below the ties of said track, a wheeled device that is adapted to roll along said track, and spacing elements which extend between said grid and said wheeled device to normally maintain said grid in vertically spaced relation below said wheeled device, said spacing elements being dimensioned to maintain said grid below and wholly out of contact with the ties of said track whenever said grid, said wheeled device and said spacing elements are assembled together and whenever said wheeled device is on said track.

2. Ballast-working apparatus for use on railroad track wherein said track has had ballast distributed therealong, wherein said track has been jacked up to the desired level, and wherein the ballast under the jack ties has been tamped, such apparatus comprising a ballast-working grid which has a plurality of spaced ballast-working surfaces that are adapted to extend transversely of said railroad track and to be positioned below the ties of said track, a wheeled device that is adapted to roll along said track, and spacing elements which extend between said grid and said wheeled device to normally maintain said grid in vertically spaced relation below said wheeled device, said spacing elements being dimensioned to maintain said grid below and wholly out of contact with the ties of said track whenever said grid, said wheeled device and said spacing elements are assembled together and whenever said wheeled device is on said track, said spacing ele-

ments being separable from said wheeled device or said grid whereby said wheeled device can be moved independently of said grid to clear said track for passing trains.

3. Ballast-working apparatus for use on railroad track wherein said track has had ballast distributed therealong, wherein said track has been jacked up to the desired level, and wherein the ballast under the jack ties has been tamped, such apparatus comprising a grid which has a ballast-working surface that is adapted to extend transversely of said railroad track, a supporting device that is adapted to move along said track, and spacers that extend between and normally hold said grid and said supporting device in vertically spaced relation, said spacers and said supporting device being dimensioned to maintain said grid at a constant distance below said track and below and out of engagement with the ties thereof as said supporting device is moved relative to said track.

4. Ballast-working apparatus for use on railroad track wherein said track has had ballast distributed therealong, wherein said track has been jacked up to the desired level, and wherein the ballast under the jack ties has been tamped, such apparatus comprising a grid which has a ballast-working surface that is adapted to extend transversely of said railroad track, a supporting device that is adapted to move along said track, and spacers that extend between and normally hold said grid and said supporting device in vertically spaced relation, said spacers and said supporting device being dimensioned to maintain said grid at a constant distance below said track and below and out of engagement with the ties thereof as said supporting device is moved relative to said track, said spacers being separable from said grid or said supporting device to permit relative movement between said grid and said supporting device to clear said track for passing trains.

5. Ballast-working apparatus for use on railroad track wherein said track has had ballast distributed therealong, wherein said track has been jacked up to the desired level, and wherein the ballast under the jack ties has been tamped, such apparatus comprising a grid which has a ballast-working surface that is adapted to extend transversely of said railroad track, a supporting device that is adapted to move along said track, outwardly projecting members secured to and carried by said supporting device, spacing members that are rotatably connected to said grid and are removably secured to said outwardly projecting members, the rotatable connection between said spacing members and said grid permitting said spacing members, upon their disengagement from said outwardly projecting members, to be rotated toward said track and out of the path of those portions of passing trains which project outwardly beyond the rails and ties of the track, said spacing members and said supporting device being dimensioned to maintain said grid at a constant distance below said track and below and out of engagement with the ties thereof whenever said supporting device is on the track and said spacing members extend upwardly at a predetermined angle toward said outwardly projecting members, and means to normally maintain said spacing members at said predetermined angle.

6. Ballast-working apparatus for use on railroad track wherein said track has had ballast distributed therealong, wherein said track has been jacked up to the desired level, and wherein the ballast under the jack ties has been tamped, such

apparatus comprising a grid which has a plurality of bars that are adapted to extend transversely of said track and to be positioned below the ties of said track, a supporting device that is adapted to move along said track, and spacers that extend between said bars and said supporting device to normally maintain said bars and said supporting device in vertically spaced relation, said supporting device and said spacers being dimensioned to maintain said bars below and wholly out of engagement with the ties of said track, said bars having blunt faces and being adapted to push ballast with said faces.

7. Ballast-working apparatus for use on railroad track wherein said track has had ballast distributed therealong, wherein said track has been jacked up to the desired level, and wherein the ballast under the jack ties has been tamped, such apparatus comprising a grid which has substantially parallel side members and a plurality of transversely extending ballast-working members which can be inserted under the ties of railroad tracks, said side members having spaced slots therein that are dimensioned to receive and carry said transversely extending members, said transversely extending members having notched ends that can be removably held in said slots in said side members, a supporting device that can move along said track, and spacing members extending between said supporting device and said grid to normally maintain said supporting device and said grid in spaced relation, said spacing members and said supporting device being dimensioned to maintain said transversely extending members of said grid at a constant distance below said track and below and out of engagement with the ties thereof as said supporting device is moved along said track.

8. Ballast-working apparatus for use on railroad tracks wherein said track has had ballast distributed therealong, wherein said track has been jacked up to the desired level, and wherein the ballast under the jack ties has been tamped, such apparatus comprising a grid which has substantially parallel side members and a plurality of transversely extending ballast-working members which can be inserted under the ties of railroad tracks, said side members having spaced slots therein that are dimensioned to receive and carry said transversely extending members, said transversely extending members having notched ends that can be removably held in said slots in said side members, a supporting device that can move along said track, spacing members extending between said supporting device and said grid to normally maintain said supporting device and said grid in spaced relation, said spacing members and said supporting device being dimensioned to maintain said transversely extending members of said grid at a constant distance below said track and below and out of engagement with the ties thereof whenever said spacing members extend upwardly at a predetermined angle toward said supporting device, and means to normally maintain said spacing members at said predetermined angle.

9. The method of working ballast in and around the ties of a railroad track that has had ballast distributed therealong that comprises jacking up a portion of said track to the desired level with jacks, thereby permitting said ballast to fall beneath said raised portion of said track, tamping ballast under the jack ties, removing the jacks, and moving a ballast-working grid through said

ballast in a direction parallel to said raised portion of said track.

10. The method of working ballast in and around the ties of a railroad track that has had ballast distributed therealong that comprises jacking up a portion of said track to the desired level with jacks, thereby permitting said ballast to fall beneath said raised portion of said track, tamping ballast under the jack ties, removing the jacks, and moving a ballast-working grid through said ballast in a direction parallel to said raised portion of said track, while maintaining said grid below and wholly out of engagement with the ties of said track.

11. The method of working ballast in and around the ties of a railroad track during a track raise which comprises distributing ballast along said track, raising a portion of said track a distance equal to the height of the raise plus the thickness of a ballast-working surface on a grid, tamping ballast under the jack ties, inserting said ballast-working surface of said grid in the loose ballast under said jacked up portion of said track, removing said jacks, and moving said grid through said loose ballast and said tamped ballast in a direction parallel to said track while maintaining said grid at a predetermined distance below the top of said track and below and wholly out of engagement with the ties of said track.

12. Ballast-working apparatus for use on railroad track wherein said track has had ballast distributed therealong, wherein said track has been jacked up to the desired level, and wherein the ballast under the jack ties has been tamped, such apparatus comprising a grid which has a plurality of spaced bar members that are adapted to extend transversely of said railroad track and to be positioned below the ties of said track, one of said bars having a projection thereon that extends beyond the rest of said bars to provide a reduced amount of ballast in that portion of the ballast between the vertical planes defined by the rails of said track, a supporting device that is adapted to move along said track, and spacers

that extend between and normally hold said grid and said supporting device in vertically spaced relation, said spacers and said supporting device being dimensioned to maintain said grid at a constant distance below said track and below and out of engagement with the ties thereof as said supporting device is moved relative to said track.

13. Ballast-working apparatus for use on railroad track wherein said track has had ballast-distributed therealong, wherein said track has been jacked up to the desired level, and wherein the ballast under the jack ties has been tamped, such apparatus comprising a grid which has a ballast-working surface that is adapted to extend transversely of said railroad track, a supporting device that is adapted to move along said track, and spacers that extend between and normally hold said grid and said supporting device in vertically spaced relation, said spacers and said supporting device being dimensioned to maintain said grid at a constant distance below said track and below and out of engagement with the ties thereof as said supporting device is moved relative to said track, said ballast-working surface having a greater vertical thickness between the two vertical planes defined by the rails of said track than it has adjacent said planes, whereby a reduced amount of ballast will be provided in that portion of the ballast between said planes, said ballast-working surface being adjacent the rear of said grid.

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