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3,584,406

ROTARY SCARIFIER FOR RAILWAY ROADBED

Filed Feb. 18, 1969

2 Sheets-Sheet 1

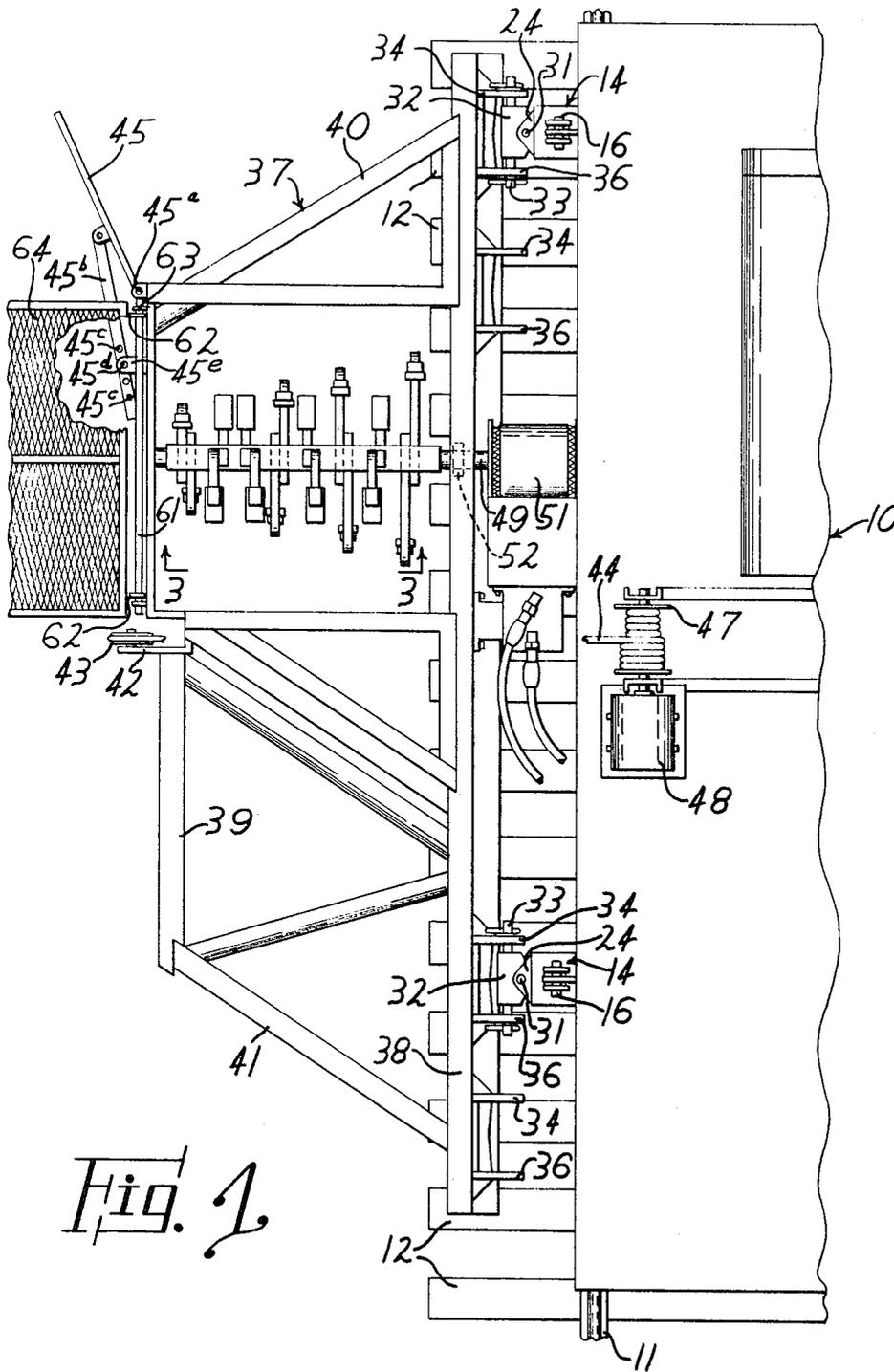


Fig. 1

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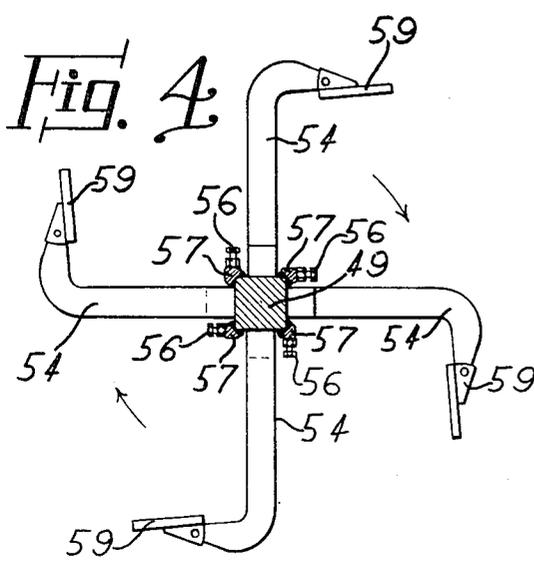
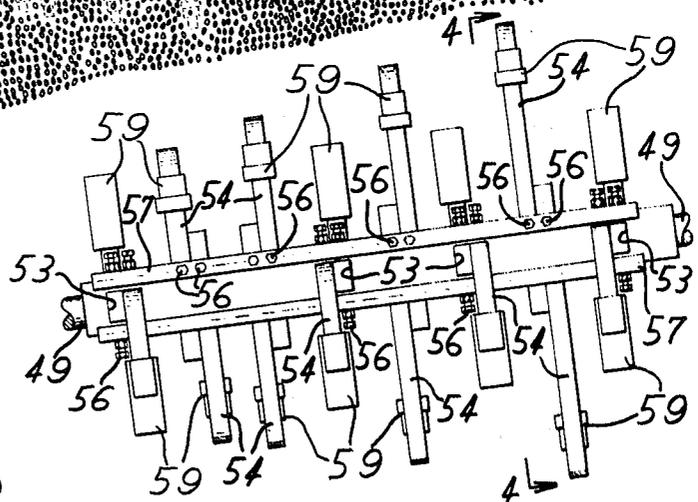
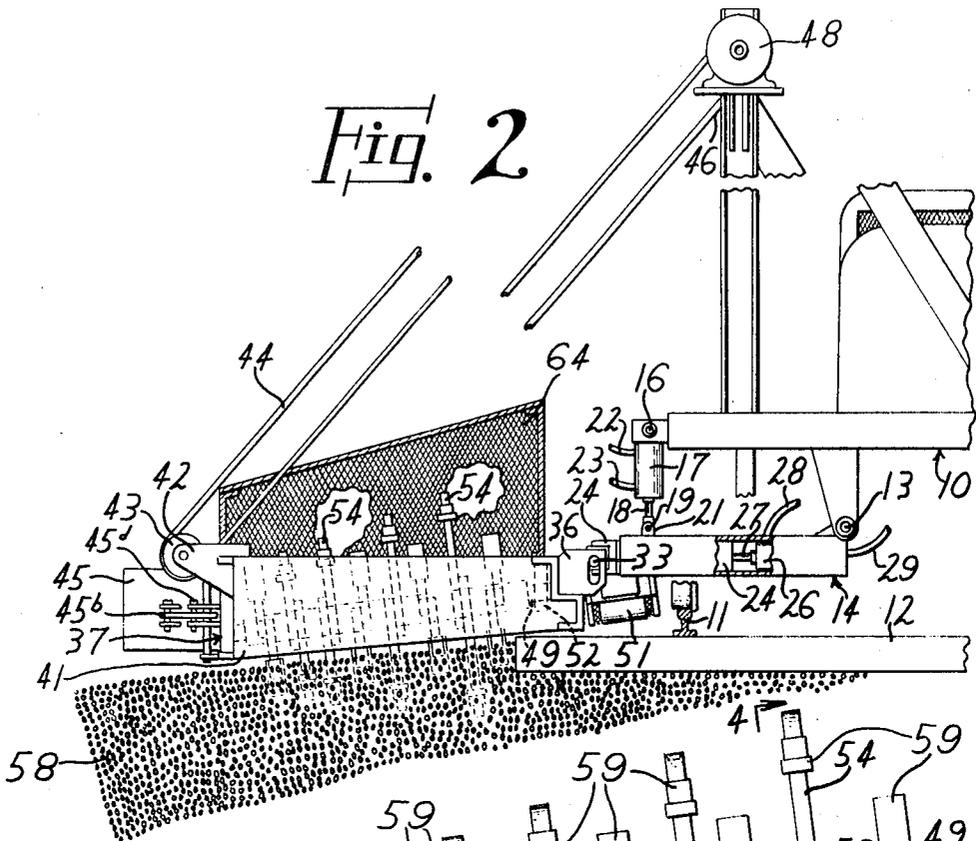


Fig. 3

Fig. 4

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ROTARY SCARIFIER FOR RAILWAY ROADBED

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2 Claims

ABSTRACT OF THE DISCLOSURE

Railroad scarifying apparatus having a supporting frame movable to selected positions and pivotally supporting a tool carrying frame which is movable to lower and elevated positions. A plurality of outwardly projecting tools are carried by a shaft mounted for rotation in a laterally extending tool carrying frame with outer ends of tools curved in direction of rotation to lift and loosen ballast. The length of tools progressively decreases toward outer end of shaft.

BACKGROUND OF THE INVENTION

This invention relates to a rotary scarifier for a railway roadbed and more particularly to such a scarifier which is adapted to lift the ballast upwardly whereby it falls back into position alongside the ends of existing cross-ties in a very loose condition whereby dirt and other fine particle size materials entrapped therein are washed away by rain, thus improving drainage around the ends of the cross-ties.

Heretofore in the art to which my invention relates, various type scarifiers have been proposed whereby the ballast is plowed up by vertically extending scarifier teeth. While disc-like members have been employed to first move the ballast outwardly from the tie ends and then towards the tie ends to loosen the ballast and provide drainage, this procedure is slow and under packed conditions does leave large lumps of ballast. Other procedures for removing and cleaning the ballast and then returning the same to the roadbed are extremely expensive due to the fact that complicated cleaning mechanism must be associated with the ballast removing apparatus. Also, a considerable amount of time is required to remove and clean the ballast, thus requiring the tracks to be out of operation for a considerable length of time.

BRIEF SUMMARY OF INVENTION

In accordance with my present invention, I employ a plurality of outwardly projecting scarifying tools which are carried by a rotary shaft-like member which extends laterally of the railway roadbed. The scarifying tools are progressively shorter toward the outer end of shaft-like member. Also, the outer ends of the scarifying tools are curved in the direction of rotation which is generally parallel to the railway roadbed and the tools are progressively shorter whereby the ballast is lifted and then falls back alongside the ends of the cross-ties in a very loose condition so that the dirt and other fine materials are washed away from the ballast by rain, thus improving drainage around the ends of the cross-ties. A perforated screen-like member extends over the rotating, scarifying tools during operation of the apparatus whereby the ballast is thrown upwardly against the under surface of the screen and then returned to the sides of the trackway while small, fine materials are free to move upwardly through the screen, thus aiding in the removal of fine materials entrapped in the ballast.

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

FIG. 1 is a top plan view, partly broken away, showing

my improved scarifier mounted at one side of a vehicle frame adapted for movement along a railroad track;

FIG. 2 is an end elevational view of the apparatus shown in FIG. 1, partly broken away and in section and showing the perforated screen in the lowered, operating position over the rotary scarifying tools;

FIG. 3 is an enlarged view taken generally along the lines 3-3 of FIG. 1 showing the manner in which the scarifying tools are mounted on the shaft-like member; and,

FIG. 4 is a sectional view of the apparatus shown in FIG. 3 and taken generally along the line 4-4 of FIG. 3.

Referring now to the drawings for a better understanding of my invention, I show a vehicle 10 adapted to run on rails 11 which are supported by cross-ties 12, as shown in FIGS. 1 and 2. Pivotally connected to the vehicle 10 by a suitable pivot joint 13 are laterally extending supporting frames 14. As shown in FIGS. 1 and 2, the supporting frames 14 extend generally parallel to the cross-ties 12. While I have shown only two spaced apart supporting frames 14 it will be apparent that any number of such supporting frames may be employed. Also, the supporting frames 14 may be mounted at both sides of the vehicle 10 whereby both sides of the railway roadbed may be scarified at the same time.

Pivotally connected to the vehicle frame 10 above each of the supporting frames 14 by pivot pins 16 are depending, fluid pressure operated cylinders 17 having piston rods 18. The lower ends of the piston rods 18 are pivotally connected by pivot pins 19 to upstanding pivot brackets 21 carried by the supporting frames 14. Fluid under pressure is introduced at selected ends of the cylinder 17 by conduits 22 and 23 whereby the outer end of each supporting frame 14 may be raised or lowered to selected positions relative to the vehicle 10. Each supporting frame 14 is tubular in shape, as shown in FIG. 2 and mounted for sliding movement. Within each supporting frame 14 is a movable member 24 which projects outwardly of the supporting frame 14, as shown in FIGS. 1 and 2. Preferably, the supporting frame 14 is rectangular, as viewed in cross section, and the movable member 24 is also rectangular, as viewed in cross section, whereby the movable member 24 moves in a rectilinear direction relative to the frame 14 without rotation. Mounted within the support frame 14 is a fluid pressure operated cylinder 26 having a piston rod 27 which is connected to the inner end of the movable member 24, as shown in FIG. 2. Fluid under pressure is introduced into opposite ends of the cylinder 26 by conduits 28 and 29 whereby the movable member 24 is moved inward and outward relative to the movable frame 14 to selected positions.

Pivotally connected to the outer end of each movable member 24 by a pivot pin 31 is a support bracket 32 having a transverse pivot pin 33 extending therethrough. As shown in FIG. 1, each pivot pin 33 extends through suitable openings in a pair of spaced apart support brackets 34 and 36 carried by one side of a tool supporting frame indicated generally at 37. Preferably, a plurality of spaced apart pairs of brackets 34-36 are provided along the inner side of the tool carrying frame 37 whereby the tool supporting frame may be moved to selected positions as determined by the position of the support brackets 34-36.

The tool carrying frame 37 is provided with inner and outer vertical walls 38 and 39, respectively, and an end wall 41 which extend outwardly and inwardly, as clearly shown in FIG. 1 whereby the ballast engaged by the bottoms of the end walls 41 is directed outwardly of the cross-ties 12. The other ends of the walls 38 and 39 are connected adjacent the upper ends thereof by a support member 40. A movable blade-like member 45 is pivotally connected to the forward end of frame 37 by a pivot pin

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45a in position to gather ballast as the apparatus moves forward. The blade-like member 45 is retained at selected positions by a link 45b having openings 45c therein which receive a pin 45d. A bracket 45e carried by frame 37 has a suitable opening therein for receiving pin 45d, as shown in FIG. 1.

Mounted adjacent the outer side of the tool carrying frame 37 by a suitable bracket 42 is a pulley 43 for receiving a cable 44. One end of the cable 44. One end of the cable 44 is anchored to the vehicle 10 as at 46 while the other end thereof passes around a winch unit 47 carried by the vehicle 10. The winch 47 is driven by a fluid pressure motor 48 whereby the winch may be rotated in opposite directions to either raise or lower the pulley 43 and the free end of the tool carrying frame 37 connected thereto.

Mounted for rotation in suitable bearings in the tool carrying frame 37 is an elongated shaft-like member 49 which is operatively connected to a fluid motor 51 whereby the shaft-like member 49 is rotated. The intermediate portion of the shaft-like member 49 is generally rectangular, as shown in FIG. 4 while each end portion of the shaft-like member 49 is round, as shown, for rotation in bearing members 52 carried by the tool carrying frame. It will be understood that the fluid pressure motor 51 is also carried by the tool carrying frame 37 whereby it rotates with the frame 37 as it is pivoted about the pivot pins 33.

As shown in FIGS. 1 and 3, a plurality of sets of longitudinally spaced openings 52 are provided in the intermediate portion of the shaft-like member 49 for receiving the inner end of scarifying tools 54. The tools 54 are secured in place by cap screws 56 carried by longitudinally extending support members 57, as clearly shown in FIGS. 3 and 4. The outwardly projecting scarifying tools 54 are spaced angularly from each other, as shown in FIG. 4 whereby the rotary scarifying unit is balanced dynamically. Also, the tools 54 are progressively shorter toward the outer end of shaft-like member 49. As shown in FIG. 4, the outer ends of the scarifying tools 54 are curved in the direction of rotation and are in position to engage and lift the ballast indicated generally at 58 alongside and beneath the ends of the crossties 12, as shown in FIG. 2, while the tool carrying frame 37 is in the lower working position. Preferably, the outer ends of the scarifying tools 54 extend in a direction generally at right angles to the remainder of the tool 54 which is secured to the shaft-like member 49, whereby the outer, curved ends of the tools lift the ballast upwardly as the tools rotate in an upward direction. As shown in FIG. 4, each scarifying tool 54 is provided with a removable digging element 59 which is generally flat and wide, as shown in FIG. 3 to aid in lifting the ballast upwardly as the tools 54 move upwardly through the ballast.

Hingedly connected to the outer side of the tool carrying frame 37 by means of a pivot rod 61 and connector brackets 62 and 63 is one end of a curved, perforated, screen-like member 64 which is adapted to move from the inoperative position shown in FIG. 1 to the operative position shown in FIG. 2. While in the operative position, the screen-like member 64 extends over the rotating scarifying tools 54 whereby the ballast thrown upwardly by the scarifying tools 54 engages the inner surface of the screen-like member 64 and is then returned to the roadbed alongside the ends of the crossties 12. By providing a screen-like member 64, the fine materials, such as dirt, are free to move upwardly through the screen while the ballast is returned to the roadbed in a very loose condition. After the ballast is returned to the roadbed and the tool carrying frame 37 moves alongside the ends of the crossties 12, the rear end wall 41 engages the ballast and applies the proper slope thereto whereby the dirt or other fine materials entrapped within the ballast are washed away by rain to thus improve drainage around the ends of the crossties.

From the foregoing description, the operation of my

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improved rotary scarifier will be readily understood. While not in use, the outer end of supporting frame 14 is elevated by cylinder 17 and the motor 48 is energized to rotate the winch unit 47 in the proper direction to shorten the effective lengths of cable 44 whereby the pulley 43 and the free end of the tool carrying frame 37 are elevated to an inoperative position, thus permitting the apparatus to move along the rails 11 one working location to another.

To place the apparatus in operation, the motor 48 is driven in a direction to lengthen the cable 44 whereby the pulley 43 and the free end of the tool carrying frame 37 move to the lower, working position, as shown in FIG. 2. In this position, the scarifying tools 54 engage the ballast 58 upon rotation of the shaft-like member 49 in the direction of the arrows shown in FIG. 4 whereby the ballast is lifted and thrown upwardly against the inner surface of the screen 64. The dirt and other fine particle size materials are free to move outwardly of the screen 64 while the ballast falls back to a position alongside the ends of the crossties 12 in a loose condition. The rear end wall 41 engages the upper surface of the ballast and levels the same to the proper elevation for free drainage whereby the dirt and other fine materials entrapped in the ballast are washed away by rain. The screen-like member 64 is pivotally connected to the tool carrying frame 37 whereby the screen-like member may be pivoted to the inoperative position to provide access to the rotary shaft-like member 49 and the scarifying tools 54 carried thereby.

From the foregoing, it will be seen that I have devised an improved rotary scarifier which is adapted for continuous operation along the rails of a railway track. By providing scarifying tools having relatively flat ballast engaging surfaces, together with the curved outer ends on the tools, the ballast is lifted upwardly and thrown against the inner surface of the screen 64 whereby the ballast is separated from fine particle size materials and then returned to the roadbed alongside the ends of the crossties. By separating the ballast from the small particle size materials and then returning the ballast in a very loose condition, together with the leveling action of the lower edge of the rear end member of the tool carrying frame, the dirt and other fine particle size materials entrapped in the ballast are easily washed away by rain to greatly improve the drainage around and beneath the ends of the crossties. Furthermore, by providing a rotary scarifier unit which is adapted to be elevated out of operating position, the scarifier unit may be moved to an inoperative position while not in use to facilitate movement of the apparatus along the railroad track.

While I have shown my invention in but one form, it will be obvious to those skilled in the art that it is not so limited, but is susceptible of various other changes and modifications without departing from the spirit thereof.

What I claim is:

1. In apparatus for scarifying a railway roadbed outwardly of existing crossties:

- (a) a vehicle adapted to run on rails supported by the crossties,
- (b) at least one supporting frame mounted on the vehicle adjacent a side of said vehicle,
- (c) means to move said supporting frame to selected positions relative to said vehicle,
- (d) a tool carrying frame pivotally connected adjacent one side to said supporting frame for movement selectively to a lower working position and to an elevated non-working position,
- (e) means to move said tool carrying frame selectively to said lower and elevated positions,
- (f) an elongated shaft-like member mounted for rotation in said tool carrying frame in position to extend laterally of the railway roadbed,
- (g) means to rotate said shaft-like member,
- (h) a plurality of outwardly projecting scarifying tools carried by said shaft-like member with the outer ends of said scarifying tools being curved in the direction

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of rotation and in position to engage and loosen ballast alongside the ends of the crossties while said tool carrying frame is in said lower working position, and

(i) a perforated screen-like member mounted on said tool carrying frame and extending over said scarifying tools to restrain upward movement of ballast.

2. Apparatus for scarifying a railway roadbed as defined in claim 1 in which said screen-like member is pivotally mounted on said tool carrying frame for movement selectively to a position over said scarifying tools and to a position removed from said scarifying tools.

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