

[54] **BALLAST REGULATOR CONTROL MEANS**

[76] Inventor: **William James Yard**, Cavan Rd.,
Dry Creek, Hazelwood Park,
Australia

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Primary Examiner—Robert E. Pulfrey
Assistant Examiner—Eugene H. Eickholt
Attorney, Agent, or Firm—Jay L. Chaskin, Esq.

[30] **Foreign Application Priority Data**

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[52] **U.S. Cl.**..... **37/105, 172/782**

[51] **Int. Cl.**..... **E02f 5/22**

[58] **Field of Search**..... **37/36, 104-107;**
172/466, 467, 468, 782

[57] **ABSTRACT**

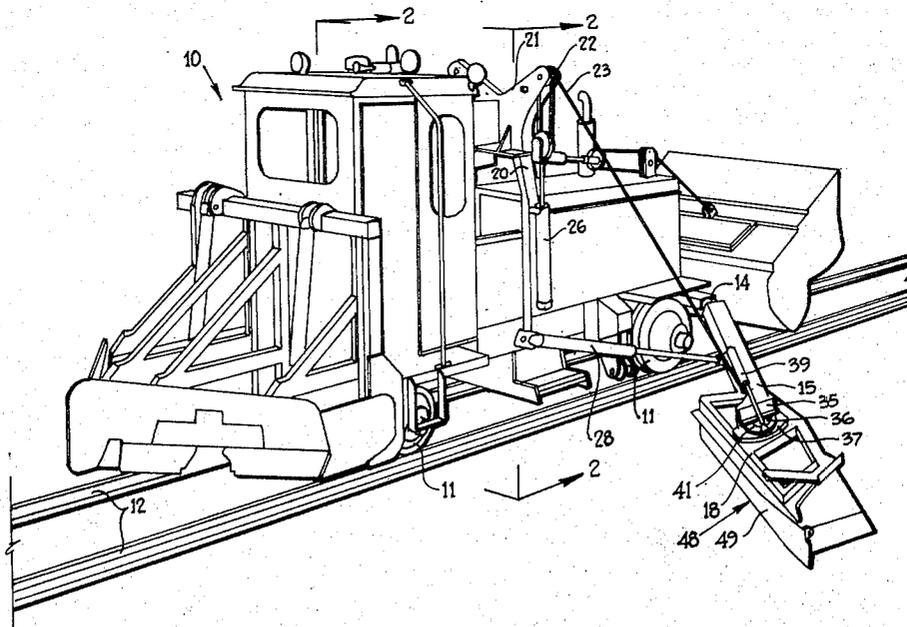
Control means for controlling the ballast box of a ballast regulator used for positioning or "regulating" ballast on the shoulder of a railroad track, wherein the box is mounted for universal movement on the outer end of an arm, the inner end of the arm being coupled to the chassis of the ballast regulator by means of a universal coupling, there being provided hydraulic cylinders for adjusting the position of the box relative to the arm about two respective pivotal axes and there also being provided a cable attached to the outer end of the arm coupled to hoisting means on the vehicle chassis for controlling the height of the arm.

[56] **References Cited**

UNITED STATES PATENTS

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6 Claims, 3 Drawing Figures



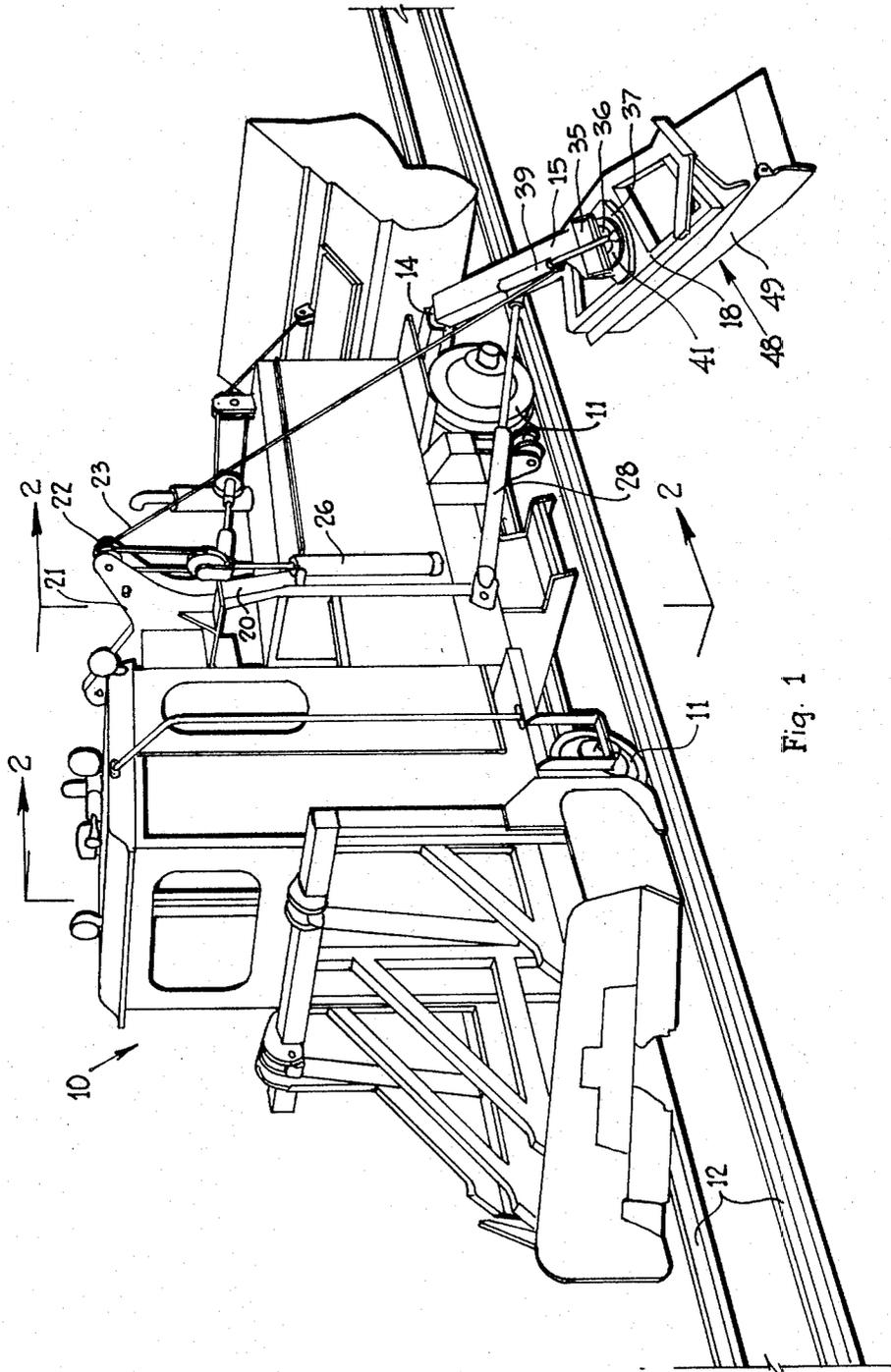


Fig. 1

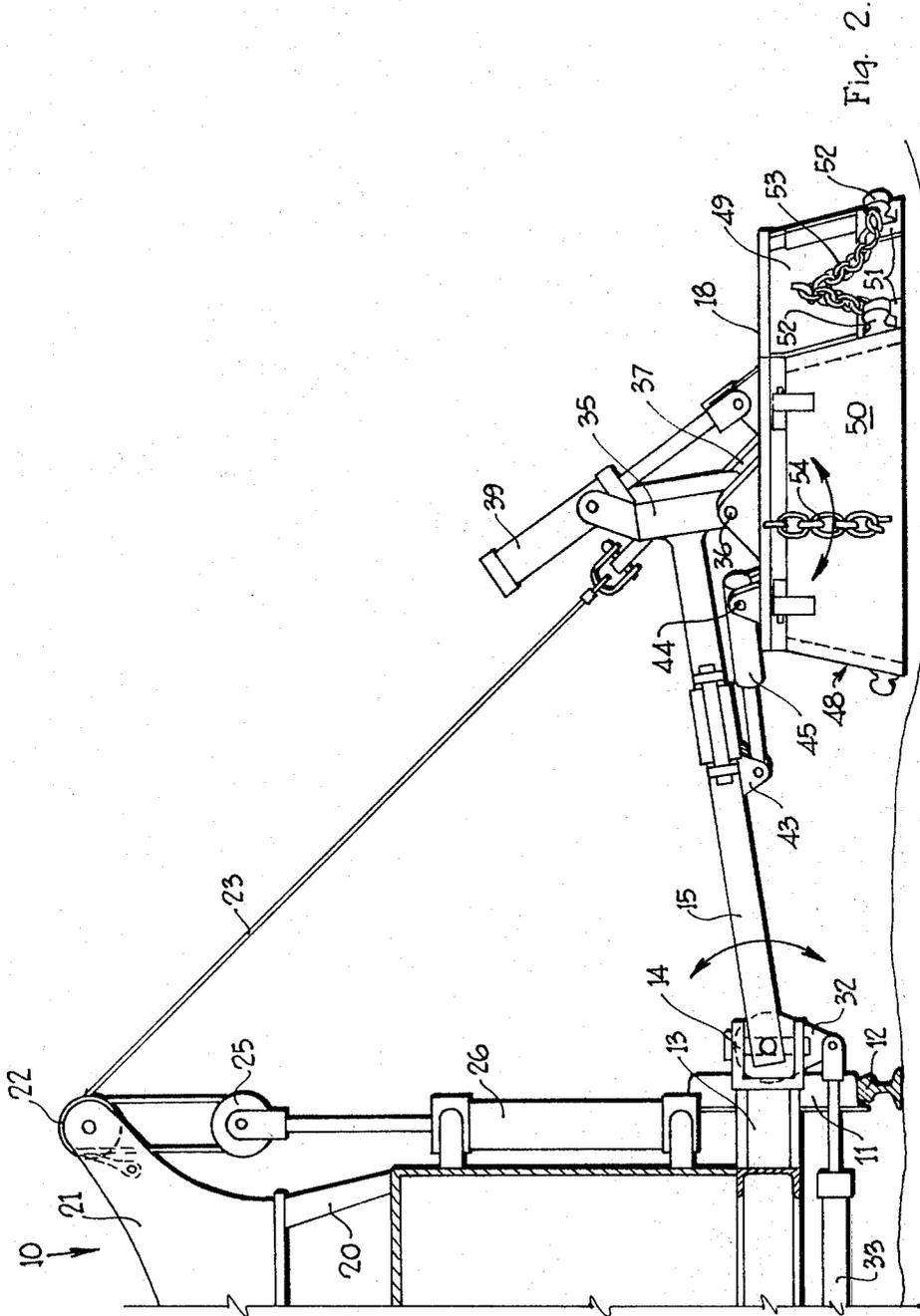


Fig. 2.

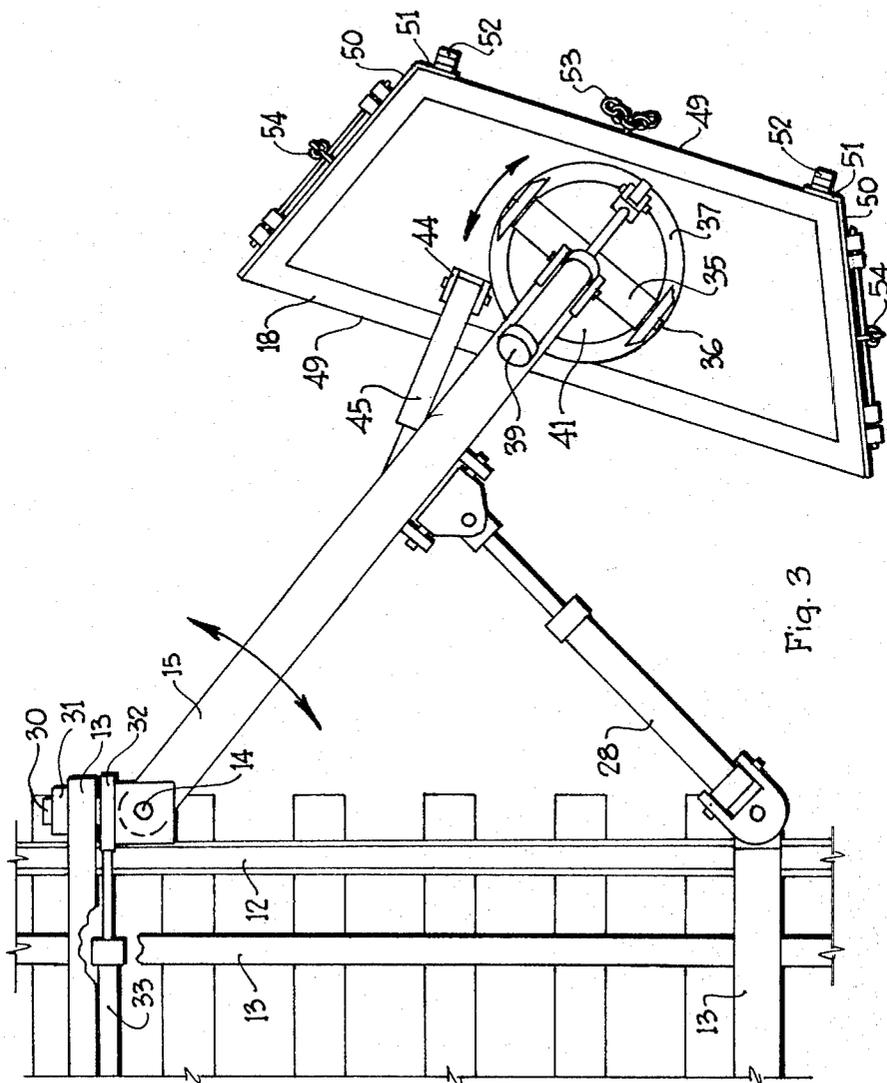


Fig. 3

BALLAST REGULATOR CONTROL MEANS

This invention relates to control means for controlling the ballast box of a ballast regulator, both for translational and rotational movement, with respect to a rail supported vehicle which carries the regulator of the type described in our U.S. Pat. No. 3,624,936.

BACKGROUND OF THE INVENTION

Ballast regulators are used for the purpose of repositioning ("regulating") ballast on the shoulders of a railroad track, and in order to have versatility it is necessary for the ballast regulator to be positionable in any one of a plurality of positions. This has been achieved heretofore usually by means of slides and guides operatively interconnected by rams. Experience has shown that slides and guides are generally unsuitable for track work owing to the wear which takes place due to abrasive action when they are subjected to dusty conditions.

OBJECT OF THE INVENTION

The main object of this invention is to provide an improved control means for the ballast box of a ballast regulator, whereby the box may be moved bodily with respect to the regulator vehicle (translational movement) and may be tilted about a plurality of axes (rotational movement).

BRIEF DESCRIPTION OF THE INVENTION

In this invention an arm is arranged to extend outwardly to one side of a ballast regulator, being joined to the ballast regulator by means of a universal coupling. The arm may have its swinging or outer end lifted by a cable coupled to arm hoisting means, and may have its angle of inclination (with respect to direction of travel) varied by a hydraulic ram. The frame of the ballast box is carried on the outer end of the arm, but through two pivotal support means, one having a vertical (or nearly vertical) axis and the other a horizontal (or nearly horizontal) axis, and there being two hydraulic rams operatively coupling the ballast box and the arm for effecting the pivotal movements about the respective axes.

More specifically, in one form the invention consists of control means for controlling the ballast box of a ballast regulator having a chassis supported by rail engaging wheels, and wherein the ballast box is provided with a box frame, side plates and end plates, comprising:

a universal coupling on the vehicle chassis, an arm coupled at one end of the chassis by the universal coupling and extending transversely outwardly therefrom but inclined at an angle relative to direction of travel so as to trail the universal coupling, a swivel control cylinder operatively coupling the arm and the chassis to control said angle of inclination, arm hoisting means carried by said chassis, and a cable extending between the arm hoisting means and the arm whereby the height of the outer end of the arm is adjustable;

first pivotal support means joining the box frame to said outer end for pivotal movement about an axis which has a large horizontal component of direction, second pivotal support means also joining the box frame to said outer end for pivotal movement about an axis which has a large vertical component of direction, and respective hydraulic cylinders operatively joining

the arm and the box frame for effecting said pivotal movements.

A consideration of the above functions will indicate that universal control of the box is achieved, in that it can be translated in a vertical or horizontal direction, and it can be tilted (rotated) about three axes which may be at right angles to one another. Even if the three axes are not exactly at right angles, however, universal movement may still be effected. This then in turn enables the box to be used for example for removing ballast from a shoulder without the need for adding extra blades, and it further enables simple bearing means to be employed which can be readily shielded against the adverse effects of dust. Furthermore, the cost can be lower than the cost of less versatile ballast regulators which utilise the slide system.

An embodiment of the invention is described hereunder in some detail with reference to and is illustrated in the accompanying drawings, in which:

FIG. 1 is a perspective view of a ballast regulator which incorporates the control means of this invention for control of its ballast box,

FIG. 2 is a fragmentary section taken on plane 2—2—2 of FIG. 1, and

FIG. 3 is a plan of FIG. 2.

In this embodiment a ballast regulator 10 comprises rail engaging wheels 11 and power means to drive the regulator along a railroad track 12. The regulator 10 is provided on each side with outstanding chassis members 13 to which are coupled through heavy duty universal joints 14 respective trailing arms 15 which are inclined at an angle to direction of travel. For the sake of simplicity, one side only of the regulator is illustrated. Each trailing arm 15 can be swung inwardly towards the chassis 13 or upwardly or downwardly so as to position a box frame 18 carried on the outer end of arm 15 in any desired position relative to the rails. In order to achieve the up and down movement of the trailing arms 15, the chassis 13 is provided with arm hoisting means which comprise upstanding posts 20 having a yoke 21 on their upper ends, the yoke 21 being provided on each side with a pair of pulleys 22 slightly overhanging the chassis 13, and a cable 23 is coupled at one end to the outer end of a respective trailing arm 15, passes over a pulley 22 on the yoke 21, then over a pulley 25 on the piston rod of a hydraulic hoisting ram 26 and has its other end coupled to the yoke 21. Operation of the hydraulic rams then give individual control of the two respective trailing arms 15 for elevation purposes. At the same time the in and out hinging relative to the chassis on each side thereof is achieved by means of a swivel control cylinder 28 (omitted from FIG. 2) coupled at one end to the chassis 13 and at the other end to the trailing arm 15 so that operation of the swivel control cylinder 28 will swivel the trailing arm 15 towards or away from the chassis 13, thereby controlling the angle of inclination with respect to direction of travel.

For some requirements it is necessary to tilt the box frame, and this is achieved in three ways. First of all the mounting between each universal joint 14 for the respective trailing arm 15 and the chassis 13 is through a pin 30 (FIG. 3) passing through a bearing 31 on the chassis 13, and the pin 30 has a depending lever arm 32 thereon, each depending lever arm 32 being coupled back to the chassis through a respective cylinder which is herein termed an arm rotating cylinder 33. Each arm

rotating cylinder 33 operates to rotate its arm 32 and thereby the respective trailing arm 15 so as to tilt the box frame 18 about the axis of the trailing arm 15.

The outer end of the trailing arm 15 is provided with a crosshead 35 having a horizontal axle 36 therein (although of course the axle tilts as the arm tilts) and the axle has one element 37 of a turntable depending therefrom and provides first pivotal support means for the box frame 18. The crosshead 35 is also operatively joined to the element 37 of the turntable on the axle by means of a tilting cylinder herein called a "box vertical tilt cylinder" 39, the operation of which tilts the turntable about the horizontal axle 36 and this gives a control at right angles to the tilt control achieved by rotation of the trailing arm 15. The other element 41 of the turntable is directly secured to the box frame 18, and the axis of rotation of the turntable is normally vertical and at right angles to the horizontal axle, so that a third plane of rotation is provided by the turntable. The three axes of rotation need not necessarily be at right angles to each other. The rotation is achieved by a further cylinder one end of which is coupled to a bracket 43 on the trailing arm 15 and the other end to a bracket 44 on the box frame 18 so that the box frame can be thereby rotated relative to the crosshead 35. The cylinder for effecting this rotation is herein called "box horizontal swivel cylinder" and designated 45. Arrows on FIGS. 2 and 3 illustrate the various pivotal movements, and the arrow on FIG. 1 illustrates rotation of the arm 15 which is effected by cylinder 33.

The box on each side of the machine for achieving the ballast regulation, or spreading, is provided with two depending side plates 39 which diverge slightly in the downward direction, and two end plates 50 which are hinged to the box frame 18. The hinged end plates 50 have side wings 51 thereon, each side wing 51 having a locking lug 52, while the side plates are provided with locking chains 53 secure thereto and the chains terminate in rings to engage respective locking lugs. The hinged end plates may be lifted and retained in a lifted position by means of tension chains 54, or may be locked in a closed position against the side plates by means of the locking chains 53. The end plates 50 are not parallel but diverge inwardly towards the chassis of the machine.

A brief consideration of the above embodiment will indicate that the invention provides simple, inexpensive and effective means for controlling the aspect of the box on each side of the machine, and thereby avoids the need for special purpose blades to be secured to the box, since the box walls themselves may be used for ploughing purposes. Furthermore, it will be seen that the extensive use of pivotal joints in lieu of slides achieves not only a lower cost but also a structure which reduces much of the damage due to dust or other abrasive particles.

I claim:

1. Control means for controlling the ballast box of a ballast regulator having a chassis supported by rail engaging wheels, and wherein the ballast box is provided with a box frame, side plates and end plates, comprising:

a universal coupling on the vehicle chassis, an arm coupled at one end to the chassis by the universal coupling and extending transversely outwardly

therefrom but inclined at an angle relative to direction of travel so as to trail the universal coupling, a swivel control cylinder operatively coupling the arm and the chassis to control said angle of inclination, arm hoisting means carried by said chassis, and a cable extending between the arm hoisting means and the arm whereby the height of the outer end of the arm is adjustable, said hoisting means comprises a hoisting ram carried on said chassis, a pulley on the movable element of said hoisting ram, a pair of pulleys on the chassis, said cable extending over the pulleys and having one end being secured to the chassis,

first pivotal support means joining the box frame to said outer end for pivotal movement about an axis which has a large horizontal component of direction, second pivotal support means also joining the box frame to said outer end for pivotal movement about an axis which has a large vertical component of direction, and respective hydraulic cylinders operatively joining the arms and the box frame for effecting said pivotal movements.

2. Control means according to claim 1 further comprising a crosshead secured to the outer end of said trailing arm, and an axle joining said box frame to the crosshead, the axle constituting said first pivotal support means.

3. Control means according to claim 1 further comprising a turntable having two relatively rotationally movable elements, one turntable element having securing means securing it to the box frame and the other turntable element having joining means joining it to the outer end of the trailing arm, the turntable constituting said second pivotal support means.

4. Control means according to claim 1 further comprising a crosshead secured to the outer end of the trailing arm, a turntable having two relatively rotationally movable elements, one said turntable element being secured to said box frame, an axle joining the other turntable element to the crosshead, one of said respective hydraulic cylinders being a box vertical tilt cylinder operatively coupling said other element to the crosshead thereby to control tilt of the box frame about the axle which constitutes said first pivotal support means, the other of said respective hydraulic cylinders being a box horizontal swivel cylinder operatively coupling the box frame to said trailing arm thereby to control swivelling movement of the box frame about the axis of the turntable, the turntable constituting said second pivotal support means.

5. Control means according to claim 1 further comprising a bearing on said chassis said universal coupling comprising a pin rotatable in said bearing, a lever arm on the pin, and an arm rotating cylinder operatively coupling the lever arm to the chassis thereby controlling rotational positioning of said trailing arm and, in consequence, said box frame.

6. Control means according to claim 1 further comprising a pair of spaced side plates depending from the box frame, end plates, hinges joining the end plates to the box frame, and chains between the end plates of the box frame operable to retain the end plates in an elevated position.

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