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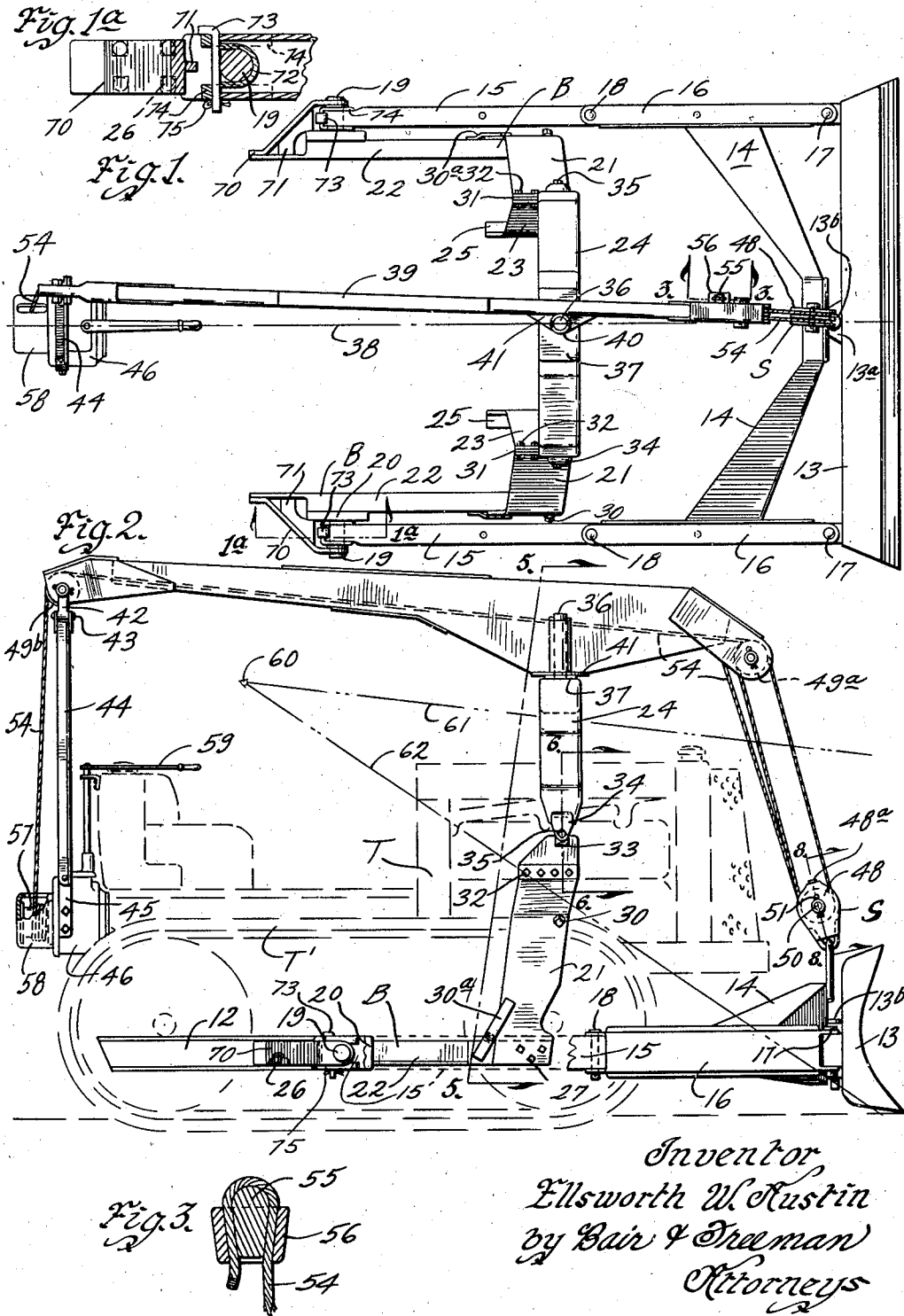
E. W. AUSTIN

2,215,025

EARTH MOVER

Filed Jan. 23, 1939

2 Sheets-Sheet 1



Inventor,
 Ellsworth W. Austin
 by Bair & Dreiman
 Attorneys

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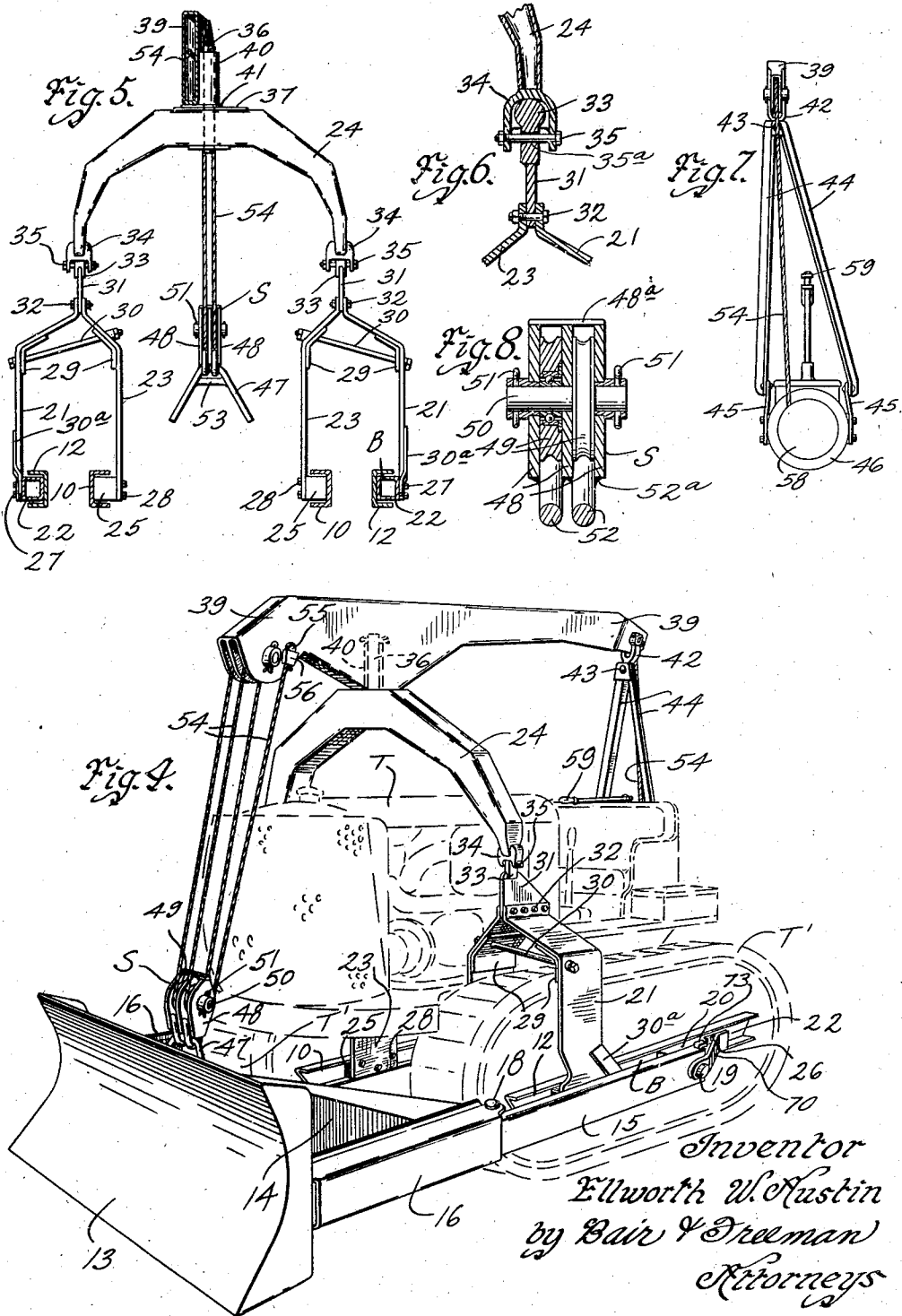
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UNITED STATES PATENT OFFICE

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EARTH MOVER

Ellsworth W. Austin, Cedar Rapids, Iowa, assignor
to La Plant-Cheate Manufacturing Co., Inc.,
Cedar Rapids, Iowa, a corporation of Delaware

Application January 23, 1939, Serial No. 252,366

17 Claims. (Cl. 37—144)

An object of my present invention is to provide an earth mover in which an earth engaging element is adapted for mounting on a track laying tractor and a cable and sheave system of simple and inexpensive construction is provided to elevate the earth engaging element relative to the ground surface to the desired height.

Still a further object is to provide a cable and sheave system including an overhead beam for supporting the system in such manner that the earth engaging element can be elevated toward the forward end of the overhead beam and the operating cable of the system extends downwardly from the rear end of the beam to a cable drum mounted on the tractor.

Another object is to provide a support for the overhead beam in the form of an upwardly arched crosshead and supports for its lower ends which are mounted on the track frames of the tractor, the connections between the supports and the crosshead being such that one track frame may be elevated relative to the other one as the tracks of the tractor pass over uneven ground without however any binding of connections as would hinder proper operation of the tractor or of the cable system used for elevating the earth engaging element.

Still another object is to provide the overhead beam swivelly mounted on a substantially vertical axis pin which in turn is supported by a crosshead mounted on the track frames of the tractor, the beam being provided to support a cable and sheave system, the cable of which extends downwardly to a cable drum on the rear end of the tractor with a thrust element connected between the beam and the tractor adjacent the drum.

Another object is to provide a structure in which the various units thereof are compact and may be readily mounted in position on the tractor by two men during installation, the connections between the parts being such that they may be mounted on the track frames and supported thereby with full flexibility for operation of the tracks without interference by the attachments.

Another object is to provide an arched crosshead for supporting the overhead beam which insures a maximum of visibility to the operator of the tractor when my cable and sheave system is applied thereto for adjusting the height of the earth engaging element.

As another object of my invention I provide a swivel sheave of novel construction mounted upon the earth engaging element and included in the cable and sheave system in such manner that the swivel sheave can pivot on a substantially fore and

aft axis without dropping over sidewise when the cable is slack.

As a further object I provide a novel connection between the side arms of my earth mover and pivot pin brackets therefor which permit ready removal of the side arms and the earth moving element they carry without spreading the arms or removing the pivot pins, such connections involving bifurcated ends of the arms receiving the pivot pins and retainer keys retaining the side arms on the pivot pins.

Still a further object is to provide a novel type of mounting bracket for the pivot pins including pivot pin braces to reenforce the pivot pins against undesired bending under the strains of operation.

Other objects, purposes and characteristic features of my invention will be particularly obvious from the accompanying drawings and partially pointed out as the description of the invention proceeds. In describing the invention in detail, reference will be made to the accompanying drawings, in which like reference characters designate corresponding parts throughout the several views, and in which:

Figure 1 is a plan view of my earth mover together with the cable drum mechanism for operating it;

Figure 1a is an enlarged sectional view on the line 1a—1a of Figure 1 showing details of construction of the pivot pin and side arm connection of my earth mover;

Figure 2 is a side elevational view thereof showing the apparatus mounted on a track laying tractor;

Figure 3 is an enlarged sectional view on the line 3—3 of Figure 1 showing a dead end for the cable;

Figure 4 is a perspective view of my apparatus mounted on the tractor;

Figure 5 is a sectional view on the line 5—5 of Figure 2 illustrating the overhead beam and the track frames of the tractor in vertical cross section;

Figure 6 is an enlarged sectional view on the line 6—6 of Figure 2 showing a ball and socket connection between a crosshead and its support;

Figure 7 is a rear elevation of the overhead beam, cable drum apparatus and a thrust element connection between them; and

Figure 8 is an enlarged sectional view on the line 8—8 of Figure 2 showing a swivel sheave.

On the accompanying drawings I have used the reference character T to indicate generally a tractor of the track laying type. The tracks thereof are indicated at T'. The tracks T' support

inner and outer track frames 10 and 12 which are shown in solid but unshaded lines on the drawings, whereas the tractor and tracks are shown in dash lines.

5 My earth mover includes an earth engaging element 13 such as a bulldozer or roadbuilder blade supported by a cross frame 14. The cross frame 14 serves as a rigid connection between arms 15 which are connected by linklike extensions 16 to the blade 13. The means of connection between the links 16 and the arms and blade include pins 17 and 18, such as more fully disclosed in my copending application, Serial No. 152,898, filed July 10, 1937.

10 The arms 15 are mounted on pivot pins 19 carried by the brackets B mounted on the outer track frames 12. The brackets B include reinforced portions 20 carrying the pins 19. The pins 19 are effectively reinforced against bending under the strains of operation by brace plates 20 welded to the pins and extending diagonally back toward the brackets B and welded thereto. A reinforcing web 71 is also welded to the reinforcements 20, the bracket B and the plates 20 to prevent buckling of the plates when strains are imposed thereon.

20 The arms 15, as shown particularly in Figure 1a, are provided with U-shaped bushings 72 welded therein and adapted to receive the pivot pins 19. After the side arms are in position on the pins they may be retained by flat keys 73 inserted in U-shaped loops 74 formed of square bars bent to U shape and then welded in position against the inner and outer sides of the arms 15. The keys 73 in turn may be retained in position by a cotter key 75.

30 The brackets B are connected with track plates 21 by intermediate portions 22. In Figure 2 the near side arm 15 has been broken except adjacent its forward and rearward ends and its intermediate portion is shown dotted.

40 The track plates 21 in conjunction with other track plates 23 constitute inverted U-shaped supports for a crosshead 24. The track plates 23 are connected to the inner track frames 10 with spacers 25 interposed between them. Bolts 26 and 27 serve to connect the brackets B with the outer track frames 12 and bolts 28 serve to connect the inner track plates 23 with the inner track frames 10.

50 The inverted U-shaped supports 21-23 are reinforced by plates 29 and a tie rod 30 while the plates 21 are reinforced relative to the portions 22 of the brackets B by plates 30a. The plates 30 and 30a are preferably welded in position. Extending upwardly from the track plates 21 and 23 are connecting plates 31 secured as by bolts 32 to the track plates. A ball member 33 is welded to the upper edge of each plate 31 and is received in a socket member 34. The socket members are retained seated on the ball heads 33 by bolts 35 in enlarged holes 35a as shown in Figure 6. It will be noted in this figure that the socket 34 is elongated laterally of the tractor so that there is some slight transverse play of the ball therein. The purpose of this will hereafter appear.

60 The cross head 24 is upwardly arched as shown in Figures 4 and 5 to clear the portion of the tractor T intermediate the tracks T'. The lower ends of the arms of the crosshead are welded to the socket members 34.

70 A pivot pin 36 extends upwardly through the crosshead 24 and is welded thereto with reinforcing plates 37 as shown in Figure 5, being

provided to strengthen the central portion of the crosshead. These plates as well as a few other relatively immaterial details have been omitted from Figure 4 to avoid confusion of the lines of the drawing. The pivot pin 36, it will be noted by reference to Figure 1, is located on substantially the central line of the tractor which is indicated at 38.

5 Arranged along one side of the pivot pin 36 is an overhead beam 39. A pivot sleeve 40 is welded thereto and a reinforcing plate 41 is provided for the sleeve. The beam 39 has a U-shaped fitting 42 pivoted thereto adjacent the rear end and pivotally connected by a pin 43 with a thrust frame 44. The thrust frame 44 is pivoted to a pair of brackets 45 mounted on a drum operating casing 46. Thus, the beam 39 is supported by the crosshead 24 and by the thrust frame 44 in conjunction with each other.

15 The cross arm 14 of the earthmover has secured thereto an inverted U-shaped rod 47. A swivel sheave S is connected therewith. The sheave S as shown in Figure 8 comprises a plurality of side plates 48 between which are mounted sheaves 49. The sheaves 49 are provided with ball bearings mounted on a pin 50 retained in position by cotter pins 51. A pair of U-shaped rods 52 are welded as at 52a between the side plates 48 and interlinked with the inverted U-shaped rod 47. The rod 47 has a reinforcing cross piece 53 as shown in Figure 5. The side plates 48 it will be noted terminate adjacent the inverted U-shaped rod 47 so as to prevent the swivel sheave system from dropping sidewise when the cable 54 that extends around the sheaves 49 is slack.

35 The overhead beam 39 is preferably formed of shaped pieces of sheet steel or the like welded together into a rectangular tubular cross section as shown in Figure 5. At its forward end there is provided a pair of sheaves 49a installed in substantially the same manner of assembly as shown in Figure 8. At its rear end the beam is provided with a single sheave 49b similarly installed.

45 The cable 54 has a dead end surrounding a wedge 55 as shown in Figure 3 and the cable end and wedge are inserted in a loop-shaped strap 56 secured to the side of the overhead beam 39. This construction effectively retains the dead end of the cable in fixed position relative to the beam.

50 The cable 54 has one stretch thereof extending through the tubular overhead beam 39 and depending from the pulley 49b where it is connected with a winding drum 57. (See Figure 2.) The winding drum 57 is mounted in a drum housing 58 which in turn is mounted on the drum mechanism housing 46, this apparatus being part of the tractor as now supplied by some tractor manufacturers. The operation of the drum 57 is controlled by a lever 59 which when thrown in one direction causes the drum to rotate and when thrown in the other direction releases a spring applied brake to permit the drum to rotate in a well-known manner which forms no part of my present invention.

65 I have provided means for mounting a cable and sheave mechanism on a track laying tractor in such manner that it does not interfere with the operation of the earth moving element. In Figure 2 the normal position of the operator's eye is indicated at 60. The lines 61 and 62 indicate his range of vision underneath the crosshead 24 and down to the earth engaging element 13. The upward arch of the crosshead thereby gives him the desired visibility for operating the earth 75

mover and at the same time elevates the front end of the cable and sheave mechanism to a position where it makes possible the elevation of the earth engaging element 13 to the maximum degree. The overhead beam provides for transmission of lifting power from the drum 57 to the earth engaging element in a very simple manner.

Due to the ball and socket connections between the inverted U-shaped supports 21-23 and the crosshead 24, either track T' may be elevated as a result of passing over an obstruction without interfering with operation of the cable and sheave system. The ball and socket joints will permit the crosshead to tip laterally and this will result in the pivot pin 36 also tipping laterally and the overhead beam tipping with it. The tipping is not excessive and accordingly does not throw the sheaves 49a and 49b so far out of alignment with the cable 54 that they will operate improperly. The elevation of one ball head 33 relative to the other causes a slight increase in the distance between them which is readily taken care of by the lateral play in the socket members 34. If there is any excessive relative movement of the tracks T' so that all this play is taken up, then the plates 21, 23 and 31 may bend slightly as they are made of sheet steel which of course has sufficient resiliency to permit some bending without permanent distortion.

The swivel mounting of the overhead beam on the crosshead permits the overhead beam to adjust itself to various inclinations of the cables 54 with a minimum of binding. The hinge connections at the upper and lower ends of the thrust frame 44 permit tipping of the crosshead 24 without binding at the rear of the overhead beam. The thrust frame serves to support the rear end of the beam and also to keep the crosshead 24 in a substantially vertical position.

The inverted U-shaped supports 21-23 and brackets B may be mounted each as a unit on its respective track frames. The next unit to be installed is the crosshead 24 after which the beam 38 can be placed in position and supported in its proper position by mounting the thrust frame 44. In this manner a plurality of easily handled units go to make up the entire assembly and facilitate the installation thereof with respect to the tractor.

The swivel sheave S makes a very inexpensively manufactured structure and provides a connection with the earth engaging element which has the desired pivotal movement of the sheave relative to the earth engaging element without any danger of the sheave dropping sidewise when the cable is slack. This insures proper operation of the cable and sheave system whenever the slack in the cable is taken up.

The pivot pins 19 reenforced by the plate 70 provide a desired rigidity against bending during operation of the earth mover, which rigidity is lacking when the pins are not so braced. The U-shaped bushings 72 coacting with the flat barlike keys 73 serve as an effective means to provide a pivotal connection between the side arms and the brackets B which are mounted on the tractor, yet permit ready removal of the earth moving apparatus from the tractor when desired by merely removing the cotter keys 75 and then the keys 73. Thereafter the tractor may be backed away from the side arms and earth engaging blade. The U-shaped bushing 72 provides all the desired pivotal surface for thrust of the pins 19 against the side arms during earth moving operations, whereas the keys 72 effectively operate as a means

to pull the blade backwardly when the tractor is backed up, at which time there is relatively less strain imposed on the pins 19.

Having described one specific embodiment of my invention together with the operation thereof, I desire it to be understood that this form is selected merely for the purpose of facilitating disclosure of the invention rather than for the purpose of limiting the number of forms which it may assume. It is to be further understood that various modifications, adaptations and alterations may be applied to the specific form disclosed to meet the requirements of practice without in any manner departing from the spirit and scope of the present invention except as set forth in the claims appended hereto.

I claim as my invention:

1. The combination with a track laying tractor having inner and outer track frames; of an earth mover comprising an earth engaging element and means for mounting said earth engaging element on said tractor at the front end thereof and for adjusting said earth engaging element relative to the ground level, said mounting means comprising brackets secured to said outer track frames and carrying pivot pins, said earth engaging element including arms pivotally mounted thereon, a pair of inverted U-shaped supports, each having its arms mounted on an inner one and an outer one of said track frames, a yoke shaped crosshead supported by said inverted U-shaped supports, universal joint connections between the arms of said crosshead and the upper ends of said inverted U-shaped supports, an overhead beam supported by said crosshead and swivelly mounted relative thereto on a substantially vertical axis, a cable drum mounted on the rear of said tractor and a cable and sheave system extending upwardly therefrom, forwardly along said overhead beam and downwardly from the front end thereof to said earth engaging element to adjust the elevation thereof by the winding of said cable on said drum.

2. The combination with a track laying tractor having inner and outer track frames; of an earth mover comprising an earth engaging element, means for mounting said earth engaging element on said tractor and means for adjusting said earth engaging element relative to the ground level, said last means comprising a pair of inverted U-shaped supports, each having its arms mounted on an inner one and outer one of said track frames, a yoke shaped crosshead supported on said inverted U-shaped supports, universal joint connections between the arms of said crosshead and the upper ends of said inverted U-shaped supports, a hollow overhead beam supported by said crosshead and swivelly mounted relative thereto on a substantially vertical axis, a cable drum mounted on said tractor and a cable and sheave system extending upwardly therefrom, forwardly through said overhead beam and downwardly from the front end thereof to said earth engaging element to adjust the elevation thereof by the winding of said cable on said drum.

3. The combination with a track laying tractor having inner and outer track frames; of an earth mover comprising an earth engaging element, means for mounting said earth engaging element on said tractor at the front end thereof and means for adjusting said earth engaging element relative to the ground level, said last means comprising a pair of inverted U-shaped supports, each having its arms mounted on an

inner one and an outer one of said track frames, a crosshead having its ends pivotally supported by said supports, an overhead beam pivotally supported by said crosshead, a cable drum mounted on the rear of said tractor and a cable and sheave system extending upwardly therefrom, forwardly along said overhead beam and downwardly from the front end thereof and connected with said earth engaging element.

4. The combination with a track laying tractor having inner and outer track frames; of an earth mover comprising an earth engaging element and means for mounting said earth engaging element on said tractor comprising brackets secured to said outer track frames and carrying pivot pins, said earth engaging element including arms pivotally mounted thereon, a pair of supports, each mounted on an inner one and an outer one of said track frames, a crosshead supported by said supports, universal joint connections between the ends of said crosshead and said supports, an overhead beam supported by said crosshead, a cable drum mounted on said tractor and a cable and sheave system extending upwardly therefrom, forwardly along said overhead beam and downwardly from the front end thereof to said earth engaging element.

5. The combination with a track laying tractor having track frames; of an earth mover comprising an earth engaging element, means for mounting said earth engaging element on said tractor for variable elevation, a pair of supports mounted on said track frames said supports being inverted U shape, straddling the upper stretches of the tracks of said tractor and having their arms secured to the track frames, a crosshead supported by the cross members of said supports, an overhead beam supported by said crosshead, a cable drum mounted on said tractor and a cable and sheave system extending upwardly therefrom, forwardly along said overhead beam and downwardly therefrom to said earth engaging element to adjust the elevation thereof by the winding of said cable on said drum.

6. The combination with a track laying tractor having track frames; of an earth mover comprising an earth engaging element and means for mounting said earth engaging element on said tractor at the front end thereof and for adjusting said earth engaging element relative to the ground level, said mounting means comprising an inverted U-shaped support straddling each track of said tractor and mounted on said track frames, a crosshead spanning the upper ends thereof and having ball and socket connections therewith, said crosshead being upwardly bowed at the center thereof to clear the portion of the tractor intermediate said track frames, an overhead beam mounted on said crosshead and extending substantially longitudinally of said tractor, sheaves carried by said beam adjacent the ends thereof, a cable drum mounted at the rear of said tractor, a sheave swivelly mounted on said earth engaging element, a cable extending over all of said sheaves and wound on said drum and a thrust element connected between the rear of said tractor and the rear end of said overhead beam.

7. The combination with a track laying tractor having inner and outer track frames; of an earth mover comprising an earth engaging element and means for mounting said earth engaging element on said tractor and for adjusting said earth engaging element relative to the ground

level, said mounting means comprising inverted U-shaped supports mounted by its arms on said inner and outer track frames, tie rods through said arms adjacent the crosspieces of said supports, a crosshead spanning the distance between said crosspieces, an overhead beam mounted on said crosshead and extending substantially longitudinally of said tractor, sheaves carried by said beam adjacent the ends thereof, a cable drum mounted on said tractor, a sheave swivelly mounted on said earth engaging element, a cable extending over all of said sheaves and wound on said drum and a thrust element connection between said tractor and one end of said overhead beam.

8. The combination with a track laying tractor having track frames; of an earth mover comprising an earth engaging element and means for mounting said earth engaging element on said tractor and for adjusting said earth engaging element relative to the ground level, said mounting means comprising supports rigidly mounted on said track frames, a crosshead spanning the upper ends thereof and having universal joint connections at its ends therewith, and an overhead beam pivotally mounted on said crosshead, sheaves carried by said beam adjacent the ends thereof, a cable drum mounted on said tractor, a sheave swivelly mounted on said earth engaging element, a cable extending over all of said sheaves and wound on said drum and a thrust element connected between said tractor and pivotally with one end of said overhead beam.

9. The combination with a track laying tractor having inner and outer track frames; of an earth mover comprising an earth engaging element and means for mounting said earth engaging element on said tractor and for adjusting its elevation relative to the ground level, said mounting means comprising inverted U-shaped supports mounted on said track frames, an upwardly bowed crosshead spanning the upper ends thereof and having ball and socket connections therewith, an overhead beam mounted on said crosshead, sheaves carried thereby, a cable drum mounted on said tractor, a sheave swivelly mounted on said earth engaging element and a cable extending over all of said sheaves and wound on said drum.

10. The combination with a track laying tractor having frames; of an earth mover comprising an earth engaging element, means for mounting said earth engaging element on said tractor and means for adjusting said earth engaging element relative to the ground level, said mounting means comprising supports rigidly mounted on said track frames, a crosshead pivoted at its ends thereto, having a rigid vertical pivot pin and an overhead beam oscillatable on said pivot pin, whereby to permit movement of said track frames in accordance with ground surface variations, sheaves carried by said beam adjacent the end thereof, a cable drum mounted on said tractor, a sheave swivelly mounted on said earth engaging element, a cable extending over all of said sheaves and wound on said drum and a thrust element connected at one end to said tractor and pivotally at its other end to said overhead beam.

11. The combination with a track laying tractor having frames; of an earth mover comprising an earth engaging element, means for mounting said earth engaging element on said tractor and means for adjusting said earth engaging element relative to the ground level, said mounting means comprising supports mounted on said track frames, an overhead beam pivotally supported

thereby and having connections therewith adapted to permit independent movement of said track frames in accordance with ground surface variations, sheaves carried by said beam adjacent the end thereof, a cable drum mounted on said tractor, a sheave on said earth engaging element, a cable extending over all of said sheaves and wound on said drum and a rigid connecting link between said tractor and said beam to prevent tipping of the beam under the load imposed on said cable, said connecting link engaging said tractor at two laterally spaced points to prevent lateral movement of the portion of the beam with which it is connected.

12. The combination with track frames of a track laying tractor; of an earth mover comprising an earth engaging element and means to adjust the height thereof relative to the ground surface including upwardly extending supports mounted on said track frames, an upwardly arched crosshead having its ends connected by ball and socket connections with the upper ends of said supports, a fore and aft overhead beam supported swivelly on said crosshead adjacent the center thereof, a cable and sheave system carried by said overhead beam and operatively connected with said earth engaging element at one end of the tractor, a winding drum at the other end of the tractor and operatively connected to the cable of said cable and sheave system and a thrust element pivotally mounted on the tractor adjacent said drum and pivotally connected with said beam.

13. The combination with track frames of a track laying tractor; of an earth mover comprising an earth engaging element and means to adjust the height thereof relative to the ground surface including upwardly extending supports mounted on said track frames with their cross members transversely spanning the upper stretches of the tracks of said tractor, a crosshead, universal joint connections between the ends of said crosshead and said cross members of said supports, an overhead beam supported on said crosshead, a cable and sheave system carried by said overhead beam and operatively connected with said earth engaging element, a winding drum on the tractor and operatively connected to the cable of said cable and sheave system and means to prevent tipping of said beam on a transverse axis.

14. The combination with track frames of a track laying tractor; of an earth mover comprising an earth engaging element having arms pivoted to said track frames and means to adjust the height of said earth engaging element relative to the ground surface including upwardly extending supports mounted on said track frames, an arched crosshead having its ends connected by ball and socket connections with the upper ends of said supports, an overhead beam supported swivelly on said crosshead adjacent the

center thereof, a cable and sheave system carried by said overhead beam and operatively connected with said earth engaging element, a winding drum on the tractor and operatively connected to the cable of said cable and sheave system and an element connected with the tractor and with said beam to prevent lateral and vertical movement of one end of said beam relative to said tractor.

15. The combination with track frames of a track laying tractor; of an earth mover comprising an earth engaging element and means to adjust the height thereof relative to the ground surface including upwardly extending supports mounted on said track frames, an upwardly arched crosshead having its ends connected by ball and socket connections with the upper ends of said supports, a beam swivelly mounted on said crosshead, said swivel connection being on substantially the center plane of the tractor and said beam being positioned along one side thereof and thereby having one end offset relative to the tractor, a drum substantially aligned therewith, a cable from said drum along said beam and depending from the other end of said beam to a point of operative connection with said earth engaging element, said other end of said beam being substantially over the center of said earth engaging element.

16. The combination with track frames of a track laying tractor; of an earth mover comprising an earth engaging element and means to adjust the height thereof relative to the ground surface including upwardly extending supports mounted on said track frames, a crosshead having its ends connected by ball and socket connections with the upper ends of said supports, said sockets being elongated transversely of the tractor to permit lateral movement of the balls therein upon one track frame being elevated relative to the other one, and a cable and sheave system supported by said cross head.

17. The combination with track frames of a track laying tractor; of an earth mover comprising an earth engaging element and means to adjust the height thereof relative to the ground surface including upwardly extending supports mounted on said track frames, a crosshead having its ends connected by ball and socket connections with the upper ends of said supports, said sockets being elongated transversely of the tractor to permit lateral movement of the balls therein upon one track frame being elevated relative to the other one, a fore and aft overhead beam supported swivelly on said crosshead, a cable and sheave system carried by said overhead beam and operatively connected with said earth engaging element, a winding drum on the tractor and operatively connected to the cable of said cable and sheave system and a thrust frame operative to prevent fore and aft tipping of said beam and crosshead.

ELLSWORTH W. AUSTIN.