ELEVATING DOZER BLADE

INVENTOR

WILLIAM J. ASKINS

ATTY.

FIG. 1

FIG. 2
ELEVATING DOZER BLADE
William J. Askins, Libertyville, Ill., assignor to International Harvester Company, a corporation of Delaware
Filed June 21, 1965, Ser. No. 465,447
14 Claims. (Cl. 172—63)

ABSTRACT OF THE DISCLOSURE

A material handling attachment positioned behind the dozer blade of a dozer vehicle. The attachment excavates material below the blade, elevates the excavated material above the upper margin of the blade, and deposits the material in front of the blade where it may be efficiently moved during a dozing operation.

Summary of the invention

This invention relates to an attachment for a construction vehicle and more particularly relates to an attachment for a dozer vehicle incorporating a material excavating and conveying mechanism mounted adjacent to the dozer blade.

In the operation of conventional earth moving equipment such as bulldozers certain earthen material presents a difficult dozing problem. Compacted earthen material such as wet clay or the like does not readily flow or "boil" up into the front surface of a dozer blade. This results in inefficient in the dozing operation because only a small amount of such material can be moved by the blade as compared to dozing loose or easy flowing material. Furthermore, because of the non-flowing characteristics of clay and similar material it is difficult for the operator to control the precise depth of cut in the material.

Previous attempts by others to solve the above problems have not been successful. Thus, Reels have been provided which pick up the earth as it has been scraped. However, this equipment requires a time-consuming unloading operation at the dump location. No device has been provided which will break up compacted material and deposit it in front of the dozer blade so that the dozer may level uneven ground and push the scraped material to any desired location.

Accordingly, it is an object of this invention to provide a novel attachment for a construction vehicle which excavates hard, compacted earth and deposits it in front of a dozer or scraper blade so that the earth may be efficiently moved by the vehicle.

Another object of this invention is to provide an attachment for the dozer blade of a construction vehicle in which the attachment incorporates a conveyor with cutting blades which excavate material and convey the same over the upper margin of the dozer blade.

Another important object is to provide a conveyor attachment for mounting behind the blade of a dozer vehicle so that earthen material is excavated and lifted over the upper margin of the blade, and in which the attachment may be vertically adjusted relative to the blade so that a variable cut may be taken in the earth.

Yet another object is to provide an attachment for an earth moving vehicle having push arms wherein the attachment incorporates a dozer blade mounted on the push arms, a conveyor mounted on the rearward side of the blade, and means to vertically adjust the conveyor relative to the blade.

Still another object is to provide a conveyor mounted on the push arms of a dozer vehicle in which a dozer blade is in turn pivotally mounted on the conveyor and in which means are provided for selective vertical adjustment of the blade relative to the conveyor.

Description of the drawings

Other objects and advantages of the present invention will become apparent to those skilled in the art when the following specification is read in conjunction with the accompanying drawings, wherein:

FIGURE 1 is a side elevation view of a dozer vehicle incorporating an attachment embodying features of the present invention;

FIGURE 2 is an enlarged side elevation view of the attachment shown in FIGURE 1;

FIGURE 3 is a rear elevation cross-sectional view of the invention of FIGURE 2 taken along the line 3—3 of FIGURE 2;

FIGURE 4 is an enlarged side elevation view, partly in cross section, of a modified form of this invention taken along the line 4—4 of FIGURE 5;

FIGURE 5 is a rear elevation cross-sectional view of the modified form of this invention taken along the line 5—5 of FIGURE 4; and

FIGURE 6 is a top plan view of the modified form of the invention shown in FIGURES 4 and 5.

Description of the preferred embodiments

Referring now to the drawings in which identical reference numerals refer to similar elements, the reference numeral 10 in FIGURE 1 designates generally a construction vehicle. A pair of transversely spaced-apart push arms 12 are each pivotally attached at one end to the mounting pins 14 on vehicle 10. A conventional extensible hydraulic ram 16 is connected at its head end to the frame of vehicle 10 and at its rod end to a cross support (not shown) between the push arms 12. Selective extension and retraction of hydraulic ram 16 operates to respectively lower and raise the push arms 12 relative to the vehicle 10.

An elevating dozer blade attachment is indicated generally by the reference numeral 18 and is rigidly attached to the free ends of push arms 12 by means of mounting pins or bolts 20. The attachment 18 comprises a conveyor 22 which supports a conventional dozer blade 24 pivotally mounted to the conveyor in a manner to be presently described. Power for operating the conveyor 22 is received through drive shaft 26 which is in driving connection with the power-take-off 28 of the vehicle 10.

Turning now to FIGURES 2 and 3 the elevating dozer blade attachment 18 is shown in greater detail. The conveyor 22 of the attachment is rigidly secured to a pair of transversely spaced-apart upstanding frame sections 30, each of which is rigidly secured to a respective one of the push arms 12 by means of the pins 20. A pair of brace members 32 extend from the uppermost ends of the frame section 30 to the push arms 12. A vertically extending transverse plate 34 has forwardly curved segments at its top and bottom ends and is rigidly secured between the frame members 30. The pair of frame members 30 together with the vertical plate 34 define a housing for the conveyor 22.

A pair of vertically spaced-apart transversely disposed shafts 36 and 40 are provided in the housing of conveyor 22. The drive shaft 36 is positioned at the uppermost end of the housing and is rotatably mounted between the pair of frame members 30 by means of bearings 38. The idler shaft 40 is in vertical registry with the drive shaft 36 and is positioned at the lowermost end of the housing; the shaft 40 is rotatably mounted between the frame members 30 by means of bearings 42. A pair of spaced-apart drive sprockets 44 are rigidly secured to the drive shaft 36 and a pair of spaced-apart idler sprockets 46 are rigidly secured to the idler shaft 40. Each of the idler
sprockets 46 is in vertical registry with a respective one of the drive sprockets 44. A pair of endless conveyor chains 48 are each trained between a respective set of drive and idler sprockets. A plurality of spaced-apart cutting blades 50 are transversely disposed in the conveyor housing and are rigidly secured to the pair of conveyor described by conventional fastening means.

FIGURE 3 shows details of the drive mechanism to power the conveyor 22. A worm wheel 52 is keyed for rotation with the left end of drive shaft 36. A worm gear 54 is formed on the end of shaft 26 and is in driving engagement with worm wheel 52. A pair of power drive sprockets 56 are each rigidly secured to a respective end of the drive shaft 36. Each end of idler shaft 40 has a power idler sprocket 58 rigidly secured thereto. The sprockets 58 are each in vertical registry with a respective one of the drive sprockets 56. A pair of endless drive chains 60 are trained between the sprockets 56 and 58. Power delivered from the power-take-off 28 through the worm gear 54 effects rotary motion of the shafts 36 and 40 through the drive chains 60. Cover members 59 are provided on each side of the conveyor 22 to enclose the drive mechanism. Bearings 61 are mounted within the cover members and rotatably support the ends of the shafts 36 and 40.

With the shafts 36 and 40 rotating in a counterclockwise direction as viewed in FIGURE 2, the conveyor chains 48 will move the plurality of cutting blades 50 upwards on the right hand side and downwards on the left hand side. As the blades 50 move downward below the lower margin of the dozer blade 24 they will loosen or excavate the earthen material. The plate 34 is spaced in close relationship with the outermost ends of blades 50 so that a trough or guideway is formed in the housing of the conveyor 22 whereby excavated material entailed by the blades 50 is carried out. The conveyor 22 is moved in a transverse direction.

The dozer blade 24 is mounted forwardly of the conveyor 22 by means of a floating linkage mechanism. This mechanism includes a pair of bellcrank links 62 which are each rotatably mounted to a respective end of the drive shaft 36, and a pair of forwardly extending links 64 which are each rotatably mounted to a respective end of the idler shaft 40. The lowermost end of dozer blade 24 is pivotally mounted between the forward ends of links 64 by suitable means such as pivot pins 66. The uppermost end of dozer blade 24 is pivotally mounted between the forward ends of links 62 by suitable means such as pivot pins 68. The pins 66 and 68 are in vertical registry so that movement of the links 62 and 64 will effect movement of dozer blade 24 in a parallel or “floating” movement with respect to conveyor 22. Pivot movement of the links 62 relative to conveyor 22 is accomplished by means of a pair of hydraulic rams 70, each of which is positioned on either side of the attachment 18. The head end of each hydraulic ram 70 is pivotally mounted to a respective frame member 30 by means of a pivot pin 72. The extensible rod 74 of each hydraulic ram 70 is pivotally mounted on the depending arm 76 of a respective link 62 by means of a pivot pin 78. Extension and retraction of the hydraulic ram 70 by means of conventional hydraulic controls (not shown) will pivot the bellcrank links 62 relative to conveyor 22 so that dozer blade 24 will be raised and lowered. Thus the operator of the vehicle may selectively vary the height of the cutting blades 50 above with respect to the lowermost margin of the dozer blade 24. The depth of cut in the earthen material by the attachment 18 is thereby selectively varied.

A modified form of the present invention is shown in FIGURES 4, 5 and 6. In this embodiment the dozer blade 24 comprises a dozer blade 24 which is directly mounted between the free ends of the push arms 12 by means of pivot pins 80 and a conveyor 22 which is mounted adjacent the rearward side of the dozer blade 24 by means of a floating linkage mechanism to be presently described. A pair of forwardly and upwardly extending brace members 84 are each connected at one end to a respective push arm 12 and at their other end to the uppermost end of dozer blade 24 by means of pivot pin 86.

The conveyor 82 is similar in construction to conveyor 22 described in connection with FIGURES 2 and 3. An upstanding transverse plate 34 is rigidly secured between a pair of transverse spaced-apart forwardly extending frame members 30 to form a housing for the conveyor. A pair of vertically spaced-apart transversely extending shafts 36 and 40 are provided in the housing. Drive shaft 36 is rotatably mounted between the uppermost ends of the two frame members 30 by means of bearings 38. Idler shaft 40 is in vertical registry with drive shaft 36 and is rotatably mounted between the lowermost ends of the frame members 30 by means of bearings 42. A pair of spaced-apartment drive sprockets 44 are rigidly secured to the drive shaft 36. A pair of idler sprockets 46 are each in registry with a respective one of the drive sprockets 44 and are rigidly secured to the idler shaft 40. A pair of endless conveyor chains 48 are provided; each of the conveyors 48 is trained between a respective set of drive and idler sprockets. A plurality of cutting blades 50 are transversely positioned in and are rigidly secured to the outer periphery of the conveyor chain 48 by suitable fastening means. A pair of cover members 88 are each rigidly secured to the outward side of a respective frame member 30. The outer ends of the drive shaft 36 extend through the frame members 30 and are rotatably supported by bearings 90 secured to the inner face of the cover members 88. Similarly the outer ends of the idler shaft 40 extend through the frame members 30 and are rotatably supported by bearings 92 secured to the inner face of the cover members 88. A pair of power drive sprockets 56 are each in vertical registry with a respective drive sprocket 46. A drive chain 60 is trained between each set of drive and idler sprockets 56 and 58. A worm wheel 52 is keyed to each end of the idler shaft 40 and is in vertical registry with a respective drive sprocket 56. A drive chain 60 is trained between each set of drive and idler sprockets 56 and 58. A worm wheel 52 is keyed to each end of the drive shaft 36 between the cover member 88 and drive sprocket 56. A worm gear 54 is formed on the forward end of the drive shaft 26 and is in driving engagement with the worm wheel 52.

The floating linkage by which the conveyor 82 to the dozer blade 24 will now be described in greater detail. A pair of transversely spaced-apart lower links 94 are each pivotally mounted at their forward end to a respective one of the pivot pins 80 and are rotatably mounted at their rearward end to the idler shaft 40 at a location between the idler sprocket 58 and cover member 88. A pair of transversely spaced-apart upper links 96 are each pivotally attached at their forward end to a respective pivot pin 96 which is in vertical registry with the lower pivot pin 80. The rearward end of each link 96 is pivotally attached to a transversely extending pin or bolt 98 which in turn is rigidly mounted between the cover member 88 and frame member 30. A pair of extensible hydraulic rams 100 are provided on either side of the attachment 79 to vertically adjust the conveyor 82 relative to the dozer blade 24. Each of the rams 100 is pivotally secured at its head end to the dozer blade 24 by means of a mounting pin 102. The rod 104 of each ram terminates in a clevis which encompasses the rearward end of the link 96 and is pivotally mounted on pin 98. Selective extension and retraction of the rams 100 by means of conventional hydraulic controls (not shown) will raise and lower respectively the conveyor 82 relative to the dozer blade 24 which is pivotally secured to the parallelogram arrangement of the linkages. Thus the operator of the vehicle may selectively vary the depth of cut which the blades 50 of the conveyor 22 will make below the lower margin of the dozer blade 24.
In the operation of either of the embodiments of FIGURES 2 or 4 it is apparent that I have provided a novel device which will solve a difficult dozing problem with compacted earth material. The operator of a vehicle with an elevating dozer blade attachment of the present invention can readily adjust floating linkage mechanism in the manner described so that the desired depth of cut is obtained. While the vehicle is moving forward the power take-off is engaged so that the conveyor will operate in a counterclockwise direction as viewed in either of FIGURES 2 or 4. The blades 50 will excavate or cut raw earth material adjacent the lower margin of the scraper blade 24; the blades 50 will then elevate the excavated material during their upward travel in the conveyor housing; as the blades 50 rapidly move over the top of the conveyor the earth material will move forward by the action of centrifugal force and cascade downwardly over the upper margin of the scraper blade 24; the loosely divided earth material will be deposited on the ground in front of the dozer blade where it will easily flow or "boil" into the contour of the blade so that it can be easily distributed.

In either of the embodiments the floating linkage mechanism may be modified so that the conveyor is at its uppermost position where the blades 50 will not travel below the lower margin of the scraper blade 24. The power take-off may then be disengaged to stop the conveyor and either of the elevating dozer blade attachments 18 or 79 may then be used in the manner of a regular dozer blade. It is also apparent that with the attachment 79 of the modified form of the invention the entire conveyor assembly 82 may be removed so that the dozer blade 24 may be operated in the regular manner.

It will be understood that various changes in the details of the invention may be made without substantially departing from the scope of the invention as claimed.

What I claim is:

1. In a construction vehicle having a dozer blade for moving earth and similar material, the combination including: conveyor means mounted between the blade and the vehicle to excavate and elevate the material; and means to vertically adjust the conveyor means relative to the blade to vary the amount of material being excavated.

2. In a construction vehicle having a forwardly facing dozer blade for moving earth and similar material, the combination including: conveyor mounted adjacent the rearward side of the dozer blade, the conveyor having a plurality of cutting blades for excavating the material below the blade and lifting the material over the upper margin of the blade; and means to adjust the conveyor vertically with respect to the blade to vary the amount of material being excavated.

3. In a construction vehicle having a forwardly facing dozer blade for moving earth and similar material, the combination including: conveyor mounted adjacent the rearward side of the dozer blade, the conveyor comprising a plurality of cutting blades mounted for vertical movement and means for moving the blades to excavate the material below the dozer blade, to lift the excavated material over the upper margin of the dozer blade, and to deposit the material in front of the blade.

4. In a construction vehicle having a forwardly facing dozer blade for moving earth and similar material, the combination including: a vertically disposed housing mounted adjacent the rearward side of the dozer blade; an endless conveyor mounted in the housing for moving the material in a generally vertical transverse plane; a plurality of spaced-apart cutting blades mounted on the conveyor for excavating material below the lower margin of the dozer blade and depositing the material over the upper margin of the blade.

5. In an attachment for a construction vehicle used in dozing earth and similar material in which the vehicle has forwardly extending push arms, the combination including: a dozer blade mounted on the push arm means; and, other means mounted behind the dozer blade to loosen the material below the blade, the other means further operating to lift the loosened material over the upper margin of the blade and to deposit it in front of the blade.

6. In an attachment for a construction vehicle used in dozing earth and similar material in which the vehicle has push arm means, the combination including: a vertically extending conveyor mounted on the dozer blade rearwardly thereof; a plurality of cutting blade means mounted for vertical movement on the conveyor to excavate the material below the blade and elevate the excavated material over the upper margin of the dozer blade, the blade means further operating to deposit the excavated material in front of the blade.

7. In a material dozing attachment for a construction vehicle having push arm means, the combination including: a dozer blade mounted on the push arm means; a vertically extending conveyor for moving the material on the rearward side of the dozer blade for vertical movement with respect thereto; and an endless conveyor mounted in the housing, the conveyor having a plurality of spaced-apart transversely extending cutting blades to excavate the matter at the lower margin of the blade and to lift the material over the upper margin of the blade.

8. In a material dozing attachment for a construction vehicle having push arm means, the combination including: a dozer blade mounted on the push arm means; a transversely extending dozer blade; and linkage means to mount the dozer blade on the forward side of the conveyor means, the conveyor being positioned with its lower end extending below the lower margin of the blade and with its upper end adjacent the upper margin of the dozer blade to deposit excavated material in front of the dozer blade.

9. In an attachment for a construction vehicle used in dozing earth and similar material, in which the vehicle has forwardly extending push arm means, the combination including: conveyor means mounted on the push arm means; a transversely extending dozer blade; and, other means mounted behind the dozer blade to loosen the earth material below the blade, the other means further operating to lift the loosened material over the upper margin of the blade and to deposit the excavated material in front of the blade.

10. In an attachment for a construction vehicle used in dozing earth and similar material in which the vehicle has push arm means, the combination including: conveyor means mounted on the push arm means; a transversely extending dozer blade; and, other means mounted behind the dozer blade to loosen the earth material below the blade, the other means further operating to lift the loosened material over the upper margin of the blade and to deposit the excavated material in front of the blade.
the forward ends of the links; and means to move the dozer blade in a vertical plane relative to the housing.

13. In an attachment for a construction vehicle used in dozing earth and similar material in which the vehicle has forwardly extending push arm means, the combination including: a dozer blade mounted on the push arm means; and conveyor means operating to excavate the material, to elevate the excavated material above the upper margin of the blade, and to deposit the material in front of the blade, said conveyor means being mounted on the dozer blade at a position between the blade and the vehicle.

14. In an attachment for a construction vehicle used in dozing earth and similar material in which the vehicle has forwardly extending push arm means, the combination as defined in claim 13 and further including means to vertically adjust the conveyor means relative to the blade.

References Cited
UNITED STATES PATENTS
473,023 4/1892 Scott 37—102
881,942 3/1908 Nicholson 37—102
1,506,263 8/1924 Souhigian 37—8
1,617,111 2/1927 Heronimus 37—102 XR
3,024,546 3/1962 Cramer 37—86
3,296,715 1/1967 Jass et al. 37—8

ABRAHAM G. STONE, Primary Examiner.
A. E. KOPECKI, Assistant Examiner.