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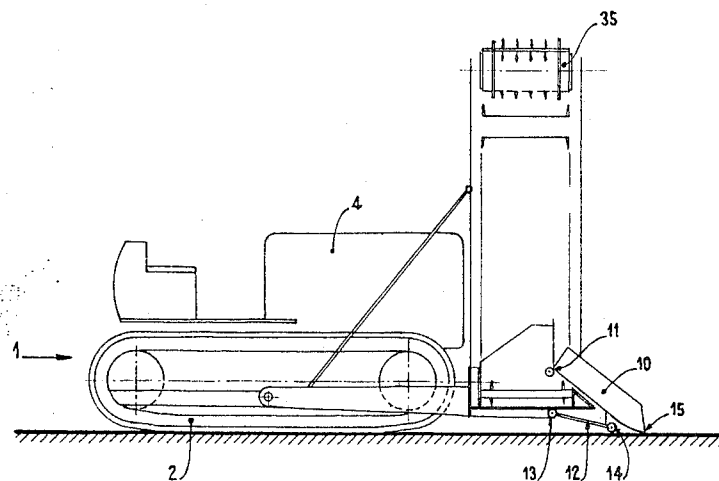
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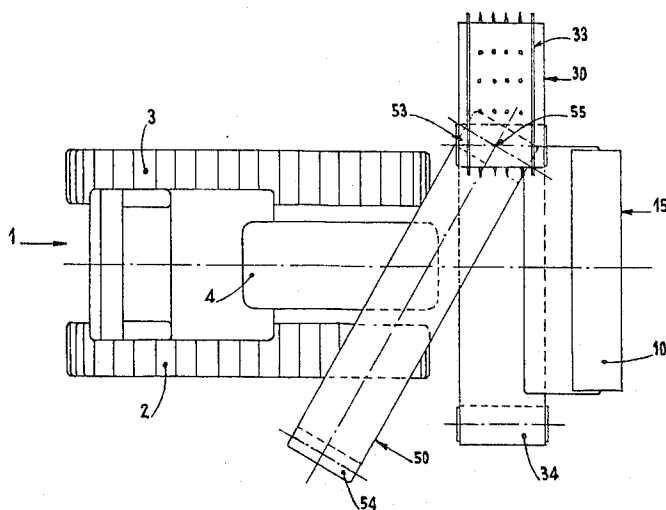
CONTINUOUS LOADER FOR BULK MATERIAL

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—Fig. 1—



—Fig. 2—

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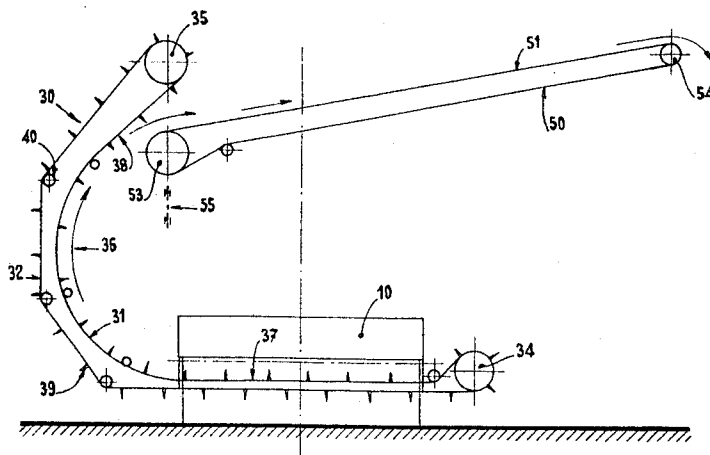
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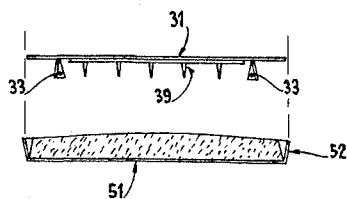
CONTINUOUS LOADER FOR BULK MATERIAL

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— Fig. 3 —



— Fig. 4 —

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CONTINUOUS LOADER FOR BULK MATERIAL
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9 Claims. (Cl. 214—91)

The present invention relates to a continuous loader for bulk material. In particular, the invention is concerned with a bulk loader comprising a mobile apparatus.

The continuous removal of bulk materials is a common operation in road construction or canal construction techniques or in the working of saline marshes. The ideal apparatus for such removal should—

(a) have the ability either to deposit the removed materials to form a bank along the sides of the excavation formed, or to load them continuously on vehicles on which they can be taken away;

(b) include a bucket capable not only of taking up the materials previously detached from the ground but also of digging into the ground when it is not too hard;

(c) be of sufficiently small dimensions and be sufficiently well balanced to permit mounting on the chassis of a conventional bulldozer;

(d) have a relatively low initial cost.

Structures of the type described which have previously been employed by the prior art are incapable of achieving the above requirements in combination. It has, in fact, been found that existing structures are more often heavy and bulky and require a high initial investment.

It is, accordingly, an object of this invention to provide a loader for bulk material which combines certain ideal characteristics in a mobile apparatus.

It is a more specific object of this invention to provide a bulk loader which is adapted to recover and deposit material in an efficient manner and which can be easily associated with a conventional bulldozer apparatus.

It is a further object of this invention to provide a bulk loader which is characterized by extremely good balance and which can be manufactured with a relatively low initial cost.

These and other objects of this invention will appear hereinafter and for purposes of illustration but not of limitation, specific embodiments of this invention are shown in the accompanying drawings in which:

FIGURE 1 is a diagrammatic elevational view of an apparatus characterized by the features of this invention;

FIGURE 2 is a plan view of the structure shown in FIGURE 1;

FIGURE 3 is a diagrammatic front elevational view of the loader mechanism; and,

FIGURE 4 is a diagrammatic illustration of the junction between conveyor belts in the construction.

The subject matter of the present invention relates to a continuous loader for bulk materials for use on a mobile apparatus, the loader being well balanced, of moderate dimensions, and of low initial cost. The loader can be used for the mechanical collection of salt from saline marshes and is capable either of depositing the materials collected in a heap or loading them onto a vehicle. It will be apparent, however, that the structure is suitable for a variety of uses.

The loader according to the invention is preferably mounted on a tractor running on crawler tracks or wheels and includes a shovel mounted at the front of the tractor, and preferably having a cutting-action. The shovel, which is pivotably mounted, has a width at least equal to the overall width of the running gear, and the shovel is pushed by a hydraulic jack secured to the tractor. A first endless belt conveyor with a belt perpendicular to the axis

of travel of the tractor is positioned so that it is horizontal at its lower portion and then assumes a concave ascending form, the concavity being directed towards the axial plane of the tractor. The speed of travel of the belt is sufficient to ensure that the centrifugal acceleration imparted to the conveyed material predominates over the influence of gravitational force on the material. The structure also includes a second belt conveyor, which is slightly inclined relatively to the horizontal so that, when the loader-carrying tractor advances, the material collected by the shovel is discharged to the first conveyor which, in its turn, projects it onto the second conveyor. The material then falls either into a vehicle in which it is taken away from the working site, or to the place where it is desired to form a heap.

In the example illustrated in the accompanying drawings, the loader proper is mounted on the tractor 1 carried by the crawler tracks 2 and 3. The engine 4 of the tractor also operates the loader.

The shovel 10, the shape of which is adapted to the nature of the materials to be loaded, and which may be interchangeable, is of a width at least equal to the overall width of the crawler track assembly 2, 3. It is pivotably mounted at the point 11 and is pushed by the tractor by means of a rod 12. One end 13 of the rod can be displaced horizontally whereas the other end 14 is pivotably connected to the shovel 10 by a ball joint. The end 13 is operated by the hydraulic jack controlled by the driver of the tractor, who can thus regulate the position, in the vertical sense, of the cutting edge 15 of the shovel.

The first endless belt conveyor 30 is mounted transversely on the front of the tractor 1. It comprises a conveyor belt 31-32 made of a natural or artificial elastic material such as rubber or an elastomer, which is provided with rims 33 and is operated by the driving drum 35, the other drum 34 being free. The belt is curved so as to constitute a cylindrical surface whose base is substantially an arc of a circle 36 prolonged by two straight segments 37 and 38. The speed of translational movement of the belt is such that the material conveyed remains applied against the belt 31 by centrifugal force until it flows off at the upper portion of the belt. The belt 31, 32 is provided with metal rakes 39 whose base, covered with a covering consisting of a material identical to that constituting the belt, is bolted or otherwise adhered to the belt. It may also be reinforced by means of transverse metal frame elements so as to have good transverse rigidity without modifying its longitudinal flexibility. In its curved portion, the belt is held by external rollers 40.

The material projected by the conveyor 30 is received by a second conveyor 50 whose belt 51 is wider than that of the conveyor 30. This second conveyor is preferably provided with rims 52 (see FIGURE 4). The second conveyor is driven by the driving drum 53, the other drum 54, which is the reversal drum for the belt at the outer end, being free. Since the drum 54 can be of very light material, this arrangement permits substantial reduction in the weight of the overhung end of the conveyor 50, thus making it possible to give the conveyor a considerable reach without unbalancing the entire assembly.

The conveyor 50 may be fixed or it may be movable about a vertical axis 55 situated in the vertical plane containing the axis of the drum 53. With this latter arrangement it is possible to vary the material discharge distance relative to the axis of the tractor.

The apparatus operates in the following manner: when the tractor 1 advances, the shovel 10 whose cutting edge 15 has been regulated to the desired height, collects the material (which it has, if appropriate, itself dug out of the ground). Since the height above the ground of the point of articulation 11 is low, the mere displacement of

the tractor is sufficient to make the material ascent to this point, and to make it flow onto the first lateral conveyor 30. The material is then carried along by the belt 31 by means of the metal rakes 39, and then applied against the concave portion of the belt which is moved at a high translational speed. The material is finally projected on to the second conveyor 50 which pours it off at the desired place, either loading a vehicle or constructing a mound with the said material.

By way of a practical example, the applicants use a loader mounted on a conventional bulldozer having a power of 150 kilowatts with a hydraulic gear box. The loading means occupy the place normally occupied by the control means for the bulldozer shield. The shovel 10 is three meters in width, the point of articulation 11 is 60 centimeters from the ground, and the translational speed of the belt 31, 32 is 4 meters per second. A delivery of 1,000 metric tons per hour is obtained.

It will be apparent that it is possible to modify the apparatus described without departing from the scope of the invention. Thus, the control means for the shovel may be different, comprising for example a control by a shaft secured to the mobile member of the jack and being displaced in a slideway fixed to the shovel. In addition the shovel may be provided with a proper shield of the type used in bulldozers. Furthermore, the conveyor belt 50 may be made mobile about the horizontal axis of the drum 53 so as to enable the discharge height to be regulated. Any apparatus comprising at least one of the characteristic features described is covered by the present invention.

In the following claims the term "tractor" is used in a broad sense to include any self-propelled vehicle capable of supporting the mechanism of this invention.

It will be understood that various other changes and modifications may be made in the constructions described above which provide the characteristics of this invention without departing from the spirit thereof particularly as defined in the following claims.

That which is claimed is:

1. A continuous loader for bulk materials adapted to be mounted on a tractor comprising a pivotally mounted, cutting action shovel, means secured to said tractor for imparting pivoting action to said shovel, a first conveyor mounted on said tractor behind said shovel, said first conveyor defining a substantially horizontal bed portion which moves adjacent the rear edge of said shovel whereby material picked up by the shovel is discharged onto said first conveyor, an ascending concave portion included in said first conveyor adjacent said horizontal portion for receiving material therefrom, means for driving said first conveyor at a translational speed sufficient to impart centrifugal force to the material conveyed in excess of the gravitational force applied to said material whereby said material remains on the surface of said first conveyor as the material is moved from said first horizontal portion to said concave portion, a second conveyor mounted on said tractor and located adjacent the upper end of said first conveyor whereby material collected by the shovel can be passed to said first conveyor and then passed onto said second conveyor and whereby said second conveyor can thereafter discharge said material, and means for driving said second conveyor.

2. A loader in accordance with claim 1 wherein each of said first and second conveyors comprise continuous belt conveyors.

3. A loader in accordance with claim 1 wherein said shovel has a width at least equal to the width of said tractor.

4. A loader in accordance with claim 1 wherein said second conveyor is inclined upwardly from a point adjacent the end of said first conveyor.

5. A loader in accordance with claim 1 wherein said first conveyor is characterized by concavity in an intermediate portion, said first conveyor including a straight portion at the upper end of said concave portion with said material being passed from said straight portion onto said second conveyor.

6. A loader in accordance with claim 1 wherein said shovel is adapted to pass material to said first conveyor as said tractor is moved forwardly.

7. A loader in accordance with claim 2 wherein the belt of the first conveyor is provided with metal rakes which facilitate the entrainment of collected material on said first conveyor.

8. A loader in accordance with claim 2 wherein the belt of the first conveyor is provided with reinforcing means adapted to improve the transverse rigidity of the belt without affecting its longitudinal flexibility.

9. In a method for the handling of bulk materials wherein a tractor is provided with a shovel, said tractor being adapted to move along the ground and said shovel being adapted to collect said bulk materials as the tractor moves, the improvement comprising the steps of providing a continuous loader for receiving the bulk materials from the shovel, said loader including a first conveyor mounted on said tractor behind said shovel, said first conveyor defining a substantially horizontal bed portion which moves adjacent the rear edge of said shovel whereby material picked up by the shovel is discharged onto said first conveyor, said first conveyor also including an ascending concave portion, driving said first conveyor at a translational speed sufficient to impart centrifugal force to the material conveyed in excess of the gravitational force applied to said material whereby said material remains on the surface of said first conveyor when the material is passed onto said horizontal portion by said shovel and then onto said concave portion, providing a second conveyor mounted on said tractor with the end of said second conveyor being located adjacent the upper end of said first conveyor, passing said material from said first conveyor to said second conveyor, and driving said second conveyor for discharging said material from the opposite end of the second conveyor.

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