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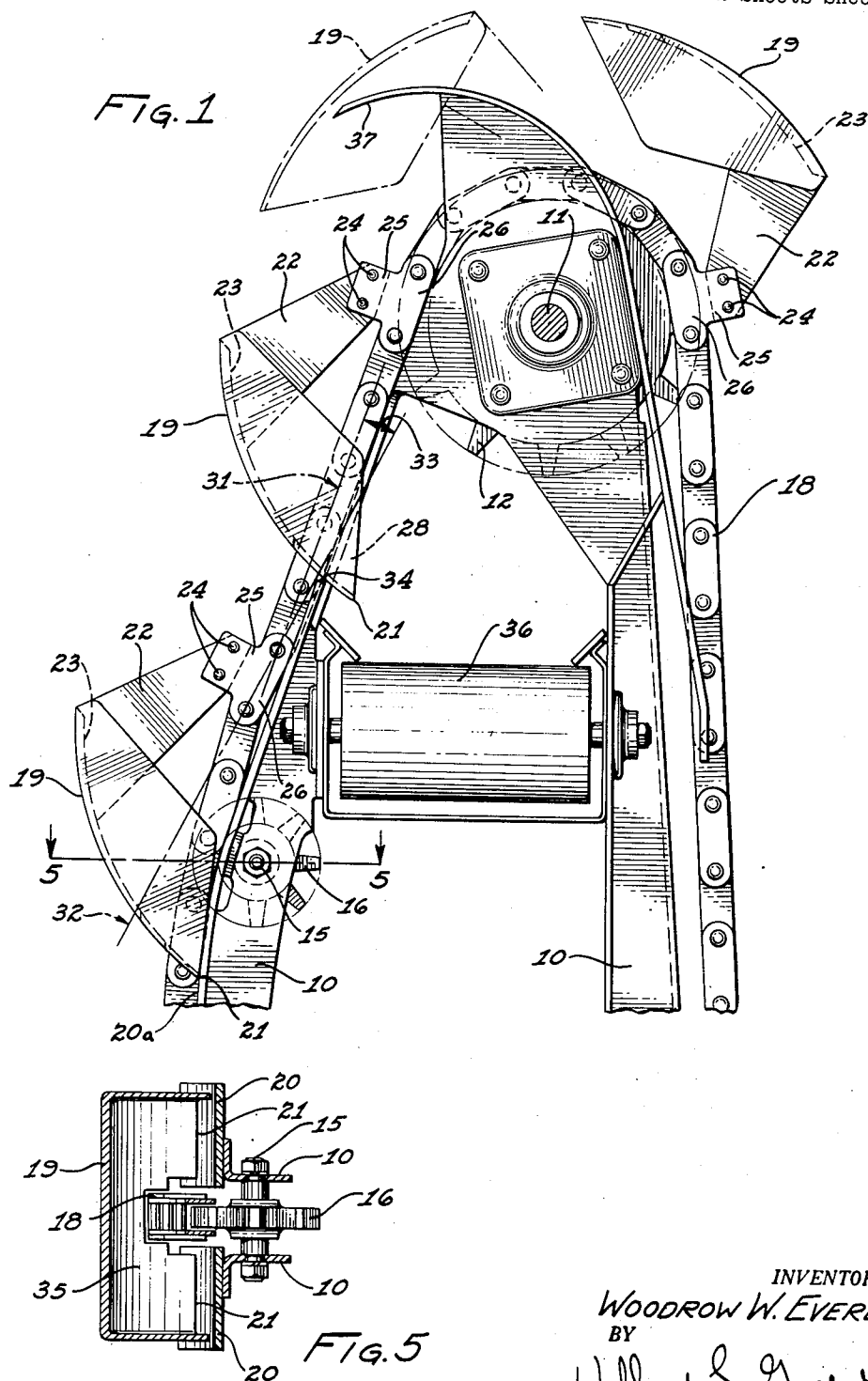
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BUCKET CONVEYER

Filed Jan. 29, 1951

2 Sheets-Sheet 1



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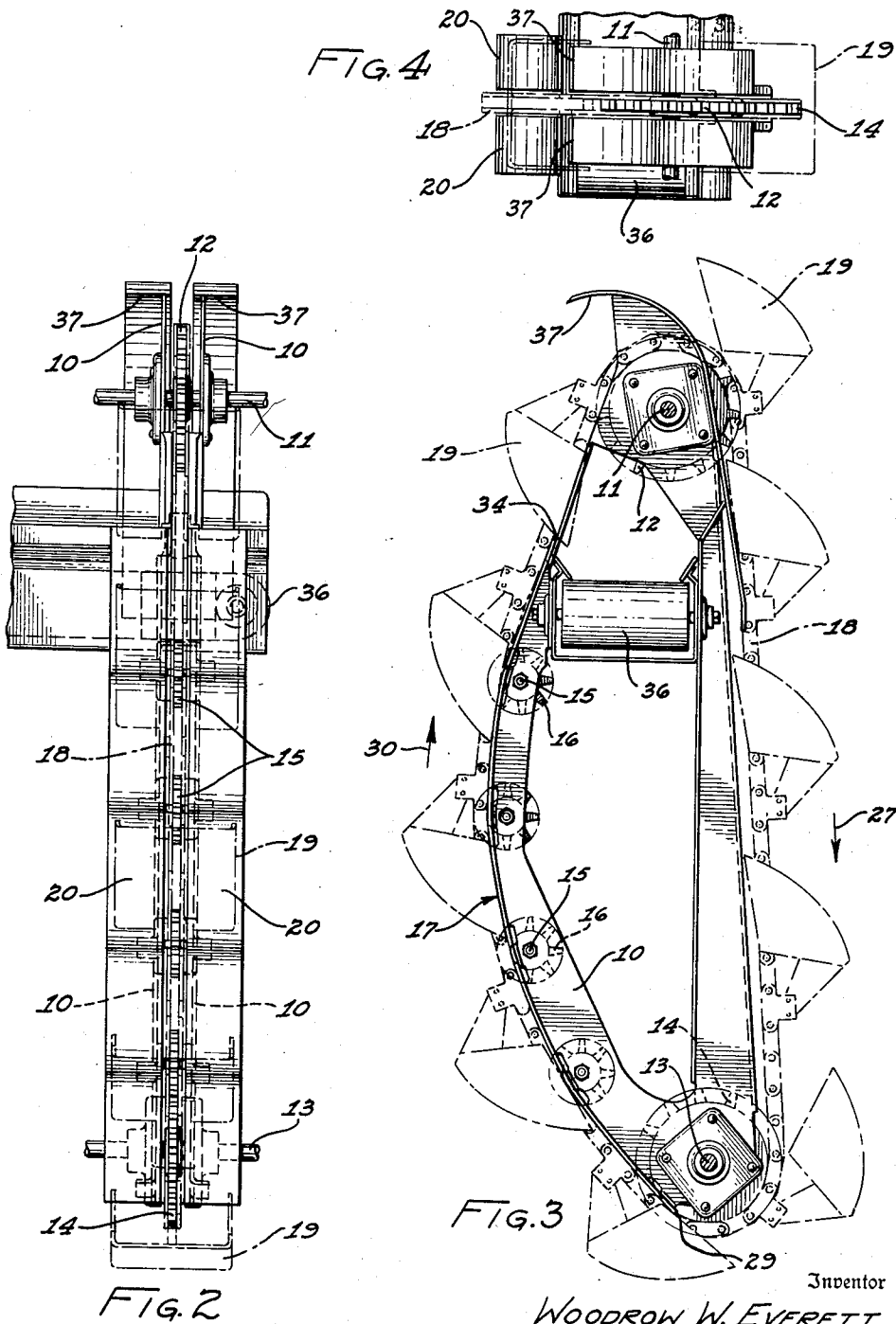
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2 Sheets-Sheet 2



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BUCKET CONVEYER

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Application January 29, 1951, Serial No. 208,349

10 Claims. (Cl. 198—144)

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This invention relates to a bucket conveyor for trenching machine and is more particularly directed to conveying apparatus adapted for cutting trenches.

One of the objects of this invention is to provide an improved means for supporting and guiding the links of an endless conveyor provided with buckets for separating material from a mass and elevating it to the desired point of delivery.

Still another object of this invention is to provide an improved chain line bucket conveyor for a trenching machine in which the material carried in the buckets is more efficiently and positively deposited on a transverse conveyor of a trenching machine.

Still another object of this invention is to provide an improved endless chain bucket conveyor utilizing open back buckets by which the soil is retained in the buckets by sliding action of the rear portion of the buckets against the guide plates and then to automatically empty the buckets by a flipping discharge action at the upper end of the chain line to deposit the dug material on a transverse conveyor.

Still another object of this invention is to provide an improved open back bucket conveyor line for trenching machine in which the soil is raised from the ditch being dug with high efficiency and with a minimum of moving operating parts.

It is also an object of this invention to provide in connection with a ladder type or straight line type of chain line bucket conveyor, an arcuate or curved upward return path of travel for the bucket chain line.

Still another object of this invention is to provide a bucket chain line supporting arrangement in which the return downward movement of the buckets follow a straight line movement while the return upward digging movement of the buckets follow an arcuate or curved path for smoother approach and attack to the earth being dug by the buckets.

And still a further object of this invention is to provide a ladder type bucket chain line arrangement in which the buckets travel straight downwardly into a ditch being dug and then gradually approach the end of the ditch being dug along an arcuate path of increasing steepness until the buckets finally approach a true vertical path of movement and then return backward further beyond said movement and conclude in a flipping action to throw the soil upon a conveyor.

Further features and advantages of this in-

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vention will appear from a detailed description of the drawings in which:

Fig. 1 is an enlarged view of the upper portion of a conveyor of the bucket chain line type incorporating the features of this invention.

Fig. 2 is a front elevation of the supporting frame for the bucket chain line of Fig. 1.

Fig. 3 is a side elevation of the apparatus shown in Fig. 2.

Fig. 4 is a plan view of the apparatus shown in Fig. 3.

Fig. 5 is an enlarged horizontal section on the line 5—5 of Fig. 1.

As one exemplary embodiment of this invention there is shown the main supporting frame 10 for the bucket chain line which has journaled in its upper end a driving shaft 11 upon which is fixed the upper driving sprocket 12. The frame 10 may be supported and the shaft 11 driven in any well known manner such for example as shown in my co-pending patent application, Serial No. 236,910 filed July 16, 1951. On the lower end of the frame 10 is journaled the shaft 13 which carries the lower idler sprocket 14. Journaled on studs 15 fixed in the frame 10 are idler sprockets 16 spaced apart along a substantially arcuate path of travel indicated generally at 17 defined by the front curved portion of the frame 10. The drive and supporting chain 18 for supporting the buckets 19 is arranged to operate over the driving sprocket 12, the idler sprocket 14, and the four idler sprockets 16.

To form the front curved arcuate path 17 there is fixed on the frame 10 two spaced plates or slide tracks 20 which are engaged by the rear edges 21 of the buckets 19, the buckets in turn having the mounting and supporting arms 22 attached integrally to the intermediate portion of the bucket at 23, and which arms 22 are connected by suitable means 24 to an extension portion 25 of a link 26 of the conveyor chain 18.

As the shaft 11 is rotated to cause the chain line to move in the direction indicated by the arrow 27 the buckets proceed downwardly, freely suspended on the chain 18, along the rear portion of the frame 10 and around the clockwise rotating idler sprocket 14, Fig. 3, to engage the soil and pick up a load of dirt. It is to be noted that the rear portion of the buckets at 28 are open so that the buckets enter in the nature of a spade into the soil and pick up their load as they round the idler sprocket 14. Just as they begin to tip up to a more vertical position the rear edges 21 of the buckets engage the edge 29 of the guide plates 20 in such a way as to close

off the back portion of the buckets and hold the soil therein as the buckets move upwardly in the direction indicated by the arrow 30. As the buckets continue upwardly under these conditions the rear edge 21 of each bucket is held firmly against the surface 20a of the plates 20 by the preloading arrangement provided by partially tilting the buckets from their normal freely suspended position on the chain. It is to be noted that the line of normal travel or pulling action 31, Fig. 1, of the chain 18 is such that when the bucket has its rear edge 21 in engagement with the surface 20a of the plates 20, that the line 32 passing through the center of the link 26 containing the supporting portion 25 for a bucket do not coincide but are separated by an angle of preloading as indicated at 33. Thus, so long as the rear edge 21 of the buckets are in sliding engagement with the plates 20 the soil is firmly held in the buckets. The arcuate path of travel of the chain upwardly between idler 14 and sprocket 12 makes possible the firm holding of the bucket backs against the plates 20.

As the buckets approach the top of their travel the edges 21 flip past the top edge 34 of the plates 20, flipping in a direction to the right in Fig. 1, so as to throw the soil from the inside 35 of the buckets on to the transverse conveyor 36 from where it is conveyed out to the side of the trench in a well known manner. To further assist in removal of soils of wet or sticky character there is provided a bucket scraper 37 rigidly attached to the frame 10 which scrapes out the last vestiges of material from the buckets and causes it to be deposited on the conveyor 36.

It is important to note that the above mentioned flipping action at the time the buckets reach the end 34 of the plates 20, provides a most efficient way of discharging the soil from the buckets without the use of any additional mechanism for agitating, moving or adjusting the buckets other than the normal operating chain of the bucket chain line. There has thus been provided a highly efficient and simplified mechanism for manipulating the buckets of a trencher machine to effect the digging and discharge of soil from the buckets.

What is claimed is:

1. In a bucket conveyor for a trenching machine comprising a frame, an endless chain mounted for movement on said frame, a series of constantly open back buckets suspended on said chain, convex arcuate slide track means on said frame slidably engaging and closing the constantly open backs of said buckets, and rear edges on said buckets slidably engaging said track means to partially swing said buckets from the normal free suspended position on said chain so as to hold dug material in said buckets during the uptravel of said chain, and means including an upper terminal edge on said slide track engaged by said rear edges of said buckets to effect an inertia discharge of the material from said buckets at the top of said uptravel of the chain by causing an instantaneous return of said buckets to free suspended position on said chain.
2. In a bucket chain line for a trenching machine, a frame, and endless chain mounted for movement on said frame, a series of constantly open back buckets mounted on said chain, an arcuate convex guide plate means on said frame, a rear edge on said buckets slidably engaging said guide plate to slidably hold the dug material in said buckets during the uptravel of said buckets on said frame and guide plate means, and

means including a top edge on said guide plate means engaged by said rear edge of said buckets to cause a flipping inertia discharge action for said buckets at the conclusion of said uptravel of said chain, and a transverse conveyor for receiving the discharged material from said buckets after said flipping operation.

3. In an endless chain bucket conveyor for a trenching machine or the like, a frame, upper and lower chain supporting sprockets on said frame, a plurality of idler sprockets on the digging side of said frame, an endless chain guided against sidewise movement on said sprockets, a series of constantly open back buckets freely suspended on said chain, an arcuate convex plate means on said frame, rear edges on the back of said buckets slidably engaging said plate means during the uptravel of said chain to hold said buckets in partially tilted position from their free suspended position on said chain while said rear edges are in sliding contact with said plate means.

4. In an endless chain bucket conveyor for a trenching machine or the like, a frame, upper and lower chain supporting sprockets on said frame, a plurality of idler sprockets on the digging side of said frame, an endless chain guided against sidewise movement on said sprockets, a series of constantly open back buckets freely suspended on said chain, an arcuate convex plate means on said frame, rear edges on the back of said buckets slidably engaging the convex surface of said plate means during the uptravel of said chain to hold said buckets in partially tilted position from their free suspended position on said chain, and means including a top terminal edge on said plate means engaged by said rear edges on said buckets to cause said buckets to flip return to free suspended position on said chain at the upper end of the uptravel of said chain on said frame.

5. In a trenching machine bucket conveyor mechanism having, a frame, means for movably supporting an endless chain on said frame, a series of constantly open back buckets freely suspended on said chain for travel in a normal path of chain movement, guide plate means fixed on said frame, rear edges on said buckets slidably engaging said guide plate means for deflecting said buckets from free suspended position on said chain in a prestressed manner relative to the normal direction of movement of said chain.

6. In a trenching machine bucket conveyor mechanism having a frame, means for movably supporting an endless chain on said frame, a series of constantly open back buckets suspended on said chain for travel in a normal path of chain movement, rear transverse edges on said buckets, means fixed on said frame engaging said rear edges of said buckets for deflecting said buckets in a prestressed manner from the normal suspended position of said buckets on said chain, said means comprising a convex arcuately disposed bucket engaging surface fixed on said frame slidably contacting said rear edges of said buckets to slidably hold the dug material therein during the upward travel of said buckets, and means comprising an upper terminal edge portion of said bucket rear edges engaging surface near the upper portion of said frame engaged by said bucket rear edges to cause said buckets to flip back to normal suspended position on said chain, to inertially discharge the bucket contents on a transverse conveyor mounted on said frame.

7. In a trenching machine bucket conveyor

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mechanism having a frame, means for movably supporting an endless chain on said frame, a series of constantly open back buckets suspended on said chain for travel in a normal path of chain movement, rear transverse edges on said buckets, means fixed on said frame slidably engaging said rear edge of said buckets for deflecting said buckets in a prestressed manner from the normal suspended position of said buckets on said chain, said means including a convex arcuately disposed bucket engaging surface fixed on said frame slidably contacting the rear edges of said buckets to slidably hold the dug material therein during the upward travel of said buckets, and means comprising an upper terminal edge portion on said bucket engaging surface near the upper portion of said frame engaged by said rear bucket edges to cause said buckets to instantly flip back to normal suspended position on said chain to inertially discharge the bucket contents on a conveyor carried on said frame, and a bucket scraper fixed on said frame operative to engage inside of said buckets as they rotate about the upper end of said frame in normal suspended position on said chain.

8. In a trenching machine bucket conveyor comprising a frame, an upper and a lower chain carrying sprocket journaled on said frame, a plurality of idler sprockets fixed on the digging side of said frame, an endless chain supported on all of said sprockets, a plurality of constantly open back digging buckets suspended on said chain, rear discharge edges on said buckets engaging slide tracks fixed on said frame adjacent said sprockets, convex arcuate slide surfaces on said tracks slidably engaging said rear discharge edges of said buckets to deflect said buckets from normal suspended position on said chain, and a terminal edge portion at the upper end of said slide tracks engaged by said rear edges to cause said buckets to instantly flip to discharge their contents at the upper portion of travel of said chain, and transverse conveyor means supported in said frame adjacent said terminal edge to receive the contents from said buckets during said flipping movement.

9. In a trenching machine bucket conveyor

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comprising, a frame, a series of constantly open back buckets, rear discharge edges on said buckets, endless chain supporting sprockets at the upper and lower ends of said frame, means fixed on said frame for supporting an endless chain in an arcuate path of travel convex toward the leading digging side of said bucket chain line, means for suspending said buckets on said chain, means on the return line side of said bucket chain line to move said buckets in free suspended condition on said chain in straight line downward movement to digging position, and means fixed on said frame slidably engaging said rear discharge edges to deflect said buckets from said free suspended position on the leading digging side of said bucket chain line.

10. In a trenching machine bucket conveyor, a frame, a series of constantly open back buckets, rear discharge edges on said buckets, endless chain supporting sprockets journaled at the upper and lower ends of said frame, further sprocket means journaled on said frame to engage said chain in an arcuate path of chain travel between said upper and lower supporting sprockets convex toward the leading digging side of said bucket chain line, an endless chain carried on said sprockets, a plurality of pivotally connected links in said chain, means for rigidly mounting each of said series of buckets to a link of said chain, arcuate guide means adjacent the arcuate path of travel of said chain including a convex slide track engaging said rear discharge edges of said buckets to tilt the lower rear portions of said buckets in the direction of said leading digging side from the normal suspended position of said buckets on the links of said chain.

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