

Nov. 19, 1946.

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2,411,228

PORTABLE CART DUMPING APPARATUS

Filed June 2, 1944

2 Sheets-Sheet 1

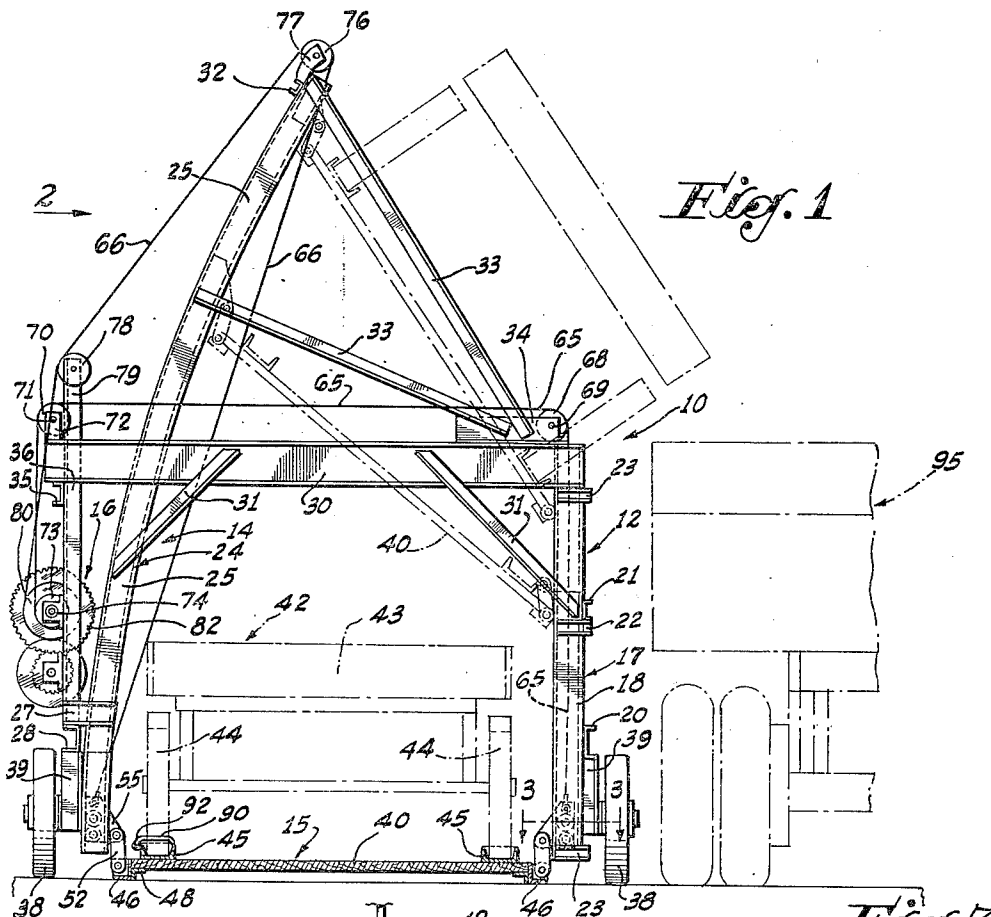


Fig. 1

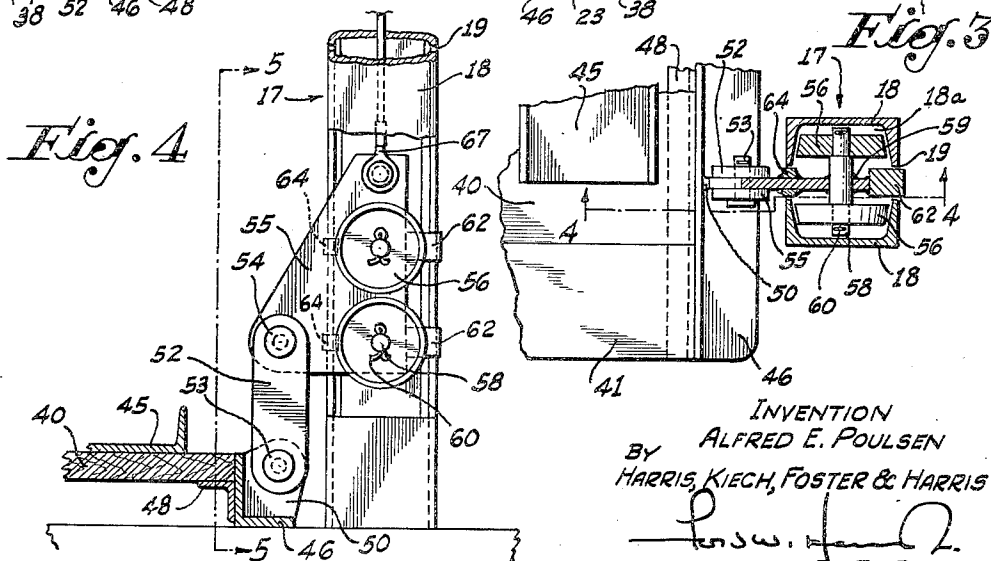


Fig. 2

Fig. 3

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FOR THE FIRM
ATTORNEYS

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Fig. 2

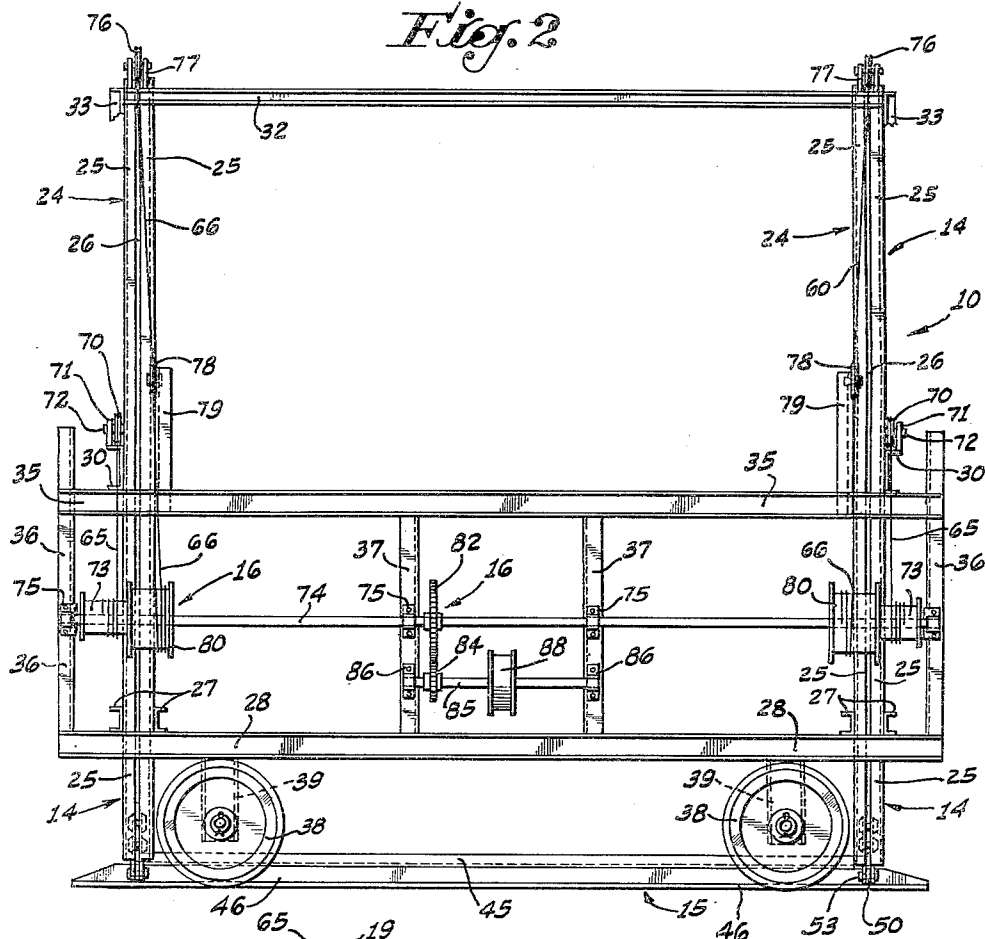
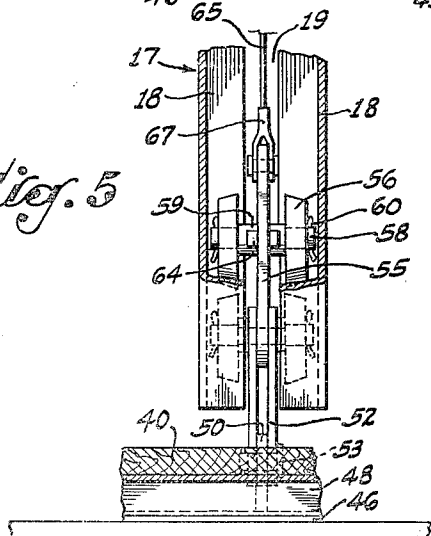


Fig. 5



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UNITED STATES PATENT OFFICE

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PORTABLE CART DUMPING APPARATUS

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Application June 2, 1944, Serial No. 538,395

15 Claims. (Cl. 214—123)

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This invention relates to means for elevating and unloading various types of receptacles, and especially relates to dumping elevators.

An object of the invention is to provide means for lifting relatively small, low carts and automatically dumping their contents into trucks or similar relatively large receptacles at gathering points preparatory to further disposition elsewhere. The invention, however, has other applications.

A special use has been found in the handling of produce in the field where vegetables and the like of appreciable bulk, such as head lettuce and cabbage, are grown in great quantities and must be hand picked and placed in vehicles for transport. A common practice of driving into the fields large trucks into which the pickers toss the cut produce causes much loss in possible picking efficiency, which is incurred because of the distance through which the picker must move each piece that has been removed from a stalk or otherwise harvested. Basket gathering likewise requires much loss of time because of the necessity for carrying the filled baskets to gathering centers. It has been discovered that if low carts of appreciable capacity are pushed through lettuce fields, for example, the pickers can easily toss the lettuce heads into the carts from their working positions near the ground's surface. Thus, a high picking speed is developed and strings of these carts when filled can be readily assembled and drawn by small tractors to suitable loading locations for transfer into large trucks or trailers.

The present invention further improves gathering efficiency by providing means for quickly dumping the carts. Since devices according to the invention are to be used in large fields where the work shifts from one location to another, it is a further object of the invention to provide a portable device which may be moved from one gathering location to another as the work progresses.

It is a further object to provide an elevator structure having carriage means to receive the receptacle to be dumped, such carriage means being adapted to be raised and lowered upon a suitable support or framework and mounted therein for automatic dumping when raised to the desired limit of elevation. A further feature is found in means to lift one side of such a carriage means more rapidly than the other side whereby the dumping is automatically effected when the desired elevation is reached. It is a further feature of the invention to accomplish

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such automatic dumping through the medium of spaced guide means in which the carriage means or other lifted means is mounted and the guide means in one side of the structure is curved to conform with a lifting differential between lifting means which raise opposite sides of the carriage or other lifted means to different heights in order to effect the dumping operation. Another object and feature of the invention is found in the employment of spaced facing channel irons which provide between them a guide passage into which extends bracket means which carry guide rollers or equivalent devices traveling within the channel irons, a portion of the bracket means being disposed outside of said passage and provided with carrying means such as a platform or other device for lifting a loaded receptacle.

A further feature of the invention provides means, such as drums of unequal sizes, which receive lifting devices such as cables or ropes, and are adapted to be actuated by a tractor, or truck or other powered vehicle readily available in the field at the place of dumping operations, whereby one side of a lifting carriage or the like may be raised more rapidly than the opposite side by a single pulling movement of the powered vehicle.

Other objects and features of the invention will be apparent to those skilled in the art by reference to the accompanying description and drawings.

In the drawings, wherein one embodiment of the invention is shown for the purpose of illustration only,

Fig. 1 shows in full lines an end elevation of a dumping elevator mechanism of the present invention, a cart to be dumped being shown in broken lines, both in normal position and in dumping position, a truck to receive the dumped load being also shown in broken lines;

Fig. 2 is a side elevation of the dumping structure shown in Fig. 1 and is taken from the left side of the showing of Fig. 1, as indicated by the arrow 2;

Fig. 3 is a cross-sectional detail of carriage-supporting structure taken from the line 3—3 of Fig. 1;

Fig. 4 is a vertical sectional detail, showing parts in end elevation, as indicated by the line 4—4 of Fig. 3; and

Fig. 5 is a vertical side elevation taken from the line 5—5 of Fig. 4, portions being broken away.

Referring particularly to Fig. 1, the apparatus

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shown in the drawings comprises as its principal parts: a main framework 10 which is provided with a vertically disposed relatively short side 12 and a vertically disposed relatively elongated side 14, an elevatable carriage 15, and a lifting mechanism 16.

The short side 12 of the framework 10 comprises corner posts or standards 17 each of which is in the form of a pair vertically disposed channel irons 18 facing each other to serve as guide rails or tracks and provide between them a vertical guide passage 18a, as best shown in Figs. 3 and 5. The spacing between the edges of each pair of channels 18 provides a vertical pathway 19 at each side of each pair of the channel irons 18, which pathways 19 act as guide channels for mechanisms extending into the passages 18a. All of the vertical channel irons 18 constituting the standards 17 of the side 12 of the framework 10 are connected by means of a horizontally disposed, longitudinally extending lower channel bar 20 which constitutes a tie bar tying all of the channel irons 18 together. At an intermediate position the channel irons 18 are tied together by another channeled tie bar 21 extending longitudinally of the side 12 of the framework 10, cooperating brackets 22 being secured to each channel iron 18 to form a more secure joint. In addition, longitudinally extending top and bottom ties 23 are provided as required.

The elongated opposite side 14 of the framework 10 comprises spaced corner standards 24, each of which is in the form of a pair of spaced curved channel irons 25 facing each other to serve as guide rails or tracks and provide between them a vertically extending guide passage corresponding to the vertical passages 18a between the channel irons 18, the spacing of the edges of the channel irons 25 providing pathways 26 (Fig. 2) corresponding with the pathways 19 between the channel irons 18, whereby mechanisms extending into the guide passage between the channel irons 25 may be properly positioned.

A lower portion of each of the channel irons 25 is provided with a short bracket 27 welded thereto and projecting outwardly from the framework, and a horizontally disposed longitudinally extending channel iron 28 is welded to the under side of each of the brackets 27, thereby serving as a tie bar to maintain the relationship between the various channel irons 25.

At each end of the framework 10 a cross beam 30 of channel iron construction is provided, one end of each beam 30 being welded to the upper end of the outer face of the adjacent outer channel iron 18 constituting part of the corresponding standard 17. Also, each cross beam 30 is welded adjacent its opposite end to the outer face of an intermediate portion of the adjacent channel iron 25. For properly bracing the structure, short angle irons 31 are welded to each of the cross beams 30 and to the adjacent channel irons 18 and 25, the irons 31 being disposed in angular relationships, as shown. The curved channel irons 25 extend above the cross beams 30 and the channel irons 18 a distance approximating the length of the channel irons 18 and 25 below the cross beams 30. The tops of the channel irons 25 are connected together by a channeled tie bar 32, and their upper portions above the beams 30 are braced by angle irons 33 whose upper ends are respectively secured to the upper ends and to intermediate portions of the channel irons 25, as shown, the lower ends of

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the angle irons 33 being secured, as by welding, to angle iron brackets 34 welded to the upper faces of the cross beams 30 adjacent the side 12 of the framework 10. In order to maintain proper spacing of the ends of the cross beams 30 adjacent their connections with the channel irons 25, the outer ends of the cross beams 30 are welded to a longitudinally extending horizontally disposed channel iron tie bar 35. The tie bar 35 has its ends welded to uprights 36 which are angle irons whose lower ends are welded to the upper flanges of the lower channel iron tie bar 28, intermediate uprights 37 being welded to intermediate portions of the tie bar 35 and the tie bar 28, as shown in Fig. 2 whereby to provide an auxiliary framework for carrying the lifting mechanism 16.

In order to render the present structure readily portable from one gathering location to another, the opposite sides 12 and 14 of the framework 10 are conveniently provided with wheels 38 which are shown as being journaled in supports 39 that are rigidly secured to the transverse channel iron tie bars 20 and 28.

The carriage mechanism 15 comprises a platform 40 which is supported in the channel irons 18 and 25 at both ends of the framework 10. The platform 40, which may be provided with an inclined approach 41, as indicated in Fig. 3, is adapted to receive a low dump cart 42 which comprises a body 43 having wheels 44, and the platform 40 carries upwardly facing channeled tracks 45 adapted to receive the wheels 44 of the dump cart 42.

For the purpose of carrying the platform 40, a longitudinally extending supporting rail 46 of angle iron construction is provided at each side of the platform 40 and each rail 46 has welded thereto an angle iron 48 upon which the platform 40 rests and to which it is secured. Each end of each rail 46 is provided with a lifting ear 50 welded in position in the angle of the respective rail 46. Each lifting ear 50 is connected with the lower ends of a pair of lifting links 52 pivotally connected to the respective ear 50 at 53, and the upper ends of each pair of links 52 are pivotally mounted at 54 upon a lower portion of a carriage-supporting plate 55. The plates 55 thus constitute elevator arms or brackets supporting the platform 40, and the links 52 permit a limited amount of play laterally whereby to compensate for variations in constructional dimensions.

Each bracket 55 projects between each pair of channel irons 18 and 25 constituting the corner standards of the sides 12 and 14 of the framework 10, whereby to travel in the pathways 19 and 26 provided respectively between the edges of each pair of channel irons 18 and 25.

In the construction shown, each bracket 55 carries two vertically aligned pairs of small tapered guide wheels or rollers 56 which bear upon and are guided by the flanges of the channel irons 18 and 25, respectively, and are mounted with a running fit upon the ends of short axles 58 which are secured in the brackets 55 as by welding at 59, the rollers 56 being conveniently retained upon the axles 58 as by means of cotter pins 60. For the purpose of positioning the elevator brackets 55 in their pathways 19 and 26 between the channel irons 18 and 25, the brackets 55 are provided on their outer edges with spacing guide blocks 62 which ride between the adjacent edges at one side of the adjacent channel irons 18 and 25, and the brackets 55 also have spacing guide blocks 64 welded to their faces for engage-

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ment with the adjacent edges at the opposite sides of the channel irons 18 and 25. Thus, as the elevator brackets 55 are raised and lowered, the rollers 56 travel in the vertical passages formed between the channel irons 18 and 25 respectively and engage the adjacent sides of the channel irons whereby the channel irons act as guide rails, the spacing guide blocks 62 and 64 serving to maintain proper relationships laterally of the brackets 55. At the same time, the two pairs of vertically aligned rollers 56 prevent tipping of the brackets 55 and thereby maintain proper spacing of the pivots 54 and the links 52 from the channel irons 18 and 25.

The elevator brackets 55 which travel in the channel irons 18 of the short side 12 of the framework 10 are adapted to be lifted as by means of wire ropes or cables 65 which are secured to the upper ends of the corresponding brackets 55, and the elevator brackets 55 which travel in the channel irons 25 are adapted to be lifted by means of wire ropes or cables 66, the cables 65 and 66 being connected with the upper ends of their respective elevator brackets 55 as by means of clevises 67 or the like (Fig. 4).

The cables 65 pass upwardly through the passages 18a between the channel irons 18 and over grooved pulleys 68 which are journaled at 69 in the angle iron brackets 34 on the upper faces of the cross beams 30, the cables 65 extending thence across the framework 10 above the cross beams 30 to grooved pulleys 70 journaled at 71 in supports 72 carried upon the opposite ends of the cross beams 30, the cables 65 extending thence to relatively small drums 73 fixed upon a shaft 74 journaled in bearing 75 carried by the uprights 36 and 37, as best seen in Fig. 2.

The cables 66, which are connected with the elevator brackets 55 carried in channel irons 25, pass outwardly through the pathways 26 from the passages within the channel irons 25, as best seen in Fig. 1, and thence pass upwardly and return into the pathways 26, whence they extend over grooved pulleys 76 carried in brackets 77 secured to the upper ends of the channel irons 25, the cables 66 passing thence downward and over grooved pulleys 78 journaled in the upper ends of upright supports 79 secured to the inner face of the channel tie bar 35, the cables 66 continuing downward and being wound around relatively large drums 80 which also are fixed on the shaft 74 adjacent the relatively small drums 73, as indicated in Fig. 1 and best seen in Fig. 2.

By reason of the fact that the drums 73 are smaller than the drums 80, operation of the drums 73 and 80 to wind and unwind the cables 65 and 66 will cause the side of the platform 40 which is connected with the elevator brackets 55 operating in the channel irons 18 to be moved more slowly than the opposite side of the platform 40 which is connected with the elevator brackets 55 actuated by the cables 66. By this arrangement it is possible to obtain different rates of movement of the two sides of the platform 40 by means of the single shaft 74. As shown in Fig. 2, the shaft 74, and the drums 73 and 80, are driven through a large gear 82 fixed on the shaft 74 which meshes with a small gear 84 fixed on a shaft 85 journaled in bearings 86 carried on the uprights 37. The shaft 85 is driven through any suitable drive means secured thereto, such as a slip belt pulley 88 adapted to be operated from a tractor or similar power vehicle or other powered device, whereby the platform 40 and a cart 42 thereon may be lifted by the drive, but allowed

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to return by gravity. By reason of the differential between the circumferences of the drums 73 and 80, the operation of the pulley 88 to drive the shaft 74 winds and unwinds the cables 65 and 66 at different rates with the result that when the platform 40 is raised from its lower, level position, as shown at the bottom of Fig. 1, into the broken line position shown at the top of Fig. 1, it is tilted in order to dump the contents of a cart 42 carried thereon. If required, retaining means such as hooks 90 hinged at 92 to one edge of the channeled tracks 45 which will be uppermost when in elevated position, may be provided to engage and retain the rims of the adjacent wheels 44 when the cart 42 is in the position indicated for dumping the load into a truck or trailer 95.

Operation

In preparing for elevating and dumping the cart 42, the cart is moved into the channels of the tracks 45 on the platform 40, certain of the wheels 44 being located in position on a corresponding track 45 by means of the retaining hooks 90, if required. The belt drive pulley 88 is then actuated from a suitable power plant, such as a tractor or the like, whereby the shaft 85 drives the gears 82 and 84 and causes the shaft 74 to rotate the drums 73 and 80 to wind thereon the cables 65 and 66, respectively. In view of the greater circumference of the drum 80 over the drum 73, the cables 66 are taken up faster than the cables 65. As a result, the elevator brackets 55 to which the cables 66 are attached are lifted at a greater rate than the elevator brackets 55 to which the cables 65 are attached. Thus, the platform 40 and cart 42 carried thereon are gradually moved into an inclined position, for example, that indicated by the intermediate broken line position of the platform 40, the platform 40 and the cart 42 eventually arriving at the broken line position shown at the top of Fig. 1 which is such that the contents of the cart 42 are automatically discharged and fall by gravity into the truck or trailer body 95. For most purposes, the channel tracks 45 provide adequate support for the cart 42 without the necessity of relying upon the hooks 90 or other retaining means, inasmuch as engagement of the sides of the wheels 44 with the flanges of the tracks 45 constitutes adequate retention.

The length of the channel iron guide members 25 with respect to the channel iron guide members 18 is such as to produce the required inclination at the dumping position, and the sizes of the drums 73 and 80 with respect to one another are such as to produce a differential in the elevating rates to cause the platform 40 to be raised into such required dumping position. The curvature of the channel irons 25 which retain and guide the corresponding elevator brackets 55 and their rollers 56 is such as to conform with the differential in the elevating rates of the two pairs of cables 65 and 66. Swinging motion resultant upon the different rates of elevation of the two sides of the platform 40 is cared for by the pivotal connections 53, and a limited amount of variation of the curvature of the channel irons 25 with respect to the elevating differential between the cables 65 and 66 is compensated by the pivotal connections at 54 of the links 52 with the various elevator brackets 55. In the particular structure illustrated in Figs. 1 and 2, the winding ratio of the drums 73 and 80 is intended to be about 1:2 to correspond with a travel of the respective elevator brackets 55 in the channel irons

25 which is about twice as great as the travel of corresponding elevator brackets 55 in the channel irons 18 of the short side of the frame 10.

When the contents of the cart 42 have been dumped, the belt or other drive mechanism operating on the pulley 33 will be allowed to slip, or be otherwise controlled, so that the platform 40 and the empty cart 42 will return to the lowermost position by gravity, whereupon the empty cart 42 may be wheeled off the platform 40 in preparation for receiving a loaded cart. When a major section of a field of produce has been picked and loaded, the side rails 46 carrying the platform 40 will be lifted somewhat from the surface of the ground upon which the device has been resting, as by suitable rotation of the drums 73 and 80, and the structure transferred to a new loading location, which transfer is readily accomplished by reason of the supporting wheels 38.

It will be apparent to those skilled in the art that many modifications of the invention here disclosed may be made within the scope of the appended claims, and it is, therefore, to be understood that the embodiment illustrated is merely exemplary of the generic invention, and that all such modifications as fall within the scope of the claims are intended to be protected thereby.

I claim as my invention:

1. In combination in a dumping elevator: supporting guide means; means guided by said guide means; link means pivotally connected with said guided means and with said carriage means to support said carriage means from said guided means; and means connected with said carriage means adapted to elevate said carriage means and to elevate one side of said carriage means faster than the opposite side for dumping materials carried by said carriage means.

2. In combination in a dumping device: spaced supports having vertical guides; a platform having guided means positioned in said guides, said guided means including brackets hingedly connected with said platform; means adapted to elevate one side of said platform at a given rate; and means adapted to elevate the other side of said platform at a different rate, whereby one side of said platform may be raised more rapidly than the other side thereof to dump the contents of a receptacle carried on said platform.

3. In combination in a dumping device: spaced supports extending vertically and each provided with guide means; a carriage; means supporting said carriage and guided by said guide means; means connected with said carriage-supporting means adapted to elevate said carriage; and elevating means adapted to cause one side of said carriage to be elevated continuously more rapidly than the opposite side, whereby materials loosely borne by said carriage will be dumped upon sufficient elevation of said carriage, the guided means including brackets hingedly connected with the carriage.

4. A combination according to claim 3 wherein the spaced supports include channels which face each other to define guide passages therebetween and the guided means include rollers engaged in said guide passages and carried by said carriage-supporting means.

5. In combination in an elevator structure: spaced vertical supports each of which comprises a pair of facing channel members forming a vertical passage between them, the edges of the sides of the channel members of each pair being spaced to provide pathways between said edges; carriage means disposed between said supports; elevator

brackets connected with said carriage means and disposed in said pathways, said brackets having portions disposed within said passages between said channel members; guide means carried by said brackets and engaging inner side walls of said channel members; and lifting means extending vertically within said passages and connected with said elevator brackets to lift the latter and said carriage means.

6. A combination according to claim 5 wherein said guide means includes vertically spaced means on each bracket engaging a respective channel member to prevent tipping of the respective bracket.

7. In combination in a dumping structure: spaced supports extending vertically, one of said supports being curved relative to the other and extending above and leaning toward the other support; elevatable carriage means connected with and guided by said supports; means to raise and lower one side of said carriage means with respect to one support; and means to raise and lower the opposite side of said carriage means with respect to the opposite support, one of said raising and lowering means being operable at a faster rate than the other to cause said carriage means to tip, and the curvature of said curved support conforming with the rate differential between said raising and lowering means.

8. In combination in a dumping device: an upwardly extending, linear support; an upwardly extending, continuously and uniformly curved support, said curved support being of a different length than said linear support and extending above said linear support and toward the vertical projection of said linear support; and elevatable carriage means disposed between said linear support and said curved support, said carriage means being guided by said supports.

9. In combination in a dumping device: an upwardly extending, linear support; an upwardly extending, continuously and uniformly curved support, said curved support being of a different length than said linear support; elevatable carriage means disposed between said linear support and said curved support, said carriage means being guided by said supports; means for moving one side of said carriage means substantially parallel to said linear support; and means for simultaneously moving the other side of said carriage means substantially parallel to said curved support, the ratio of the rates of motion of the sides of said carriage means being equal to the ratio of the lengths of the corresponding supports.

10. In combination in a dumping device: upwardly extending, spaced supports each including a pair of spaced channels which face each other to define a guide passage therebetween, one of said supports being linear and the other of said supports being curved and said curved support being longer than said linear support; elevatable carriage means disposed between said linear support and the concave side of said curved support; and guided means attached to said carriage means and extending into said guide passages, each of said guided means including a bracket pivotally connected to said carriage by a link member.

11. In combination in a dumping device: upwardly extending, spaced supports each including a pair of spaced channels which face each other to define a guide passage therebetween, one of said supports being linear and the other of said supports being curved and said curved sup-

port being longer than said linear support; elevatable carriage means disposed between said linear support and the concave side of said curved support; brackets pivotally connected to said carriage means, one of said brackets extending into each of said guide passages; rollers mounted on each of said brackets within the guide passage thereadjacent, said rollers being adapted for engagement with said guide passages; and means attached to each of said brackets for moving said brackets simultaneously along the corresponding guide passages, the ratio of the rates of motion of said brackets being approximately equal to the ratio of the lengths of the corresponding supports.

12. In combination in a dumping device; elevatable carriage means; means for moving one side of said carriage means along a vertical path at a desired rate; and means for moving the other side of said carriage means along an inclined, curved path at a different rate, the ratio of said rates being substantially constant for all positions of said carriage means, said carriage means being substantially horizontal in the lowermost position thereof and inclined in the uppermost position thereof.

13. In combination in a dumping device: an upwardly extending linear support; an upwardly extending curved support of different length from that of the linear support and extending above and inclined toward said linear support; elevatable carriage means disposed between said linear support and said curved support; means for moving one side of said carriage means along said linear support at a desired rate; and different means for moving the other side of said carriage means along the other support at a different rate,

the ratio of said rates being substantially constant, said carriage means being substantially horizontal at one extreme position and inclined for the purpose of dumping at the other extreme position.

14. In combination in a dumping device: a spaced support extending vertically and provided with guide means; a carriage; means supporting said carriage and guided by said guide means; means connected with the said carriage-supporting means adapted to elevate said carriage; means adapted to cause one side of said carriage to be elevated more rapidly than the opposite side, whereby materials loosely borne by said carriage will be dumped upon sufficient elevation of said carriage; and means pivotally connecting said carriage-supporting means with the corresponding sides of said carriage, thereby to permit relative swinging motion of said carriage on said supporting means as said carriage tips.

15. In combination in a dumping device: a spaced support extending vertically and provided with guide means; a carriage; means supporting said carriage and guided by said guide means; means connected with the said carriage-supporting means adapted to elevate said carriage; means adapted to cause one side of said carriage to be elevated more rapidly than the opposite side, whereby materials loosely borne by said carriage will be dumped upon sufficient elevation of said carriage; and links pivotally connected to said carriage-supporting means and corresponding sides of said carriage, whereby to permit relative swinging motion and to compensate for structural variations as said carriage tips.

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