

Jan. 16, 1923.

W. G. HOWE ET AL.
CONVEYER.
FILED APR. 27, 1920.

1,442,219.

4 SHEETS—SHEET 1.

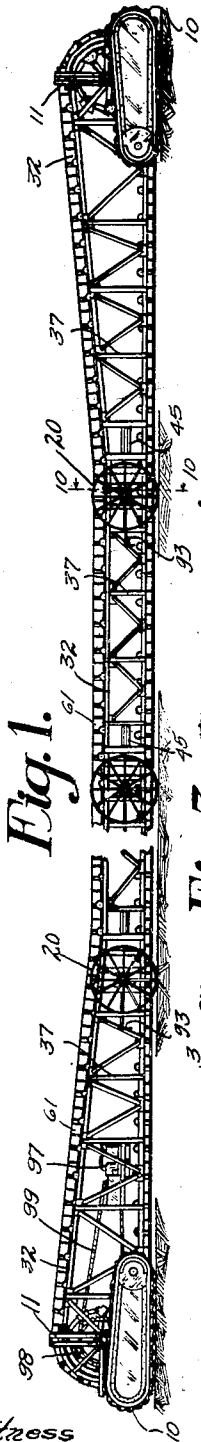


Fig. 1.

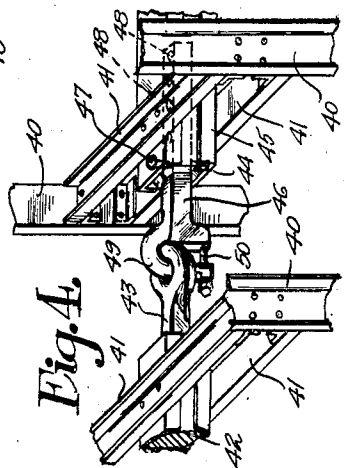


Fig. 4.

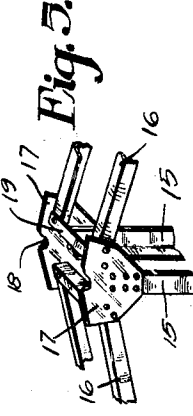


Fig. 5.

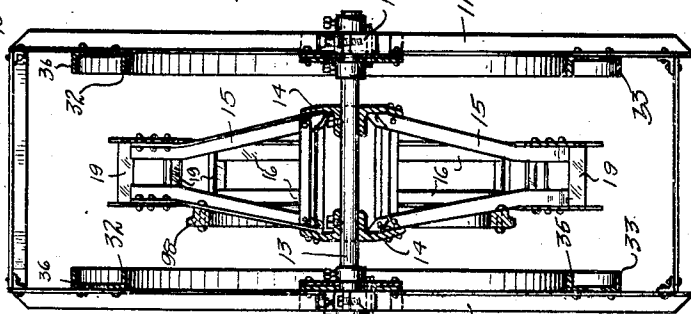


Fig. 3.

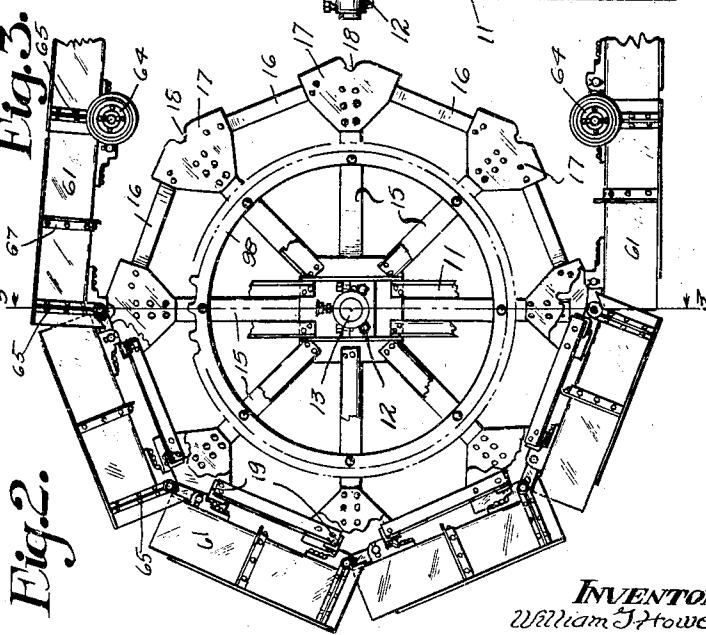


Fig. 2.

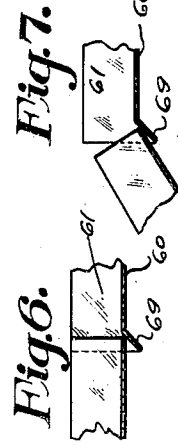


Fig. 6.

Fig. 7.

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Fig. 8.

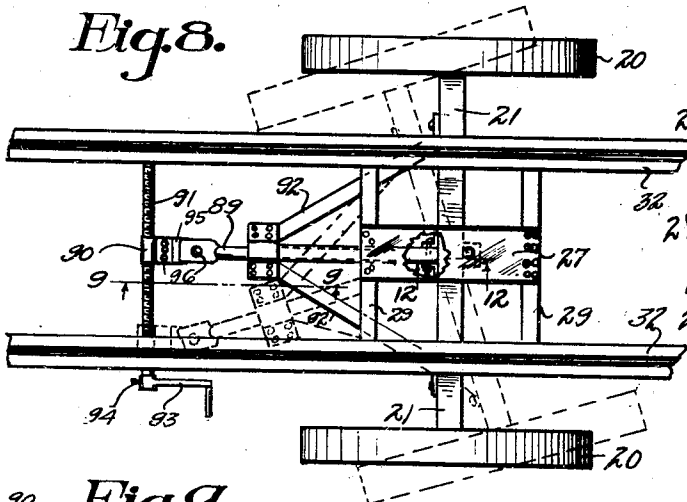


Fig. 25.

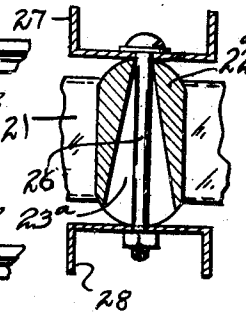
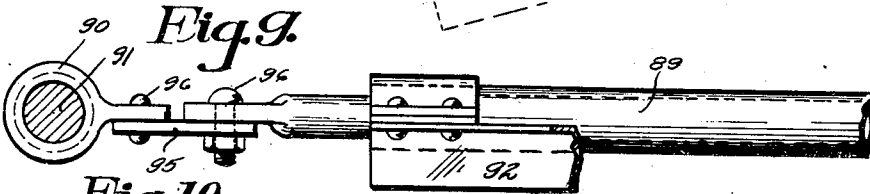


Fig. 10.

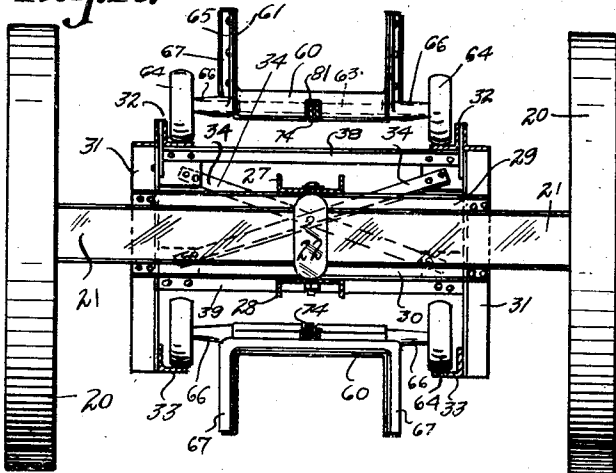


Fig. 11.

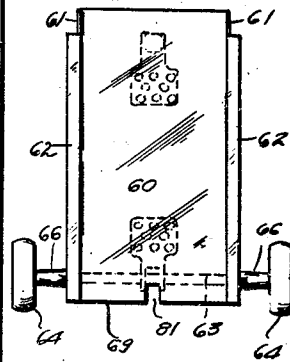
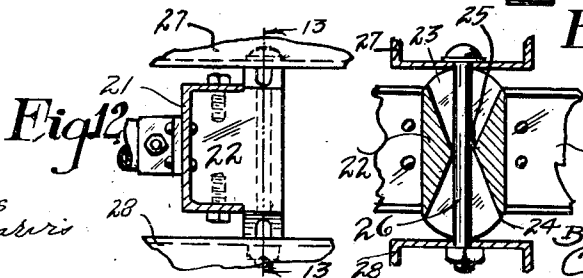


Fig. 13.



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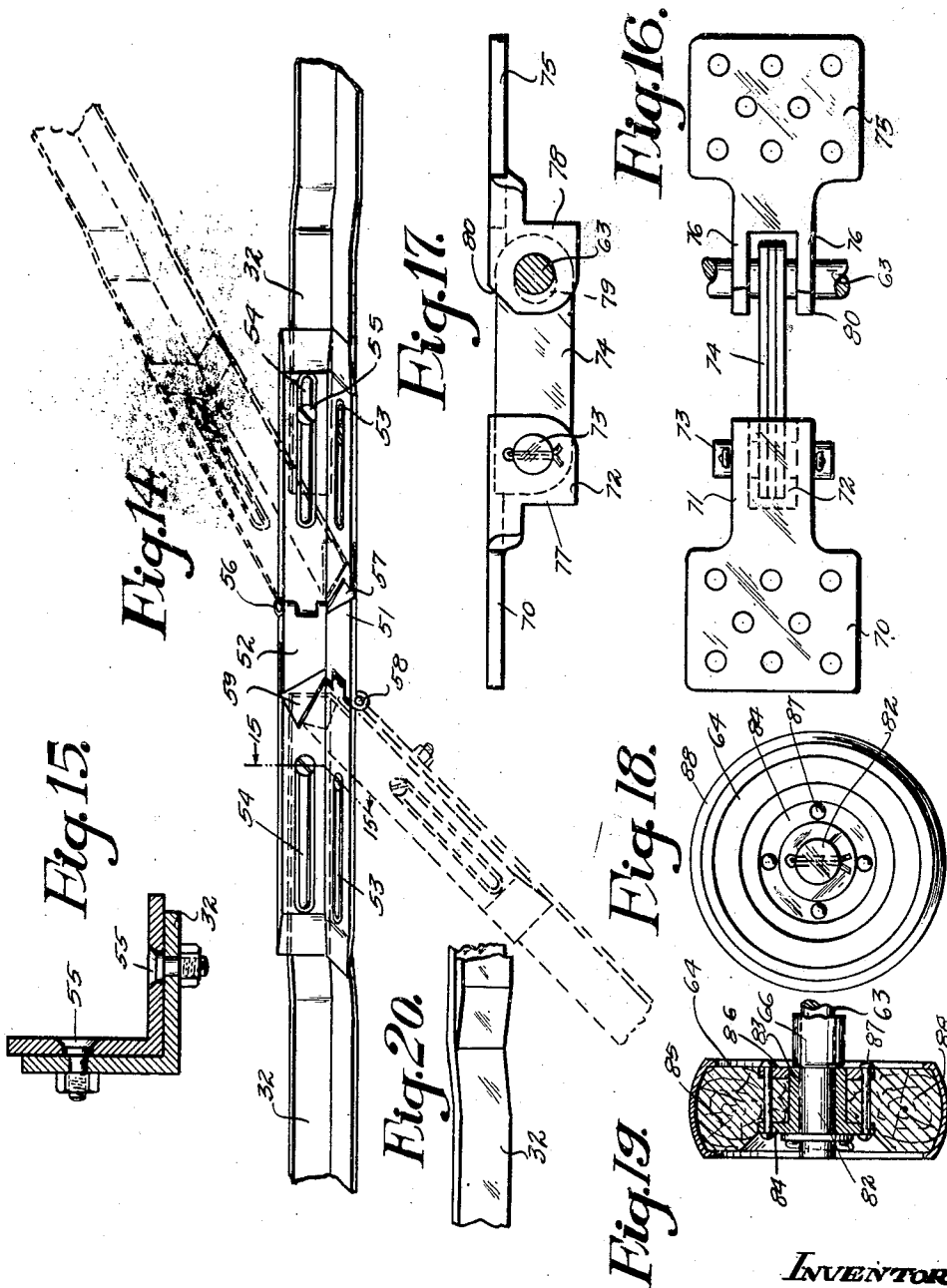
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4 SHEETS—SHEET 3.



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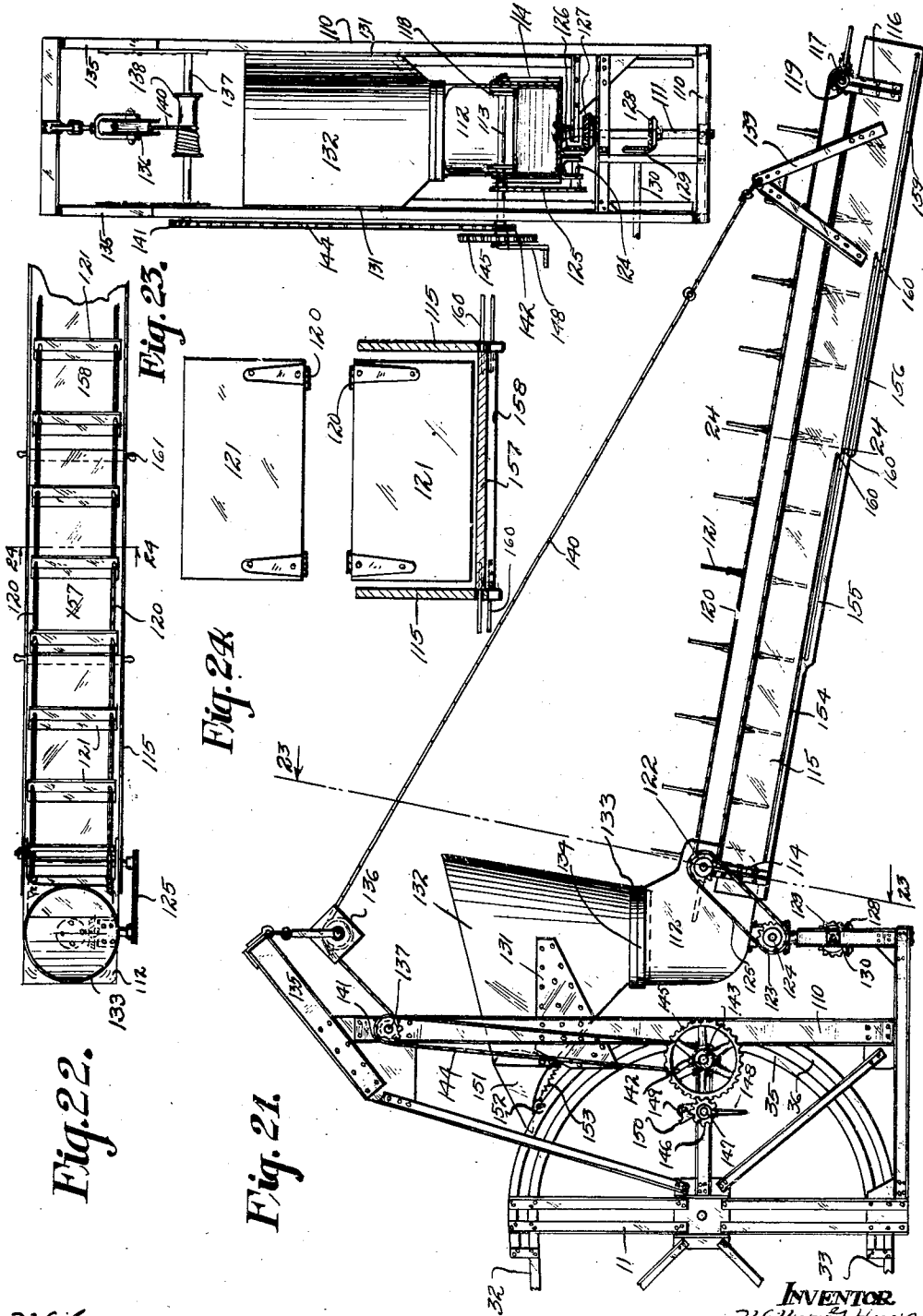
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4 SHEETS—SHEET 4.



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UNITED STATES PATENT OFFICE.

WILLIAM G. HOWE, OF DES MOINES, AND FRED RAY WHITE, OF AMES, IOWA.

CONVEYER.

Application filed April 27, 1920. Serial No. 377,091.

To all whom it may concern:

Be it known that we, WILLIAM G. HOWE and FRED RAY WHITE, citizens of the United States, and residents of Des Moines and Ames, in the counties of Polk and Story, in the State of Iowa, respectively, have invented a certain new and useful Conveyer, of which the following is a specification.

The object of our invention is to provide a conveyer for earth, building materials, and other matter, which is portable on its own supports, and reversable for carrying material in either direction.

A further object is to provide a conveyer having a delivery conveyer of novel construction.

A further object is to provide such a conveyer of the endless type, whereby dirt or the like may be moved for a substantial distance, and may be conveyed in a great variety of directions, the endless conveyer being flexible vertically and horizontally.

Still a further object is to provide such a conveyer made in sections which may be removed or inserted, so that the length of the conveyer may be increased or diminished without interfering with the qualities of the conveyer.

Still a further object is to provide such a conveyer of the general type mentioned, and to provide in the general structure frame sections and track sections having portions so constructed as to permit the flexibility above mentioned.

Still a further object is to provide such a conveyer having a series of cars or conveyer members, and having means for connecting the cars together in such a way as to permit the flexibility of the entire conveyer to exist.

Still a further object is to provide such a conveyer in which the cars are so connected together as to form practically a continuous chute or conveying trough.

Still a further object is to provide such a conveyer having steerable supporting members.

Another object is to provide a conveyer with such steerable supporting members so arranged and constructed that the entire conveyer may be made to assume a curved form and may then be advanced over the ground without changing the curvature of the machine.

Still a further object is to provide such a device having a conveyer member, and having, at the end of the main machine, rotary members over which the conveyer member travels, the parts being so arranged that when one of said rotary members is rotated, it imparts motion to the conveying member, and being so arranged that by reversing the direction of movement of the rotary member, the direction of travel of the conveyer may be reversed.

A further object is to provide such a device having an endless conveyer, and supporting members therefor, with means for so hanging or supporting the endless conveyer on the supporting members that the endless conveyer will maintain its level or horizontal position regardless of unevenness of the ground on which the supporting members rest.

With these and other objects in view our invention consists in the construction, arrangement and combination of the various parts of the device, whereby the objects contemplated are attained, as hereinafter more fully set forth, pointed out in our claims and illustrated in the accompanying drawings, in which:

Figure 1 shows a side elevation of an assembled machine embodying our invention.

Figure 2 shows a side elevation of one end of the machine, the creeping tread members being removed, and parts being broken away for the better illustration of other parts.

Figure 3 shows a detail, transverse, vertical, sectional view taken on the line 3—3 of Figure 2, the cars of the endless conveyer being omitted.

Figure 4 shows a perspective, detail view of the means for connecting two sections of the conveyer track and frame.

Figure 5 shows a detail, perspective view of a portion of one of the large rotary members at the end of the machine.

Figure 6 shows a detail, sectional view of the end of two adjacent cars, showing the manner in which the cars are connected when substantially horizontal.

Figure 7 shows a similar view showing the cars in a slightly different position, while going around the rotary members at the end of the machine.

Figure 8 shows a top or plan view of a

section of the track, illustrating the structure of the steerable supporting wheels.

Figure 9 shows a detail, sectional view taken on the line 9—9 of Figure 8, of part of the mechanism for controlling the steerable supporting wheels.

Figure 10 shows a transverse, vertical, sectional view taken on the line 10—10 of Figure 1.

Figure 11 shows a top or plan view of one of the cars or conveyer member sections.

Figure 12 shows a detail, sectional view taken on the line 12—12 of Figure 8, illustrating part of the mechanism for supporting the endless conveyer member and the frame therefor on the supporting devices.

Figure 13 shows a detail, sectional view taken on the line 13—13 of Figure 12.

Figure 14 shows a detail, perspective view of a portion of one of the tracks illustrating the joint therein.

Figure 15 is a detail, sectional view taken on the line 15—15 of Figure 14.

Figure 16 is a top or plan view of the device for coupling together two of the cars or conveyer member sections.

Figure 17 is a side elevation of the same, the axle being shown in section.

Figure 18 shows a side elevation of one of the car wheels.

Figure 19 shows a vertical, sectional view of said wheel.

Figure 20 shows a top or plan view of a small portion of one of the tracks.

Figure 21 shows a side elevation of a portion of one end of the machine with the delivery conveyer mounted thereon.

Figure 22 is a top or plan view of part of the delivery conveyer and elevating mechanism therefor.

Figure 23 is a transverse, detail, sectional view taken on the line 23—23 of Figure 21.

Figure 24 is a detail, sectional view taken on the line 24—24 of Figure 22; and

Figure 25 is a detail, sectional view of a modified form of the track and frame supporting device.

At the opposite ends of our machine there are provided suitable supporting devices. In the drawings herewith which illustrate a form in which our invention may be embodied, we have shown creeping tread devices indicated by the reference numeral 10 for supporting the ends of the machine for portability.

Suitably supported on the creeping tread members 10 at each end of the machine is a frame of proper construction indicated generally by the reference character 11.

The frame 11 is provided with suitably spaced bearings 12 for a transverse shaft 13. Mounted on the shaft 13 at each end of the machine is a rotary device having the spaced hubs 14 fixed on the shaft 13. Extending outwardly from the hubs 14 are

frame members 15. The outer ends of the members 15 are connected by connecting members 16. The members 15, extending outwardly from the respective hubs 14, are arranged in pairs as shown for instance in Figures 3 and 5. The adjacent members 16 on each side of the rotary member are spaced apart, and are connected with each other and with their appropriate frame members 15 by plates 17. These plates 17 have in their outer edges notches 18 designed to receive the axles of the cars or conveyer member sections hereinafter more fully described. The plates 17 are also fastened to the frame member 15.

The outer edges of the plates 17 are cut to fit against the bottoms of the cars or conveyer member sections as the cars travel around the rotary members at the ends of the machine.

Extending transversely between the plates 17 at the outer ends of each pair of members 15 are angle-bars 19 spaced from each other circumferentially of the rotary member.

At suitable points in the length of the machine we have provided supporting devices which may in each instance consists of a pair of laterally spaced wheels 20, connected by an axle which may be in the form of a channel bar 21.

Secured to the axle 21 near the middle thereof, and projecting therefrom longitudinally of the machine is a block 22. The longitudinally projecting portion of the block 22 also projects upwardly and downwardly from the axle 21, and the upper surface of the upwardly projecting portion is curved from its central part laterally and downwardly in both directions, while the lower surface of the downwardly projecting portion is curved laterally and upwardly in both directions from its central portion, as indicated at 23 and 24 (Fig. 13).

Extending from the top to bottom through each block 22 is a hole 25, which receives what we may call a king pin 26, which at its upper and lower ends is connected with longitudinally extending channel bars 27 and 28. The hole 25 is gradually enlarged laterally in both directions from its central portion to the top of the block 22 and to the bottom of the block 22, to permit the king pin 26 to rock laterally in said hole.

In Figure 25 we have shown a modified form of the block 22, indicated by the numeral 22^a, which has extending through it from top to bottom a hole 23^a for the king pin 26, which hole is gradually widened laterally from top to bottom of the block 22^a. At the ends of the respective channel bars 27 and 28 are cross frame members 29, and 30. The ends of the cross frame members 29 and 30 at the opposite sides of the ma-

chine are connected by upright frame members 31. Suitably supported at the upper ends of the members 31 are the track members 32 which may be made of angle-iron, and supported on the lower ends of the upright members 31 are the track members 33, also preferably made of angle-iron.

It will be noted that the upper and lower tracks are so arranged that the wheels of the cars, forming part of the endless conveyor, are supported on the track whether the cars are then forming part of the upper or of the lower stretch of the conveyor.

The frame which supports the track is braced by diagonal cross braces 34. It will be noted that the track supporting frame is supported on the axle on the upper curved surface 23 of the block 22, at a point considerably above the center of gravity of said frame, so that the track supporting frame is hung on the supporting axle.

Assuming that the supporting wheels 20, just described, are those adjacent to one of the rotary members at the end of the machine, it may be said that the upper track members 32 extend to the said adjacent rotary member and are curved downwardly around the outer parts of the said rotary member, as illustrated in Figure 21, the curved portion being indicated by the reference character 35. The lower track members extend to the adjacent rotary member, and are curved around the outside thereof, spaced from and outside the portion 35, as indicated at 36.

The upper and lower track members are connected between the ends of the machine and the next adjacent supporting wheels 20 by frame members 37.

The upper and lower track members are spaced apart farther at the ends of the machine than at the central portions thereof, so that the tracks extend upwardly slightly from the pair of wheels 20 nearest the end of the machine toward the end of the machine in their upper stretch.

As many sections of track and track supporting frame may be inserted between the pair of wheels next to one end of the machine, and the pair of wheels next to the other end of the machine as may be desired.

Each section includes a supporting device such as that shown in Figures 8 and 10, and heretofore described, a track supporting frame and track members thereon, similar to those already described. For connecting two sections of track and track supporting frame, the following means have been provided.

The laterally spaced track members 32 of the upper track are connected by cross frame members 38 at suitable intervals, and the lower track members are connected by similar cross members 39, which are spaced above the track members 33 and are connect-

ed at their ends with the upright members 31 or the upright members 37. At the adjacent ends of the two sections of the track supporting frame and track, each of said sections is provided with a pair of laterally spaced upright channel-bar frame members 40. The members 40 of each section are connected by vertically spaced cross members 41. Secured between the channels 41 at one end of each section of track supporting frame is a block 42 mounted in which is a projecting eye-bolt 43. Secured between the channels 41 of the opposite end of each track supporting frame section, is a pair of channel-bar members opening toward each other, and receiving and holding between them a block 44. These last channel-bar members are numbered 45.

Slidably received in the block 44 is a bar 46 which may be adjustably secured in various positions by means of a bolt 47, extending through the channel-bars 45 and through one of a series of holes 48 in the bar 46. At one end of the bar 46 is a hook member 49 designed to be received in the eye of the eye-bolt 43 for forming a universal joint.

Extended through the hook member 49 is a screw-bolt 50 whereby the hook member 49 and the eye-bolt are locked against accidental displacement.

We shall now describe the method of jointly connecting the tracks of two sections of conveyor tracks and supporting frames.

In Figures 14 and 15 we have illustrated one of the joints in the track. At the joint between sections of track the ends of the track members 32, for instance, adjacent to each other at the joints are spaced apart and connected by a jointed track member consisting of the horizontal flange 51 and the vertical flange 52. These flanges are provided with horizontally elongated slots 53 and 54 which receive screw-bolts 55 which bolts are fastened to the track members 32 or 33 as the case may be.

It will be seen that by providing the elongated slots it is easy to originally assemble the machine, and to connect the track sections together in a series.

The flange 52 is provided with a joint 56 shown in Figure 14. The flange 51 adjacent to the hinged joint 56 is split as at 57, and is provided with a notch as shown, to allow for the free movement of the track members according to the action of the hinge 56.

The flange 51 is provided with a hinge 58, and the flange 52 adjacent to said hinge is split and provided with a suitable notch 59 to permit proper action of the hinge 58.

It will be seen that by the provision of the hinges just described, the tracks, are made to a certain extent flexible: That is

to say, one section of track may be bent upwardly or downwardly with relation to the adjacent section, or may be bent laterally in either direction with relation to the adjacent section. Insomuch as the track supporting frame is connected by the track members, it will be seen that the whole conveyer track and frame is capable of a great degree of flexibility both horizontally and vertically.

It may be noted that the joints in the upper and lower tracks are arranged to register with each other vertically. The joint formed by the eye-bolt 43 and the hook 49 is arranged in a vertical plane mid-way between the hinges 58 and 56 and in a horizontal plane mid-way between the upper and lower tracks.

Our endless conveyer proper consists of a series of cars or conveyer members connected together in a manner which will now be described.

Each of said cars or conveyer members comprises a bottom 60 and side members 61. The side members 61 have outwardly extending flanges 62 at their upper edges, which at one end of the car terminate slightly short of the end of the car.

Extending across the car beneath the bottom thereof and near one end of the car, is an axle 63, on the ends of which are wheels 64. At the sides of the car near the ends thereof are upright braces 65 on the outer sides of the side walls, which have at their ends bearings 66 for the axle.

Near the middle of the car an angle-iron brace extends entirely around the sides and bottom of the car, as indicated by the reference character 67.

One end of each car is telescoped within the adjacent end of the next car when the cars are horizontal.

The bottom of each car at one end is inclined slightly downwardly as at 69 (see Figure 7). In Figures 16 and 17 we have shown secured to the bottom of each car near the end thereof a plate 70, having a tongue or the like 71 projecting toward the next adjacent car.

Formed on the tongue 71 is a socket 72. Extending across the socket is a pin 73. One or more connecting links 74 are arranged with their ends projected into the sockets 72 mounted on the pin 73.

Secured to the bottom of the other end of each car underneath the car, is a plate 75 having a pair of spaced arms or the like 76, projecting toward the next adjacent car.

Extending through the arms 76 is the axle 63. The links 74 project between the arms 76 and are mounted on the axle 63.

It will be noted that the socket 72 is provided with a shoulder 77, and that the arms 76 are provided with shoulders 78, the pur-

pose of which will be hereinafter more fully explained.

It will be noted that the holes in the links 74 indicated by the reference character 79, which receive the axle 63, are elongated horizontally somewhat as illustrated in Figure 17, by dotted lines, to allow some play of the axle 63 in said holes.

It may be noted in this connection also that the space in the interior of the socket 72 is slightly greater laterally than the lateral thickness of the link 74, so as to allow said link to slide laterally somewhat on the pin 73, for permitting sufficient play of the parts to permit the lateral flexibility of the entire machine. Such lateral flexibility is also made possible by the peculiar shape of the holes 79.

The ends of the arm 76 farthest from the plate 75 and adjacent to the bottom of the car are bevelled as at 80, so as not to interfere with the bottom of the adjacent car when the cars are going around the rotary member at the end of the machine.

The downwardly turned bottom member 69 is provided with a notch 81 to receive the link 74. At the end of the axle 63 are reduced spindles 82, on which are mounted the wheels 64, shown in Figures 18 and 19, which wheels consist of a hub, comprising a sleeve 83, having at one end a flange 84. Mounted on the sleeve 83 is a wooden wheel member 85 in which the flange 84 is counter-sunk as illustrated in Figure 19.

A disc 86 is mounted on the sleeve 83 at the end thereof opposite the flange 84, and said flange 84 and disc 86 and wooden wheel member 85 are clamped together by suitable bolts 87.

Pressed on the periphery of the wooden wheel member 85 is a metal tire 88. For steering the wheels 20 of the various sections of the track and track supporting frame, we have provided the following means.

Secured to the axle 21 and extending longitudinally along the machine therefrom, is a rod 89 having in its end farthest removed from the axle a screw-threaded bearing 90 in which is mounted a screw-threaded shaft 91.

Brace members 92 extend from the frame member 89 diagonally to the axle 21 to which they are secured.

The ends of the shaft 91 are rotatably but non-slidably mounted in any suitable way on some of the frame members which support the track.

On one end of the shaft 91 there is detachably mounted a crank 93 by means of a set-screw 94. It will be seen that by manipulating the crank 93 and thereby rotating the shaft 91, the bearing 90 will be shoved laterally in the machine, and the

wheels 20 may be moved to a variety of positions for steering them.

In Figure 8 we have shown in dotted lines one position to which the wheels may be moved for the purposes mentioned.

It may be here mentioned that the rod 89 is connected with the bearing 90 by a short link 95 and suitable bolts or the like 96 with such play among the members as to permit the steering operation.

Suitably supported on the frame members which support the track near one end of the machine is a power device such as a gasoline engine 97. Supported on the frame members 15 on one side of a adjacent rotary device is a sprocket gear 98, which is connected with the engine 97 by means of a chain 99. It will be understood that power may be applied for operating the endless conveyer device in a great variety of ways, and we have simply illustrated the form shown as one possible method of accomplishing the purpose.

It will be understood also that the creeping tread devices 10 may be connected with tractor mechanism, so that the entire device may be drawn over the ground with its own power when desired.

In the practical operation of our improved machine, the machine is located so that one end is adjacent to the digging and loading device, such for instance, as a steam shovel, and the other end is located adjacent to the point where it is desired to discharge the dirt, or other material.

It will be seen that in order to carry the dirt from one point to a desired point of discharge, it may in some instances be desirable to add several sections or in other instances to take out sections in order to make the machine of the proper length. The endless conveyer consisting of the cars or conveyer members duly connected together in the manner hereinbefore described, is operated from the engine 97. It will be seen from the description of the mechanism already given, that the endless conveyer is capable of travelling in either direction and it will be understood that any suitable sort of reversing mechanism may be employed in connection with the engine 97.

When the rotary member which is operatively connected with the engine is rotated it will be seen that the axle or shaft 63 of each car as it starts around the rotary member is received in the pocket formed by the notches 18 and between the angles 19.

In the case of the car travelling upwardly from the lower part around the end of the machine and over the upper part of the rotary member, it will be seen that one of the angle frame members 19 engages the shoulder 77 (see Figures 5, 17 and 2) for carrying the train of cars around the rotary member.

The rotary member is small enough so

that in such course of travel of the cars, the cars which first engage the rotary member have their shoulders 78 in snug and complete engagement with the cross member 19, whereas the shoulders on the cross members which are leaving the rotary member are not so snugly engaged. The principle is the same as that of the construction of a sprocket and chain to prevent buckling, and to prevent the chain links or the cross members, which correspond to chain links, from jumping out of the notches in the sprocket corresponding to our rotary member.

The dirt or other material is loaded into the cars at the receiving end of the machine and is conveyed to the discharging end where we have provided the swinging discharge conveyer hereinafter more fully described.

It will be seen that the main portion of the machine may be given a curved or serpentine shape for conveying dirt from one point to another, and may be made to retain such shape by properly adjusting the supporting wheels 20.

It will be noted, for instance, that one end of the machine may be arranged at one side from the center of the road, and parallel therewith, while the central part of the machine may be curved into the road, and the other end of the machine may be arranged in the center of the road parallel therewith.

By setting all of the supporting wheels in position where they tend to travel parallel with the road, the machine may be advanced longitudinally of the road and will retain its serpentine shape.

This we consider to be an important feature of our invention.

It will be noted that the machine is so constructed that the cars comprising the members of the endless conveyer may be caused to travel in either direction, and it is important that the machine should be made to travel in both directions.

In Figures 21 to 24 inclusive we have shown a swinging delivery conveyer which may be detachably mounted on either end of the machine.

Supported on the main frame of the machine are frame members 110. Supported on the frame members 110 is an upright shaft 111. Supported on the upper end of the shaft 111 is an L-shaped conveyer member 112 so arranged as to permit the shaft 111 to rotate freely.

Mounted on the walls of the L-shaped delivery member 112 is a transverse shaft 113. Supported on the shaft 113 are hangers 114 which support the frame 115 of the swinging conveyer comprising side walls and a connecting bottom wall.

Near the discharge end of the delivery

frame 115 are brackets 116, in the upper ends of which is mounted a shaft 117.

On the shafts 113 and 117 are sprockets 118 and 119, on which travel chains 120.

5 Secured to the chains 120 are projecting blades 121. On one end of the shaft 113 is a sprocket 122, shown in Figures 21 and 23 which is in line with a sprocket 123 on a short shaft 124, mounted in suitable bearings 10 on the bottom of the delivery member 112.

A sprocket chain 125 travels on the sprockets 123 and 122. On the shaft 124 is a bevelled gear 126 which meshes with a bevelled gear 127 on the shaft 111.

15 On the shaft 111 is a bevelled gear 128 meshing with a bevelled gear 129 on a shaft 130, which may be connected with any suitable source of power, whereby rotation may be imparted to the shaft 113 and the sprockets 118 thereon for causing travel of the chains 120.

It will be noted that the conveyer frame 115 is pivotally supported at the center of the shaft 113, so that the outer end of the conveyer frame 115 may be raised or lowered without interfering with the gearing connections between the shaft 113 and the shaft 130.

Supported on the frame 110 are bracket 30 members 131, which are connected with and support a hopper 132. The hopper 132 has a cylindrical lower end 133 adapted to coact with a similar end 134 at the upper end of the delivery member 112, so as to permit 35 the delivery member 112 to rotate freely with relation to the hopper 132 without interfering with the discharge of dirt or the like from the hopper 132 to and through the delivery member 112. The other end of 40 the delivery member 112 projects into the conveyer frame 115.

It will be seen that the conveyer member 115 may be swung laterally to different positions for discharging dirt at different 45 points with relation to the main machine, on the shaft 111 as a pivot.

At the upper end of the frame members 110 is a frame member 135, to which is swiveled a pulley 136. Supported on the 50 upper ends of the frame members 110 is a transverse shaft 137 on which is a drum 138. At the outer or discharge end of the conveyer frame 115 are supporting bracket members 139 to which there is secured a 55 cable 140. This cable is extended over the pulley 136 and wound on the drum 138.

On the shaft 137 is a sprocket 141 in line with a sprocket 142 on a shaft 143 supported on the frame of the machine.

60 A chain 144 travels on the sprockets 141 and 142. On the shaft 143 is a gear 145 which meshes with a smaller gear 146 on a shaft 147. On the shaft 147 is a crank han-

dle 148. Supported on a bracket 149 is a pivoted reversible pawl 150 arranged to co- 65 act with the gear 146.

By manipulating the crank handle 148 the gear 146 may be rotated for winding or unwinding the cable 140 on the drum 138.

The hopper 132 is provided with a snout 70 or receiving end 151 which projects into the series of cars hereinbefore described.

On the bottom of the snout 151 is a roller 152 designed to travel on the bottoms of the cars so as to hold the receiving end of the 75 snout 151 slightly spaced from the bottom of the cars a sufficient distance to prevent the snout from catching.

A spring 153 holds the snout snugly in its position for causing it to almost scrape the 80 bottom of the main endless conveyer so that as the endless conveyer cars or members travel past the snout, their contents will be dropped into the hopper 132, whence such contents will drop into the delivery mem- 85 ber 112. The blades will then carry the dirt or other contents to the discharge end of the delivery frame 115.

For convenience in discharging the contents of the conveyer frame 115 at any point 90 in the length thereof we have provided the following structure.

In the side walls of the conveyer frame 115 are series of slots. The slots are numbered in series from the receiving to the discharg- 95 ing end of said conveyer frame, 154, 155, and 156. It will be understood that the slots 154 are provided in pairs on the opposite side walls of the conveyer frame 115, and similarly the slots 155 and 156 are provided 100 in opposite pairs. The slots are so arranged that the slots 154 in each side wall overlap the upper halves substantially of the slots 155, and the slots 155 overlap the upper halves of the slots 156, as illustrated in Figure 21. 105

There are provided slidable bottom members 157, 158, and 159.

Secured to the respective bottom members 157, 158, and 159 are laterally extending pins 160 which project through the slots 110 154, 155 and 156 for slidably supporting said bottom members. A sufficient number of the pins for the purpose are provided to form handles for the convenient manipulation of the slidable bottom members. 115

It will be seen that if it is desired to discharge dirt from the end of the conveyer frame 115, the movable bottom members are left at their positions nearest the discharge end and the blade members will 120 carry the dirt to such discharge end. If, however, it is desired to discharge dirt at a point intermediate of the ends of the conveyer frame 115, the slidable member 157, 158 or 159 as the case may be is slid to- 125 ward the receiving end of said conveyer

member 115, leaving an opening in the bottom of the discharge conveyer through which the dirt may be dropped.

It will be seen that the discharge end of the discharge conveyer may be raised or lowered by operating the crank handle 148 for swinging the discharge conveyer to different points, or for holding it out of the way during the travel of the main machine.

It will also be seen that the discharge conveyer may be swung around to different discharging positions on the shaft 111 as a pivot.

Many of the advantages of our improved structure may be seen from the foregoing description.

It will be seen that the main machine may be curved or given a serpentine form, and that such structure prevents any break in the main frame of the machine, nor is there any break in the track when the machine is curved.

Attention is called in this connection to the advantage of the peculiar construction of the cars or conveyer members, and the means for connecting them to permit the flexibility hereinbefore mentioned.

Attention is also called to the advantage of suspending the conveyer frame, tracks, and conveyer members at points above the center of gravity of the machine, and in such a way that the conveyer frame and tracks will always hang in horizontal position regardless of unevenness of the ground, or of the position of the supporting wheels.

Attention is also called to the advantage of the steering devices hereinbefore shown, arranged at various points in the length of the conveyer, so that the conveyer may be made to travel in almost any desired path by adjusting the steering devices, or by locking them in certain positions.

Ordinarily dirt is moved from a high point to a low point, and it will be noted that in moving dirt with our device less power is required, on account of the above fact.

Some changes may be made in the construction and arrangement of the various parts of our improved device without departing from the essential features and purposes of our invention, and it is our intention to cover by our claims any modified forms of structure or use of mechanical equivalents which may be reasonably included within their scope.

We claim as our invention:

1. A portable endless conveyer comprising a series of units, each having supporting wheels and each having frames with tracks supported thereon, the tracks of the respective units being flexibly connected together for vertical and horizontal pivotal movement, and an endless conveyer arranged to travel on said tracks.

2. A portable endless conveyer comprising a series of units, each having supporting wheels and each having frames with tracks supported thereon, the tracks of the respective units being flexibly connected together for vertical and horizontal pivotal movement, and an endless conveyer arranged to travel on said tracks, said supporting wheels being steerable, and means for locking and holding said supporting wheels in any of their adjusted steerable positions.

3. A portable endless conveyer comprising a series of units, each having supporting wheels and each having frames with tracks supported thereon, the tracks of the respective units being flexibly connected together for vertical and horizontal pivotal movement, and an endless conveyer arranged to travel on said tracks, said tracks being hung, so as to remain level in all the adjusted positions of the supporting wheels.

4. A portable endless conveyer comprising a series of units, each having supporting wheels and each having frames with tracks supported thereon, the tracks of the respective units being flexibly connected together for vertical and horizontal pivotal movement, and an endless conveyer arranged to travel on said tracks, said supporting wheels being steerable, and means for locking and holding said supporting wheels in any of their adjusted positions, said tracks being hung so as to remain level in all the adjusted positions of the supporting wheels.

5. In a device of the class described, an endless conveyer having a series of conveyer members arranged successively end to end with overlapping ends, said conveyer members each having a bottom and sides, supporting wheels on the respective conveyer members, said conveyer members being flexibly connected together, tracks on which said wheels may travel for supporting said endless conveyer, said tracks being comprised of sections flexibly connected together for relative movement in vertical and horizontal planes, a frame for supporting said tracks comprising a series of sections flexibly connected together for relative movement in vertical and horizontal planes, and wheel supports for the respective sections of said frame.

6. In a device of the class described, an endless conveyer having a series of conveyer members arranged successively end to end with overlapping ends, said conveyer members each having a bottom and sides, supporting wheels on the respective conveyer members, said conveyer members being flexibly connected together, tracks on which said wheels may travel for supporting said endless conveyer, said tracks being comprised of sections flexibly connected together for relative movement in vertical and horizontal

planes, a frame for supporting said tracks comprising a series of sections flexibly connected together for relative movement in vertical and horizontal planes, and wheel supports for the respective sections of said frame, said wheel supports in each instance comprising an axle, having wheels thereon, means for pivotally hanging a frame section on said axle, and means for connecting each axle with a frame section at a point spaced from the axle, said last-named means being adjustable for moving the axle for steering said wheels.

7. In a device of the class described, an endless conveyer having a series of conveyer members arranged successively end to end with overlapping ends, said conveyer members each having a bottom and sides, supporting wheels on the respective conveyer members, said conveyer members being flexibly connected together, tracks on which said wheels may travel for supporting said endless conveyer, said tracks being comprised of sections flexibly connected together for relative movement in vertical and horizontal planes, a frame for supporting said tracks comprising a series of sections flexibly connected together for relative movement in vertical and horizontal planes, and wheel supports for the respective sections of said frame, said wheel supports in each instance comprising an axle, having wheels thereon, means for pivotally hanging a frame section on said axle, and means for connecting each axle with a frame section at a point spaced from the axle, said last-named means being adjustable for moving the axle for steering said wheels and being adapted to be held against displacement from any adjusted position.

8. In a device of the class described, supporting members, frames, track portions on said frames, means for connecting various sections of the frame and track portions together for permitting flexibility between sections, and means for supporting the frame on said supporting members at points above the center of gravity of the machine for universal movement, so that the frame and tracks will hang in substantially horizontal position, regardless of variations in the positions of the supporting members and a flexible conveyer arranged to travel on said track portions.

9. An endless conveyer comprising a plurality of sections, each of said sections having a supporting device, a frame structure hung on said supporting device, above the center of gravity of the machine for universal movement, and track portions on said frame structure, means for connecting the frame structure and tracks of adjacent sections for permitting the machine to have flexibility, rotary devices at the ends of said machine, and an endless conveyer arranged

to travel on said tracks and rotary devices.

10. A conveyer, comprising rotary members at its ends, an endless conveyer comprising a series of units flexibly connected together, said units each having a bottom and sides, each unit of said endless conveyer having supporting wheels, tracks for said supporting wheels, comprising sections connected together, frame sections for supporting said tracks, said track sections and frame sections being connected for flexible movement in vertical and horizontal planes.

11. A conveyer, comprising rotary members at its ends, an endless conveyer comprising a series of units flexibly connected together, said units each having a bottom and sides, each unit of said endless conveyer having supporting wheels, tracks for said supporting wheels, comprising sections connected together, frame sections for supporting said tracks, said track sections and frame sections being connected for flexible movement in vertical and horizontal planes, and steerable wheels for each frame section.

12. A conveyer, comprising rotary members at its ends, an endless conveyer comprising a series of units flexibly connected together, said units each having a bottom and sides, each unit of said endless conveyer having supporting wheels, tracks for said supporting wheels, comprising sections connected together, frame sections for supporting said tracks, said track sections and frame sections being connected for flexible movement in vertical and horizontal planes, a wheel supported axle for each frame section and means for pivotally hanging each frame section on its axle.

13. A conveyer, comprising rotary members at its ends, an endless conveyer comprising a series of units flexibly connected together, said units each having a bottom and sides, each unit of said endless conveyer having supporting wheels, tracks for said supporting wheels, comprising sections connected together, frame sections for supporting said tracks, said track sections and frame sections being connected for flexible movement in vertical and horizontal planes, a wheel supported axle for each frame section and means for pivotally hanging each frame section on its axle, means for connecting each axle with its frame section at a point spaced from the axle.

14. A conveyer, comprising rotary members at its ends, an endless conveyer comprising a series of units flexibly connected together, said units each having a bottom and sides, each unit of said endless conveyer having supporting wheels, tracks for said supporting wheels, comprising sections connected together, frame sections for supporting said tracks, said track sections and frame sections being connected for flexible movement in vertical and horizontal planes,

a wheel supported axle for each frame section, and means for pivotally hanging each frame section on its axle, means for connecting each axle with its frame section at a point spaced from the axle, said means being adjustable for varying the position of said axle.

15. A conveyer, comprising rotary members at its ends, an endless conveyer, comprising a series of units flexibly connected together, said units each having a bottom and sides, each unit of said endless conveyer having supporting wheels, tracks for said supporting wheels comprising sections connected together, frame sections for supporting said tracks, said track sections and frame sections being connected for flexible movement in vertical and horizontal planes, a wheel supported axle for each frame section, means for pivotally hanging each frame section on its axle, means for connecting each axle with its frame section at a point spaced from the axle, said means being adjustable for varying the position of said axle and comprising a member fixed to the axle and projecting substantially longitudinally with relation to the machine and having a screw-threaded end and loose pivotal connection with said last member.

16. In a device of the class described, an endless conveyer structure comprising a series of connected car members, tracks for supporting said car members, frame devices for supporting said tracks, and means for pivotally supporting said frame devices at points above the center of gravity of the machine for universal movement.

17. In a device of the class described, an endless conveyer structure comprising a series of connected car members, tracks for

supporting said car members, frame devices for supporting said tracks, means for pivotally supporting said frame devices for universal movement at points above the center of gravity of the machine, said means including adjustable supporting members.

18. In a device of the class described, an endless conveyer structure comprising a series of connected car members, tracks for supporting said car members, frame devices for supporting said tracks, means for pivotally supporting said frame devices at points above the center of gravity of the machine for universal movement, said means including adjustable steerable supporting members.

19. In a device of the class described, an endless conveyer structure comprising a series of connected car members, tracks for supporting said car members, frame devices for supporting said tracks, means for pivotally supporting said frame devices at points above the center of gravity of the machine for universal movement, rotary members at the opposite ends of said device, coacting means on said upright members, and car members whereby when the rotary members are rotated, the endless conveyer structure will be moved, and means for imparting rotation to one of the rotary members.

20. In a device of the class described, an endless conveyer structure comprising a series of connected car members, tracks for supporting said car members, frame devices for supporting said tracks, means for pivotally supporting said frame devices at points above the center of gravity of the machine, and tractor devices at the ends of the machine.

Des Moines, Iowa, March 5, 1920.

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