April 18, 1950 H. E. WOOD 2,504,290

CAR PROPELLING MEANS

Filed Dec. 12, 1945 2 Sheets-Sheet 1

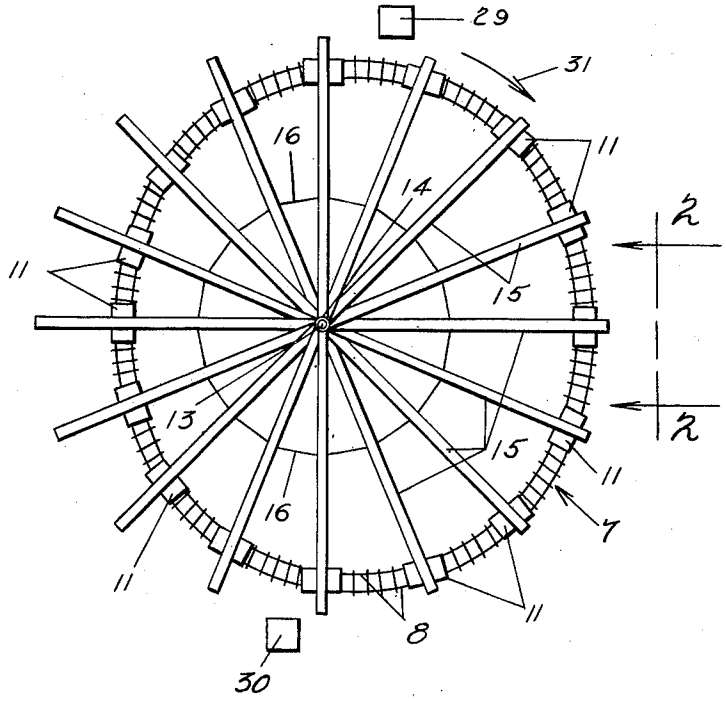


Fig. 1

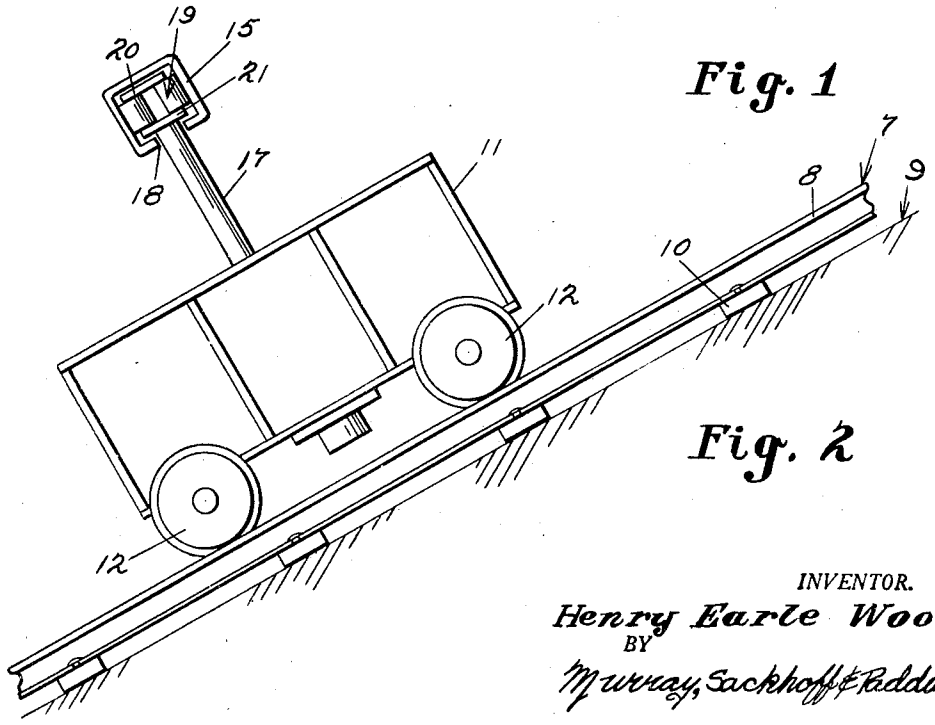


Fig. 2

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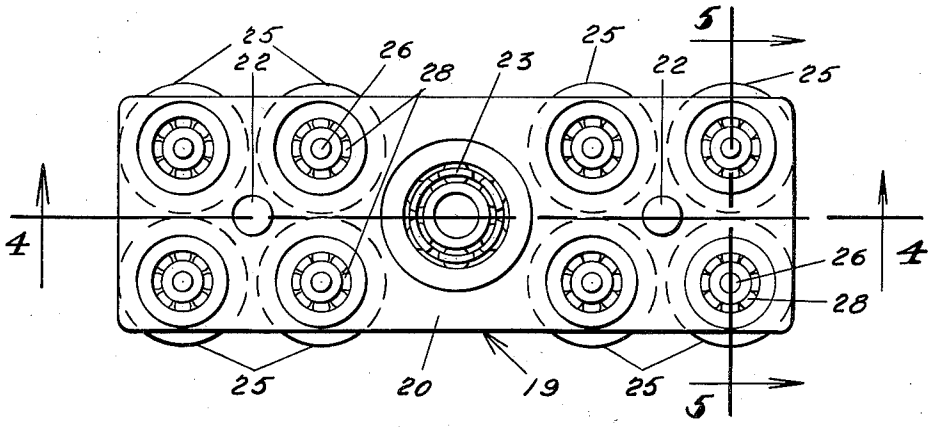


Fig. 3

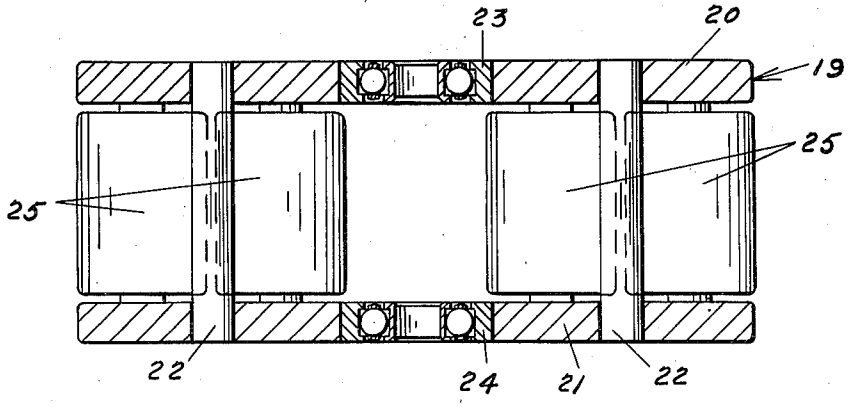


Fig. 4

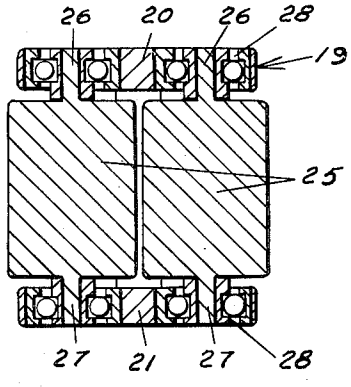


Fig. 5

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CAR PROPELLING MEANS

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3 Claims. (Cl. 104—163)

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The present invention relates to a car propelling means and has for an object the provision of a device for connecting a vehicle or the like with a moving sweep or arm and to permit shifting of said device intermediate the ends of the arm with a minimum of frictional resistance as the vehicle follows a predetermined path such as a track.

A further object of the invention is to provide a gravity, endless conveyor system embodying the device of the invention.

A still further object of the invention is to provide an improved device whereby said device is enabled to automatically alter its position within a channel in a retaining arm while following the associated vehicle through a predetermined path.

These and other objects are attained by the means described herein and disclosed in the accompanying drawings, in which:

Fig. 1 is a top plan view of an endless gravity conveyor system embodying the devices of the invention.

Fig. 2 is a fragmental, elevational view taken on line 2—2 of Fig. 1 and disclosing in end elevation a device of the invention operatively mounted therein.

Fig. 3 is an enlarged top plan view of a device of the invention detached from the conveyor.

Fig. 4 is a cross-sectional view taken on line 4—4 of Fig. 3.

Fig. 5 is a cross-sectional view taken on line 5—5 of Fig. 3.

The device of the invention is operatively shown in Figs. 1 and 2 to provide for a combination of relative movements between the individual vehicles of a gravity conveyor mechanism and the control arms which serve to synchronize and control the relative movement of a number of vehicles operating through identical paths.

In the gravity conveyor system of Fig. 1 there is shown diagrammatically a continuous track indicated generally at 7 and which may comprise a pair of endless parallel rails 8 suitably supported on an inclined plane surface 9 such as the surface of a hillside. The rails may be secured to cross ties 10 or otherwise fixed in position. A plurality of vehicles 11 are tractionally supported on the rails 8 by means of flanged wheels 12. The track 7 (Fig. 1) is desirably arranged in an oval shape on the inclined side of the hill. Mounted within the interior of the oval thus formed, and at a distance from the geometric center of said oval, a heavy stud shaft or center post 13 is firmly anchored in the ground and is arranged perpendicularly to the inclined surface 9 of the hillside. Connected to a center hub 14, which is rotatable on shaft 13, is a series of inverted channel shaped sweeps or spokes of uniform length. The successive sweeps or spokes

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15 extend radially from the center or hub at uniform angles throughout and may be retained in this uniform, angularly related position in any suitable fashion such as by struts or ties 16.

It will be apparent from the foregoing and upon inspection of Fig. 1 that the eccentrically related rotating spoke structure and the track will, upon rotation of the spoke structure, cause the end of any given sweep 15 to approximately overhang the track 7 at one position, and that on continued rotation of the spoke structure about its axis on shaft 13, the end of said sweep 15 will project a considerable distance beyond the track 7. Each of the vehicles 11 is provided with a fixedly mounted, perpendicular connector pole 17, the end of which enters the open slot 18 in the bottom of one of the sweeps 15. Supported on each pole 17 and disposed within the hollow interior of the inverted channel shape sweep 15, is one of the antifriction members indicated generally at 19. The shuttle hitch 19 (see also Figs. 3, 4 and 5) comprises a top plate 20 and a bottom plate 21 which are connected in spaced parallelism by a pair of posts 22, to the opposite ends of which they are rigidly connected in any suitable manner. Mounted in the geometrical center of each of the uniform plates 20 and 21 are antifriction bearings 23 and 24, these antifriction bearings being axially aligned for the reception of the top end of post 17 of the vehicle 11. From the foregoing it will be readily understood that the member 19 is always supported by post 17 at a uniform distance above track 7 upon which the vehicle rides. Between the plates 20 and 21 and on either side of the longitudinal center thereof, are disposed bearing rollers 25. These rollers 25 are arranged in groups of four in mutually non-contacting relation and disposed so that the peripheries thereof project uniformly beyond opposite longitudinal edges of the plates 20 and 21. As can be best seen in Fig. 3, the groups of four rollers 25 are disposed on opposite sides of the center antifriction bearings 23 and 24.

As can be best seen in Fig. 5, each roller 25 has projecting from its opposite ends a top stud shaft 26 and a bottom stud shaft 27 which are rigidly fixed to or integral with the roller. Antifriction bearings 28 are provided for the respective stud shafts 26 and 27, the components of said antifriction bearings being connected with said shafts and the respective plates 20 and 21.

From the foregoing it will be apparent that the peripheries of the rollers 25, which are adapted for free rolling contact on the opposed inner parallel faces of the channel shaped sweeps 15, will allow hitch member 19 to shift longitudinally in the sweep 15 with a minimum of resistance, while the center antifriction bearings 23 and 24, which receive the post 17, permit the

vehicle to follow the ever changing curvature of track 7. With the vehicles 11 retained in pairs on diametrically opposite sides of the center shaft 13 of the spoke unit, the respective members 19 are shifted longitudinally in their respective spokes 15, permitting hitch 19 and the vehicle 11 to follow track 7 and to converge and diverge from the eccentrically located center shaft 13 of a spoke unit. In the arrangement shown in Fig. 1 29 represents a loading station at the higher elevation on the incline or hillside and 30 represents an unloading station for the vehicles disposed at a lower elevation on said incline. By the arrangement shown, the vehicles leaving the loading station 29 may descend in the direction of arrow 31 for gravitational movement to an unloading station 30. By the eccentric arrangement shown the vehicles 11 which have been unloaded are caused to converge toward the center of rotation 13 as they follow the upwardly inclined section of track 7 which is situated closer to the center of rotation 13. In view of this it will be readily apparent that, in addition to the difference in weight of the descending loading vehicle and the rising empty vehicle upon each pair of aligned sweeps 15, the positions of the respective vehicles on their sweeps finds the empty, upwardly traveling vehicle closer to the axis of rotation 13. Considering the aligned, oppositely extending radial sweeps as a lever and the point 13 as a fulcrum, it will be readily apparent that even a lightly loaded vehicle on the descending side of the conveyor will readily overbalance the load of the empty vehicle diametrically opposite it. The combined movements of each device 19 as it progressively converges and then diverges with relation to the center of rotation 13 and the accompanying rotary adjustment of the post 17 in antifriction bearings 23 and 24 provide for remarkably smooth and free rotation of the series of vehicles about the track under the influence of gravity.

In practice the inclined plane on which the device operates may assume various angles other than that exemplified in Fig. 2. The inclined plane may be selected on a natural site such as a hillside or said inclined plane may be artificially produced to accommodate the circuit travel of the vehicles from one level to a lower one and return. The essence of the smooth and facile gravitational operation of the device resides in the provision of the antifriction connection of bearings 23—24 on the post 17 fixed on the vehicle, in conjunction with the free rolling bearing of rollers 25, which are uniformly grouped on opposite sides of bearings 23—24, upon the contacting parallel inner faces of sweeps 15.

The structure disclosed is to be understood as not limited to the specific disclosure since it is contemplated that minor details of construction are to be made in adapting the conveyor or the propelling means of the invention to specific installations. For example, the antifriction bearings are shown herein as ball bearings but they may be replaced with roller bearings or with any improved antifriction bearings that may be better suited to a desired installation embodying the invention.

What is claimed is:

1. In a gravity conveyor the combination of an orbital track of substantially uniform curvature disposed in an inclined plane, a rotatably mounted spoke unit having its axis of rotation fixed eccentrically within the track orbit and perpendicular to the inclined plane, said unit

comprising a plurality of radially spaced, channeled sweeps movable in unison over the track and in parallelism therewith, vehicles on said track below the respective sweeps, a hitch post extending upwardly from each vehicle into the channel of the sweep above it, and a propelling means disposed in the channel of each of said sweeps, each propelling means comprising a central antifriction bearing whereby said propelling means is revolubly supported on the end of the hitch post and further comprising rollers having antifriction bearings at opposite ends thereof, said rollers adapting the propelling means for movement longitudinally within the respective sweeps.

2. A gravity conveyor comprising an orbital track of substantially uniform curvature disposed in an inclined plane, a rotatable spoke unit having an axis of rotation fixed eccentrically within the track orbit and perpendicular to the inclined plane, said unit comprising a plurality of radially spaced channeled sweeps movable in parallelism with the plane and over the track, vehicles on the track beneath the respective sweeps, hitch posts on the vehicles extending into the channels of the respective sweeps, car propelling means rotatably supported on the respective hitch posts and disposed within the channels of the respective sweeps, said car propelling means including bearing rollers having tractional engagement on opposed sides of the channels of said sweeps and providing for reciprocation thereof longitudinally within the associated sweeps as the vehicles move along the track and converge and diverge to and from the center of rotation of the spoke unit during such movement.

3. In a device of the class described an endless track of substantially uniform curvature disposed in a non-horizontal plane, a center shaft fixedly mounted in said non-horizontal plane within the area bounded by the track and to one side of a center line passing through the highest and the lowest points in said track, a spoke unit rotatably mounted on said shaft and including a plurality of radially extending sweeps of uniform length arranged in aligned pairs about the center of rotation, the sweeps of said spoke unit overhanging the track in varying degrees during rotation of the spoke unit, tractionally supported members on the track beneath their respective sweeps, antifriction car propelling members mounted for longitudinal reciprocation on the respective sweeps, and hitch posts fixed to the respective, tractionally supported members and rotatably supporting the respective members in the plane of movement of said sweeps.

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