United States Patent

[11] 3,559,586

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[21] Appl. No. **779,706**
[22] Filed **Nov. 29, 1968**
[45] Patented **Feb. 2, 1971**

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[54] RETRACTING PUSH-ROD ASSEMBLY FOR CONVEYORS

4 Claims, 6 Drawing Figs.

[52] **U.S. Cl.** **104/172**
[51] **Int. Cl.** **B65g 17/42**
[50] **Field of Search** 104/172; 74/96; 104/178

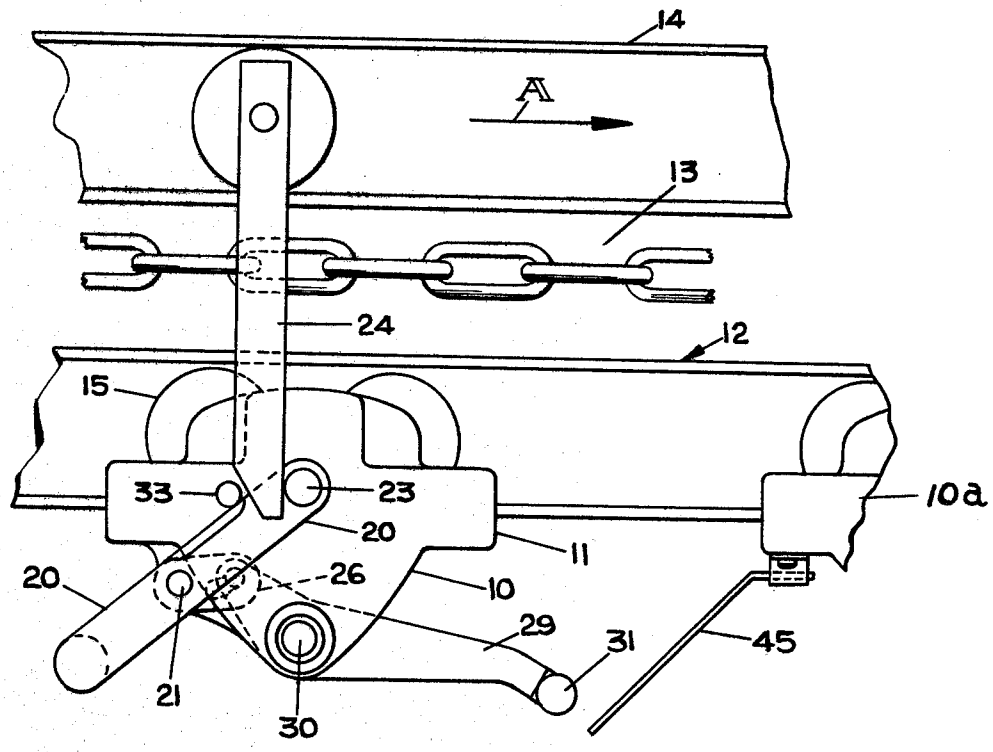
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ABSTRACT: A linkage to effect the automatic release of the trolleys of a power and free conveyor from the continuously moving propelling member in which the arm which connects the trolley to the propelling member is hingedly jointed to a sensing lever which is pivotally shifted upon contact with an obstruction ahead of the trolley such as a preceding trolley stalled on the track. The hinge provides a connection which locks the arm in erected propelling member engaging position and positively holds the arm in retracted position, out of engagement with the propelling member, when the sensing lever is pivotally shifted by contact with an obstruction.



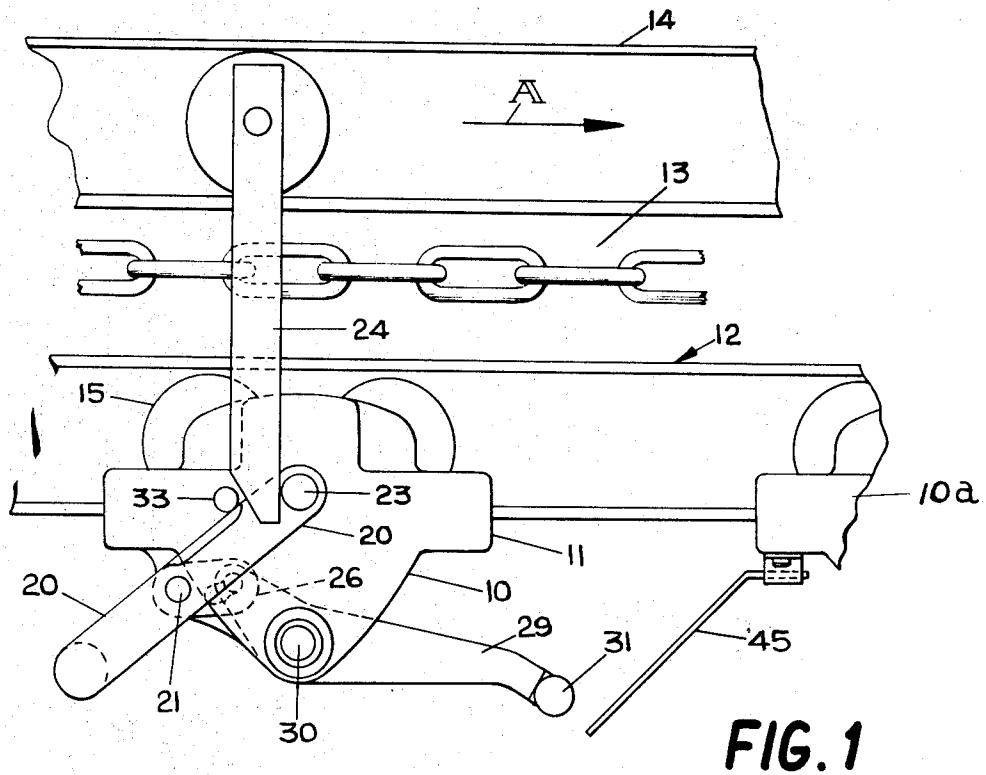


FIG. 1

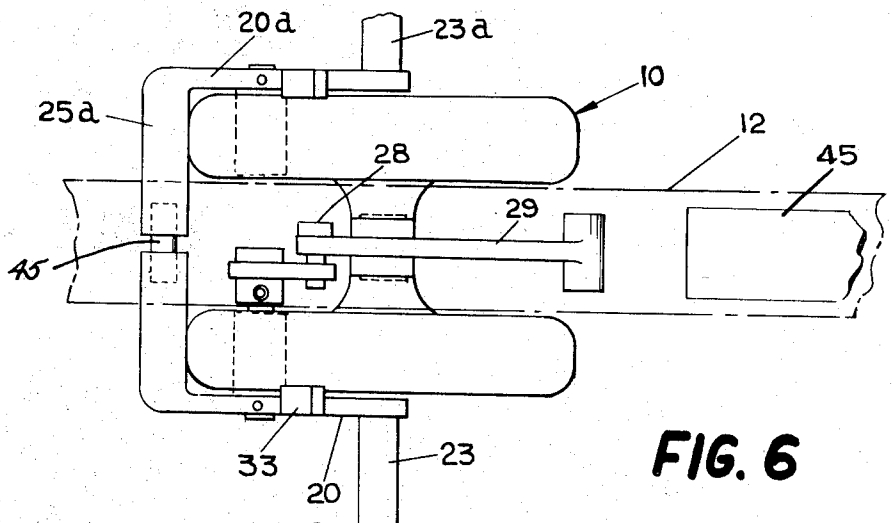


FIG. 6

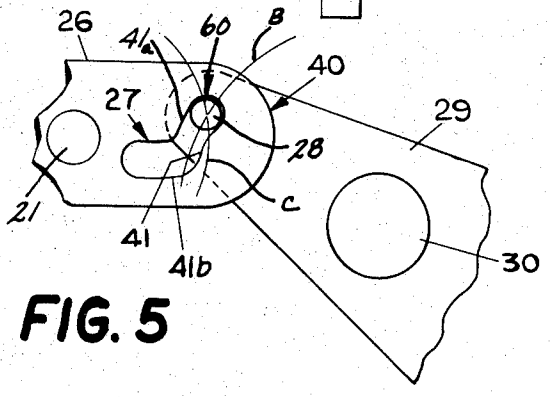


FIG. 5

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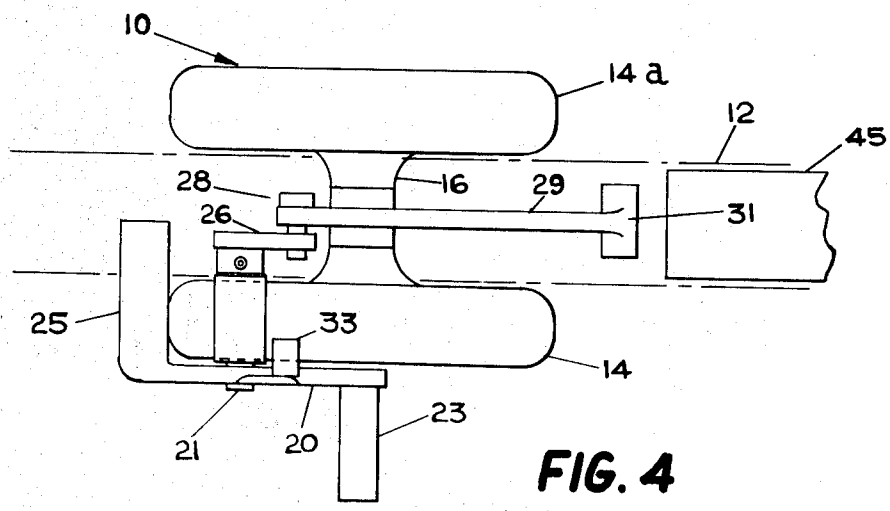


FIG. 4

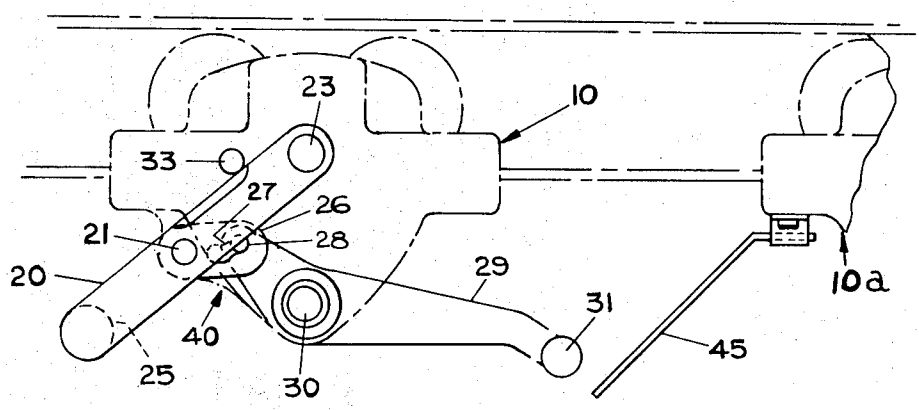


FIG. 2

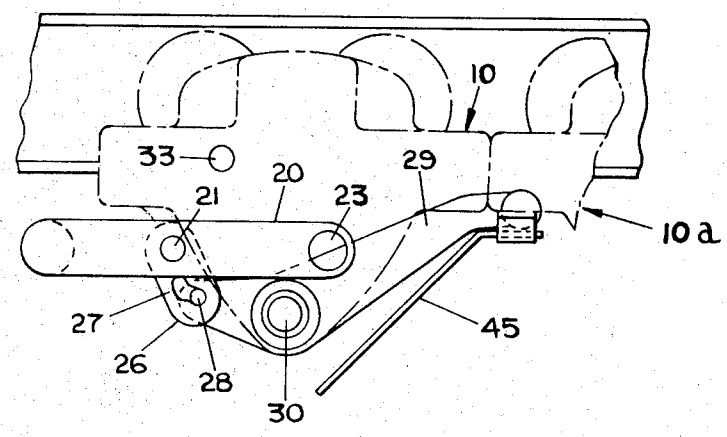


FIG. 3

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RETRACTING PUSH-ROD ASSEMBLY FOR CONVEYORS

BACKGROUND OF THE INVENTION

Various mechanisms for automatically releasing a trolley's driving connection to its propelling member have long been known to the conveyor art, including the use of pivoted, obstruction responsive levers as is disclosed in U.S. Pat. Nos. 2,885,969, entitled FREE PALLET CONVEYORS , issued May 12, 1959 to Kay et al. and 3,044,416, entitled CONVEYOR TROLLEY WITH RELEASABLE DRIVING DOG, issued Jul. 17, 1962 to Reibel et al. This invention improves on these devices by providing a simple and positive means which locks the propelling member engaging arm in erected, propelling member engaging position and positively holds it in retracted, disengaged position. By positively holding the arm in retracted position, repeated engagement between it and the propelling member is eliminated while the trolley is stationary. This eliminates the serious wear which has been experienced in those systems in which the trolley-propelling member connection makes repeated contact with the propelling member while the trolley is stationary. Also this invention eliminates the noise problem inherent in these existing systems. This is not necessarily a problem when only a few trolleys are involved but becomes a major one in large systems where many trolleys are stalled in one location.

The invention provides a simplified structure which is more compact and involves less moving parts. This reduces both initial cost and the problem of maintenance. By maintaining positive disengagement between the arm and the propelling member while the trolleys are stationary, wear is significantly reduced. Further, the invention provides a mechanism which acts positively, i.e., the arm is either positively erected and held there or is positively retracted and held there. Thus, functional failure due to dirt and other environmental agents is significantly reduced.

SUMMARY OF THE INVENTION

The invention provides a hinge connecting the sensing lever to the driving dog engaging arm. This hinge is constructed in such a manner that it locks the arm against retraction under the forces acting upon it as a result of the movement of the driving dog. However, the hinge easily flexes when the sensing lever is shifted to retract the arm. The hinge also maintains the arm under the control of the sensing lever at all times. Thus, it holds the arm in retracted position when the sensing lever is actuated.

DESCRIPTION OF THE DRAWINGS

These and other objects and advantages of this invention will be understood upon reading the following specification and the accompanying drawings:

In the drawings:

FIG. 1 is a side elevation view of a trolley with a fragmentary illustration of the track and propelling member for the same, showing this invention in normal, driving position;

FIG. 2 is a fragmentary side elevation view showing the invention in erected position, the trolley being shown in phantom for better illustration of the invention;

FIG. 3 is a view similar to FIG. 2 showing the invention in retracted position;

FIG. 4 is a plan view of the invention with the track shown in phantom to better illustrate the invention;

FIG. 5 is an enlarged fragmentary side elevation view of the hinge connection;

FIG. 6 is a plan view of a modified form of the invention again showing the track in phantom to better illustrate the invention.

Referring specifically to FIG. 1 of the drawings, the numeral 10 indicates a trolley having a housing 11 equipped with wheels 15 to support the trolley for movement along a track 12. A plurality of trolleys are supported on the track, the number being governed by the size of the conveyor and the normal spacing to be maintained between the trolleys. Above

the track is a propelling member 13, here illustrated as a chain which, in turn, is supported for travel on a rail 14. The propelling member is powered for continuous movement in the direction of the arrow A by any suitable power source. The housing consists of a pair of spaced side elements 14 and 14*a* joined by a cross member 16 (FIG. 4). The preceding elements and the structural relationships of the elements are conventional and further description is not considered necessary.

A driving connection between the trolley and the propelling member is effected by the arm 20 which is situated adjacent the outer face of the side element 14. The arm 20 is pivotally mounted intermediate its ends on shaft 21 and is so connected to the shaft that both must rotate together. The upper end of the arm has an outwardly projecting finger 23 which engages the driving dog 24 on the chain. The dogs are rigidly secured to the chain and are mounted at spaced intervals. The spacing between the dogs governs the spacing between the trolleys moving along the track in normal operation. The lower or opposite end of the arm is equipped with a counterweight 25 which biases the arm into erected position, as shown in FIGS. 1 and 2.

Secured to the shaft 21 for rotation with the shaft is the link 26 (FIG. 2). Adjacent the free end of the link is a slot 27 to receive the pin 28 mounted on the end of the sensing lever 29. The sensing lever 29 is pivotally mounted at 30 to the housing 11 and has a portion projecting forwardly beyond the leading end of the trolley. This end is equipped with a bumper 31. The arm 20, sensing lever 29, link 26, form a linkage joined by the hinge.

The slot 27 and pin 28 constitute a hinge 40 joining the link and sensing lever. It will be noted that the slot 27 has two portions which communicate with each other at approximately the midpoint of the slot and arranged at a minor angle to each other. As is best seen in FIG. 5, the portion of the slot 27 in which the pin 28 is seated, both when the arm 20 is erected and when it is retracted, has one wall 41 which is arched slightly into the slot. This arching is away from the pivot point 30 of the sensing lever and follows a curve (line B) generated about this pivot point and thus corresponds to the path of movement of the pin 28 when it is moved by the sensing lever 29 about the pivot point 30. It will also be noted that when the arm 20 is erected, a force acting on the arm which urges it toward a retracted position will cause the pin 28 to follow a curve (line C) generated about the pivot point 21. Since curve C is opposite to curve B resulting in movement of the pin toward the pivot point 30 of the sensing lever 29, a bind occurs at point 60. This results in a positive interference, thus, forming a lock which prevents retraction of the arm 20.

However, if the forward end of the sensing lever 29 is raised, the motion of the pin will follow the curved path B around the pivot point 30. It will, thus, move along the curvature of the wall 41. Wall 41*a* is sufficiently spaced from wall 41 to permit the pin to move along the slot without interference. When the pin reaches the end of the first leg of the slot, it will engage the wall 41*b* and initiate pivotal movement of the link 26. This permits the hinge 40 to flex. Thus, the hinge permits normal flexing or folding of the joint when the force is applied to one hinge member but forms a positive lock when the force is applied to the other hinge member.

As the hinge flexes, it passes from one side to the other of a line connecting the points of pivotal movement of the arm and sensing lever. As it does so, the pin 28 passes from one end of the slot to the other and returns to its original position. Thus, it is in the same position with respect to the slot both when the arm is erected and when it is retracted. The forwardly projecting portion of the sensing lever 29 and the bumper 31 bias the forward end of the sensing lever downwardly and, thus, cooperate with the counterweight 25 to maintain the arm 20 in normally erected position. The stop 33 limits the upward erection movement of the arm 20 and, thus, controls the normal position of the linkage.

Each trolley is equipped with a rearwardly extending ramp 45 shaped to provide an upwardly and forwardly inclined sur-

face. The ramp **45** is located to engage the bumper **31** when a following trolley **10** approaches the trolley **10***a* ahead of it.

FIG. **6** illustrates a slightly modified form of the invention. The structure is identical to that which has been described above except an arm **20** is provided on both sides of the trolley for either left or right hand operation. Thus, the trolley is equipped with arms **20** and **20***a*, fingers **23** and **23***a* and a split counterweight **25***a* spans the distance between the arms. The two sections of the counterweight **23***a* are joined at the center by a pin **45**.

The operation of the invention will now be described. Under normal circumstances, the dog **24** engages the finger **23** to push the trolley **10** along the track **12**. The lock formed by the hinge **40** prevents the arm from shifting from its erected position. Should the trolley approach another trolley stalled on the track, such as the trolley **10***a*, the forward end of the sensing lever **29** will ride up the ramp **45** pivoting the lever upwardly. This will forcibly retract the arm **20**. This action will be helped by the force of the dog **24**, since it is urging the arm to retract. Since the movement of the upper or free end of the arm **20**, as the arm retracts, is in the direction of movement of the propelling member **13**, the disengagement between the two while rapid will be a progressive one. This produces in a smooth rather than an abrupt release or snapping action. The result is reduced shock, noise and wear. Because the hinge **40** forms a permanent connection between the arm and the sensing lever, the arm **20** will be held in retracted position so long as the forward end of the sensing lever remains in raised position. This prevents repeated engagement between the arm and propelling member such as occurs when the arm is free to pivot into erected position but isn't locked to transmit drive from the propelling member.

When the trolley **10***a* is removed, the sensing lever **29** will drop and the arm **20** will then be engaged by the next dog **24** to approach, restoring forward motion to the trolley.

I claim:

1. In a power and free type conveyor having a track (**10**), a continuously moving propelling member (**13**) and a plurality of trolleys (**10**) mounted for travel along said track; a linkage on said trolley for connecting said trolley to said propelling member, said linkage having both a pivotally mounted arm (**20**), which when erected engages said propelling member and an obstruction sensing lever (**29**) pivotally mounted to said trolley, the improvement in said linkage comprising: an actuating link (**26**) rigidly connected to said arm at the pivotal mounting thereof for pivotal movement with said arm; said sensing lever being connected to said link through a hinge (**40**); said hinge having a lost motion means a first portion of which is on said sensing lever and a second portion of which is on said link forming a lock at each extremity of movement of said sensing lever and said link for allowing said link to rotate about the pivotal mounting of said arm and positively holding said arm at all times against any movement other than simultaneously with said sensing lever.

2. A linkage for power and free conveyors as described in claim **1** wherein said lost motion means at said hinge has a slot (**27**) of shallow U-shaped in one portion of said hinge and a pin (**28**) seated in said slot and mounted on the other portion of said hinge; the U-shape of said slot and the shape of the walls of one end of said slot being such that a positive interference relationship is created therebetween when said driving member in erected position urges said hinge to flex.

3. A linkage for power and free conveyors as described in claim **1** wherein the pivotal mounting of said sensing lever is intermediate said ends and, as said arm and sensing lever shift between said first and second positions, said hinge shifting from one side to the other of a line connecting the centers of pivotal movement of said arm and sensing lever, the arcuate path (C) of movement of the end of the slot seating said pin being curved oppositely from the path of travel (B) of said pin causing positive interference between the pin and the walls of said slot and forming said lock when force is applied to the free end of said arm urging it to shift from its erected position.

4. In a power and free-type conveyor having a track (**12**), a continuously moving propelling member (**13**) and a plurality of trolleys (**10**) mounted for travel along said track; a linkage on said trolley for connecting said trolley to said propelling member, said linkage having both an arm (**20**), which when erected engages said propelling member and an obstruction sensing lever pivotally mounted to said trolley, the improvement in said linkage comprising: an actuating link (**26**) rigidly connected to said arm for pivotal movement with said arm; a hinge (**40**) connection between said sensing lever and said link having a pin (**28**) on one of said sensing lever and said link and a slot (**27**) in the other thereof receiving said pin therein; said slot having a first portion and a second portion, said portions being arranged at an angle to each other; said sensing lever upon engaging an obstruction ahead of a trolley being pivotable from a first position to a second position and in so doing pivoting said arm from erected position to a retracted position out of propelling member engagement; as said sensing lever and arm shift between said positions said pin traveling from one end of said slot the full length of both portions of said slot and returning to its original position at said one end thereof and when seated at said one end with said arm erected forming a lock positively holding said arm against pivotal movement under forces acting upon said arm and urging it to retract.