United States Patent [19]

Ross

[11] **3,741,126**

[45] **June 26, 1973**

[54] **SUSPENDED CONVEYOR SYSTEM**

[75] Inventor: **Ivan L. Ross**, Birmingham, Mich.

[73] Assignee: **American Chain & Cable Company, Inc.**, New York, N.Y.

[22] Filed: **Mar. 18, 1971**

[21] Appl. No.: **125,501**

[52] **U.S. Cl.** ..... **104/96,** 104/172 S

[51] **Int. Cl.** **B61b 3/00,** B61j 1/12, B61g 17/42

[58] **Field of Search** ..... 104/96, 172 S; 105/96, 172

[56] **References Cited**

UNITED STATES PATENTS

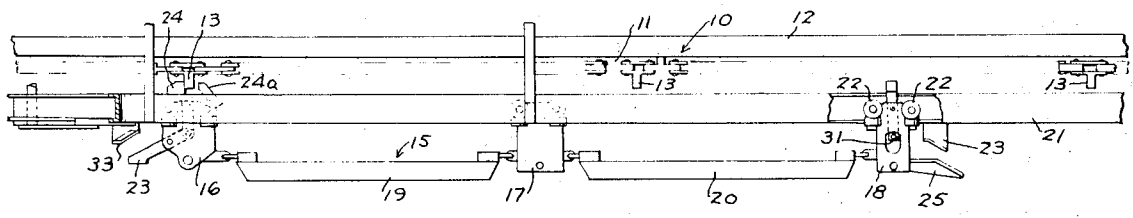
3,602,148	8/1971	Swartz	104/172 S X
3,548,752	12/1970	Karlstrom	104/172 S
3,451,352	6/1969	Curry et al.	104/172 S
3,618,532	11/1971	Clewett	104/96 X

Primary Examiner—Gerald M. Forlenza
Assistant Examiner—Howard Beltran
Attorney—Barnes, Kisselle, Raisch & Choate

[57] **ABSTRACT**

A suspended conveyor system including a first load supporting track and a second load supporting track with an intermediate transfer portion. A powered conveyor is provided in association with each of the first and second tracks. A plurality of carriers are provided. Each of the carriers has a first pusher dog that is in position for normal engagement with the pusher member of the conveyor and a second pusher dog mounted for movement between an operative carrier pushing position and an inoperative position. At a transfer point, a first cam engages the second dog to move the second dog to operative carrier transferring position. Means are provided for releasably holding the second dog in operative carrier transferring position. Beyond the transfer point, a second cam engages the second dog to move the dog downwardly out of operative position.

18 Claims, 13 Drawing Figures



PATENTED JUN 26 1973

3,741,126

SHEET 1 OF 5

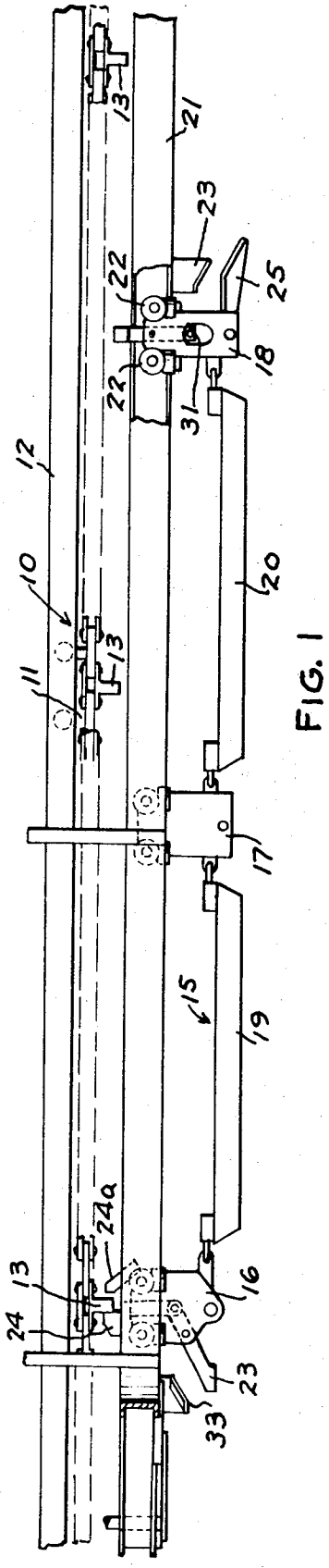


FIG. 1

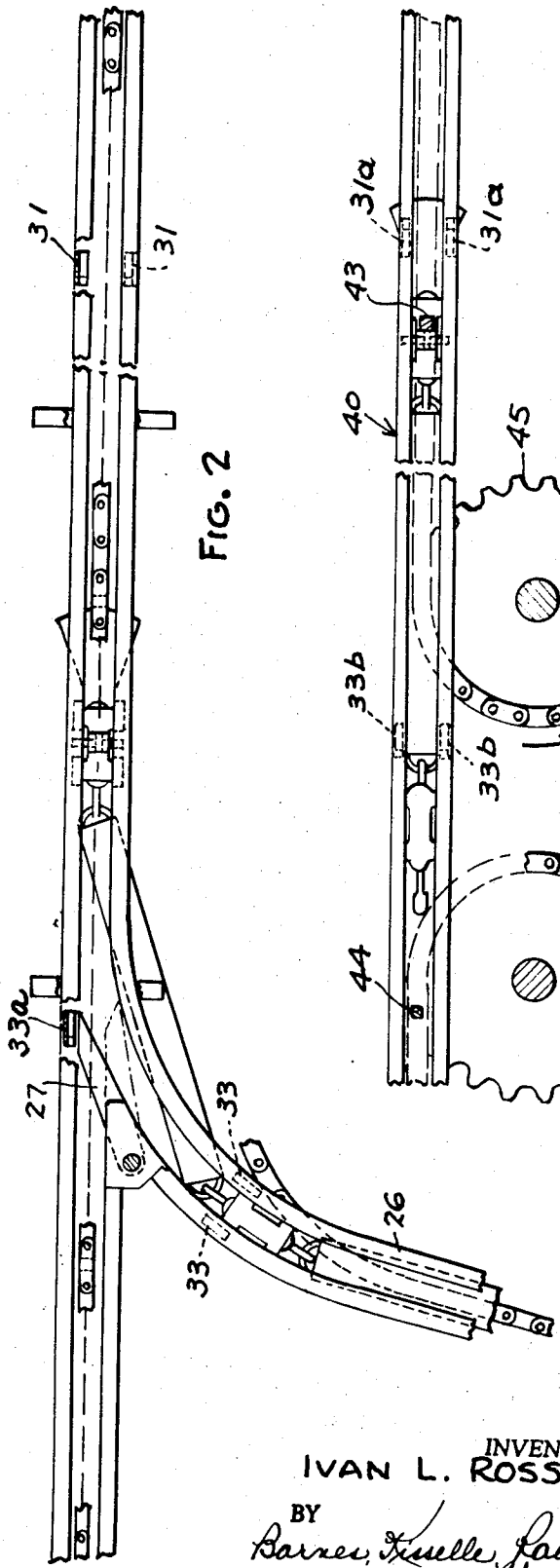


FIG. 2

FIG. 3

INVENTOR.
IVAN L. ROSS

BY
Barnes, Kisselle, Raisch & Choate

ATTORNEYS

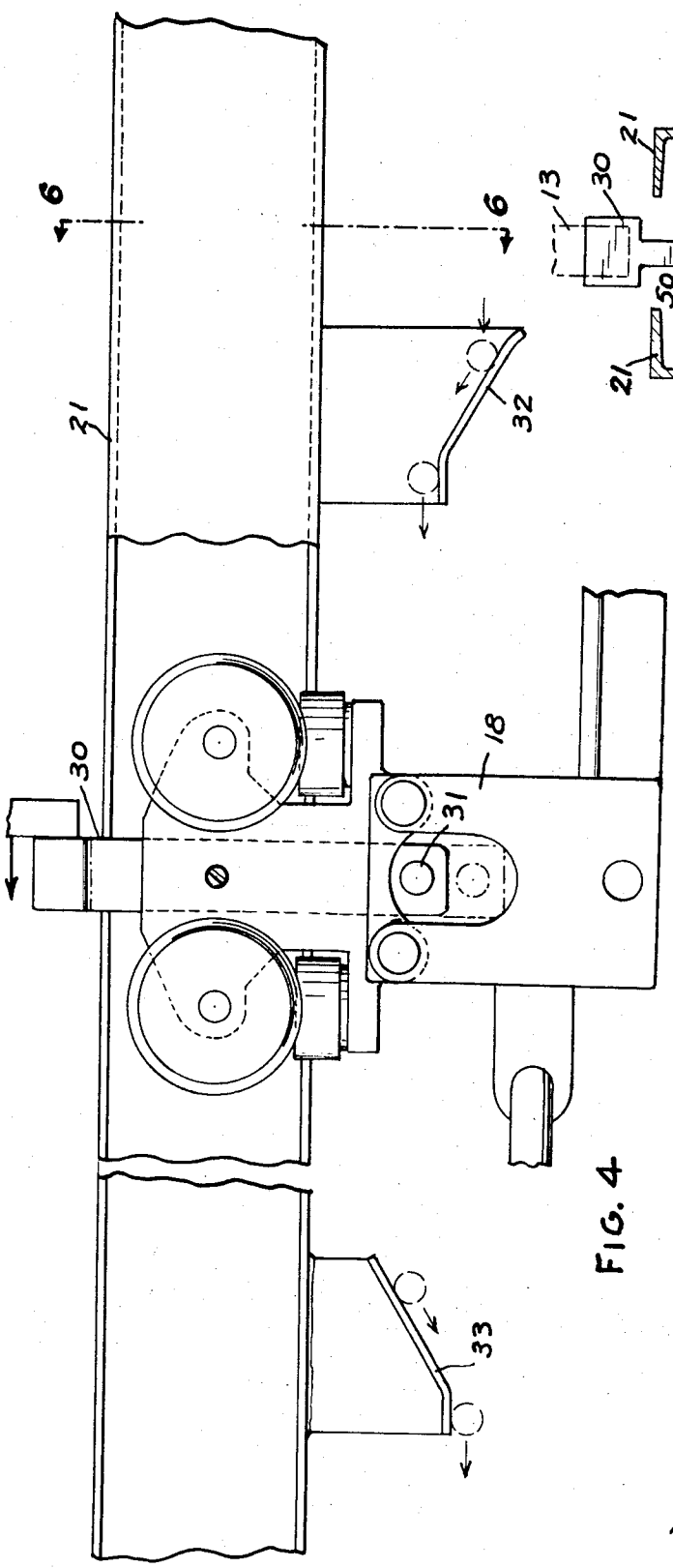


FIG. 4

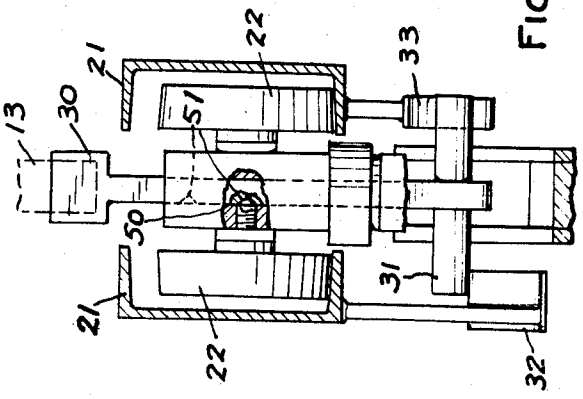


FIG. 6

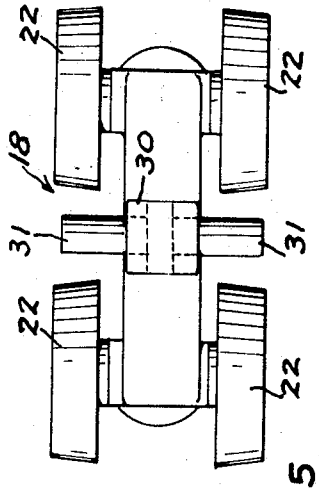


FIG. 5

INVENTOR.
IVAN L. ROSS
BY
Barnes, Kisselle, Raisch & Choate
ATTORNEYS

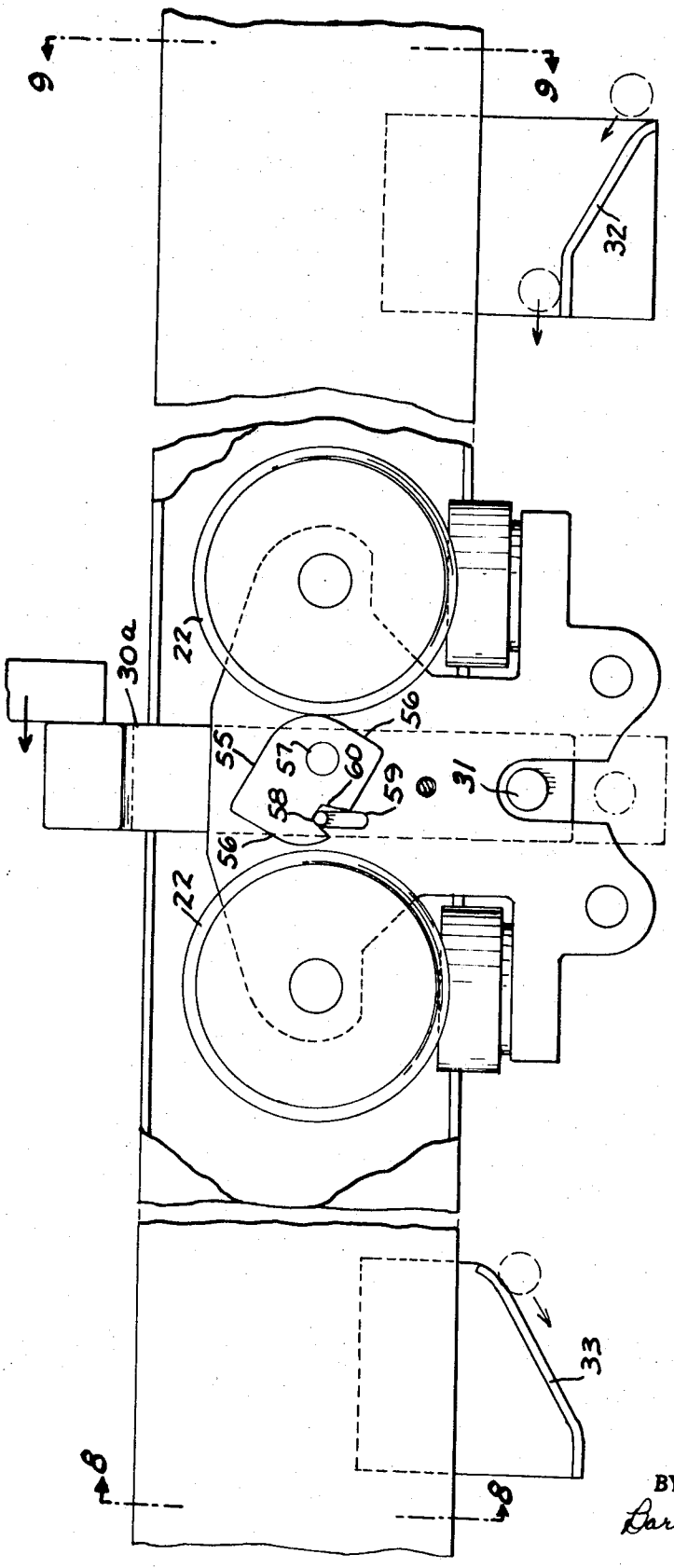


FIG. 7

INVENTOR.
IVAN L. ROSS

BY
Barnes, Kisselle, Raisch & Choate
ATTORNEYS

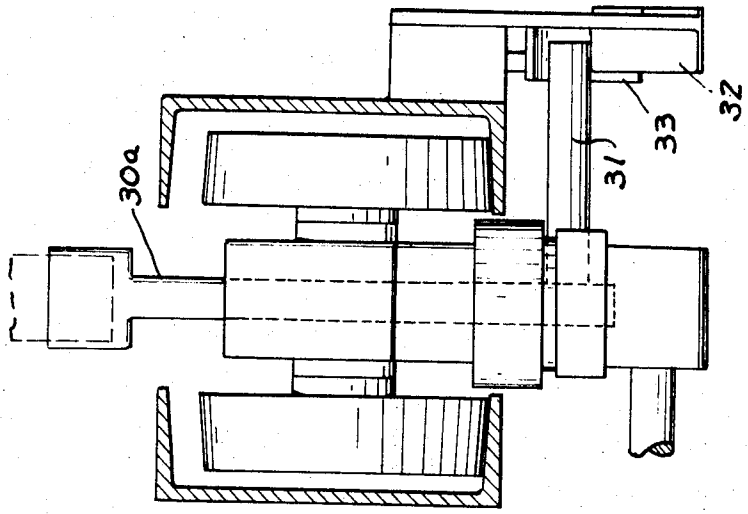


FIG. 9

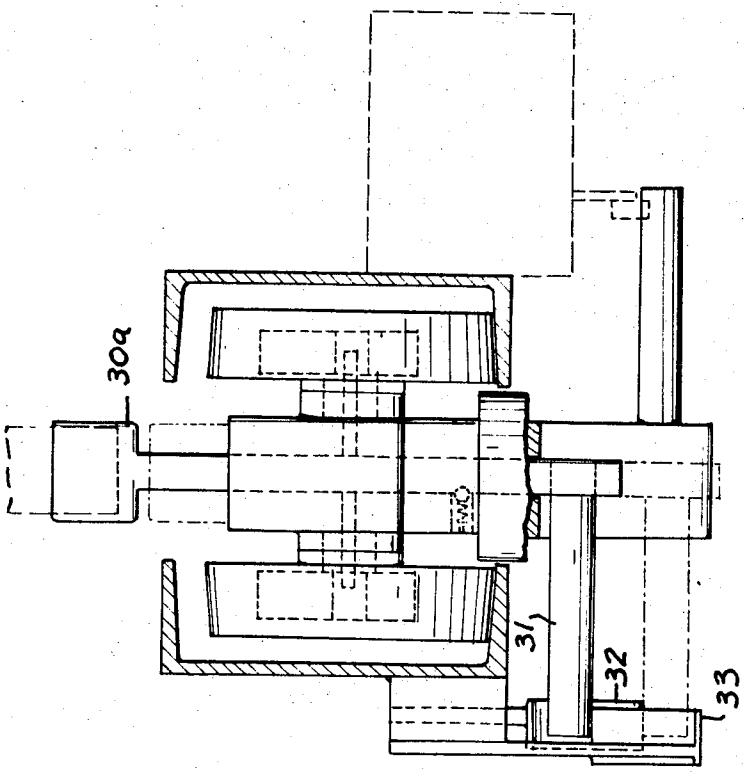


FIG. 8

INVENTOR.
IVAN L. ROSS

BY
Barnes, Kisselle, Raisch,
& Choate

ATTORNEYS

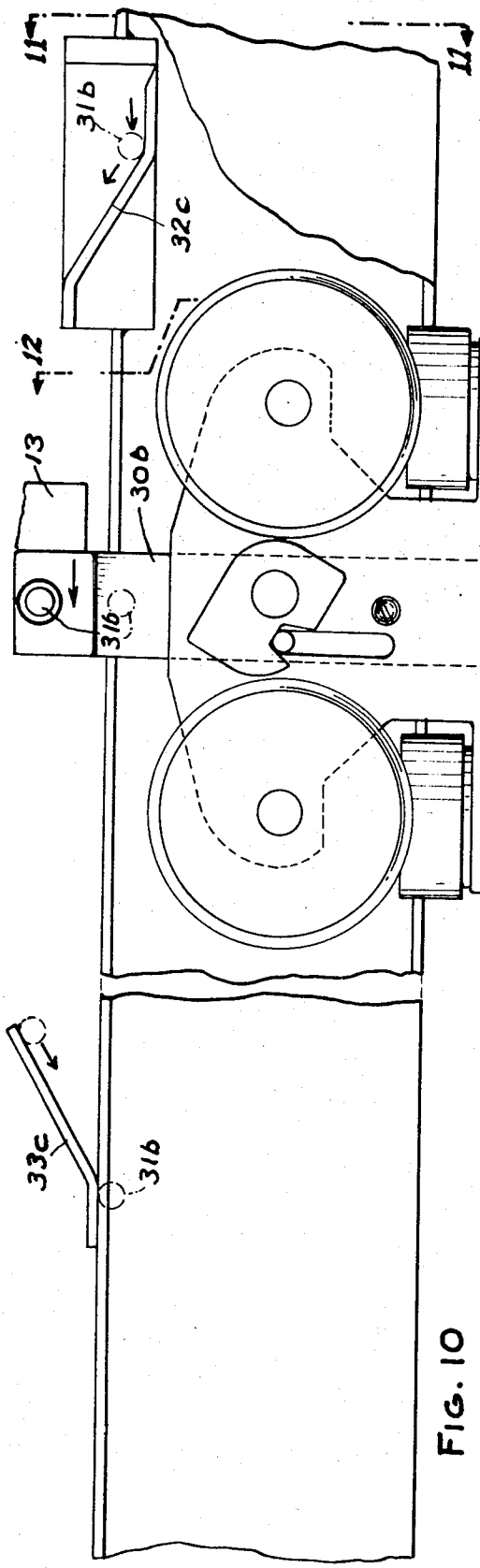


FIG. 10

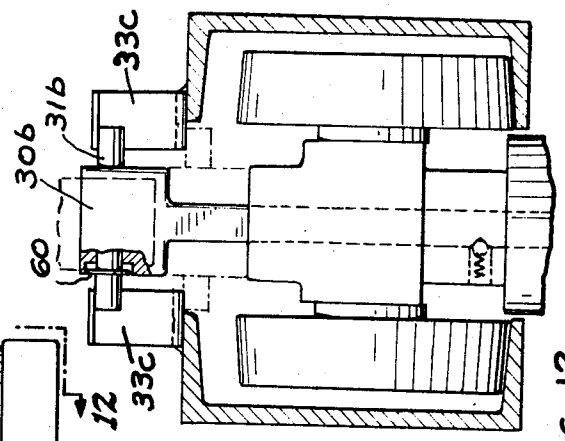


FIG. 12

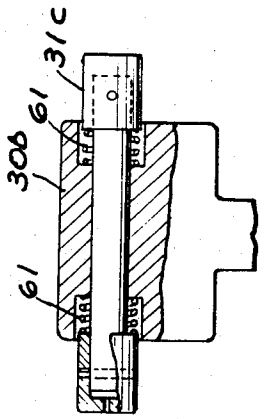


FIG. 13

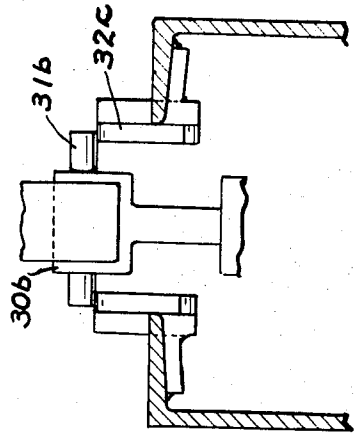


FIG. 11

INVENTOR.
IVAN L. ROSS

BY
Barnes, Kisselle, Raisch & Choate

ATTORNEYS

SUSPENDED CONVEYOR SYSTEM

This invention relates to conveyor systems and particularly to power and free conveyor systems.

In power and free conveyor systems wherein carriers are moved along predetermined paths by engagement with conveyors, it is often necessary to transfer the carriers from one predetermined path to another. In one type of system, this transfer is achieved by providing a transfer conveyor that engages the carrier and transfers it between the predetermined paths. In another type of system, the carrier is moved from the one path toward the other and then pushed through the transfer area to the second path.

Among the objects of the present invention are to provide a power and free conveyor system of the latter type wherein a carrier is transferred from one predetermined path to another by pushing across a transfer zone; and wherein such system is achieved with minimum cost and maintenance.

SUMMARY OF THE INVENTION

A suspended conveyor system including a first load supporting track and a second load supporting track with an intermediate transfer portion. A powered conveyor is provided in association with each of the first and second tracks. A plurality of carriers are provided. Each of the carriers has a first dog that is in position for normal engagement with the pusher member of the conveyor and a second pusher dog mounted for movement between an operative carrier pushing position and an inoperative position. At a transfer point, a first cam engages the second dog to move the second dog to operative carrier transferring position. Beyond the transfer point, a second cam engages the second dog to move the second dog out of operative position.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is a fragmentary part sectional side elevational view of a conveyor system embodying the invention.

FIG. 2 is a fragmentary plan view of the system.

FIG. 3 is a fragmentary plan view of a modified form of conveyor system.

FIG. 4 is a fragmentary elevational view on an enlarged scale of a portion of the system shown in FIG. 1.

FIG. 5 is a fragmentary plan view of a portion of the carrier shown in FIG. 4.

FIG. 6 is a sectional view, parts being broken away, taken along the line 6—6 in FIG. 4.

FIG. 7 is a fragmentary side elevational view of another modified form of the conveyor system.

FIG. 8 is a fragmentary sectional view taken along the line 8—8 in FIG. 7.

FIG. 9 is a fragmentary sectional view taken along the line 9—9 in FIG. 7.

FIG. 10 is a fragmentary side elevational view of a further modified form of the conveyor system.

FIG. 11 is a fragmentary sectional view taken along the line 11—11 in FIG. 10.

FIG. 12 is a fragmentary sectional view taken along the line 12—12 in FIG. 10.

FIG. 13 is a fragmentary transverse sectional view of a modified form of carrier.

DESCRIPTION

Referring to FIG. 1, the invention relates to a conveyor system wherein a power chain is adapted to selectively engage trolleys and move them in predetermined paths. The trolley motion is from right to left. Specifically, conveyor chain 10 is supported by chain trolleys 11 for movement along a track 12. The chain 10 includes longitudinally spaced pushers 13 that are adapted to engage carriers, as presently described, to move them. As shown, a carrier 15 comprising two or more longitudinally spaced trolleys (herein shown as three trolleys 16, 17, 18) pivotally interconnected by tie bars 19, 20 is provided for movement along track 21. The trolleys include wheels 22 that engage the lower webs of spaced inwardly facing C-shaped channels of track 21 (FIG. 6). The foremost trolley 16 includes an actuating lever 23 that is operatively connected to a pusher dog 24 so that when lever 23 engages an obstacle or a projection 25 on the rear trolley 18 of the preceding carrier, the lever 23 is swung in a clockwise direction as viewed in FIG. 1 to lower the pusher dog 24 out of the path of a pusher 13. Such an arrangement is known as an accumulating conveyor system. The foremost trolley 16 further includes a pivoted hold-back dog 24a in accordance with conventional practice.

As further shown in FIG. 2, the system includes a second track 26 that extends at an angle from the track 21 and a switch tongue 27 that is operated to selectively guide the carrier 15 into the second track 26. The switch tongue 27 is controlled by signal devices such as are well known in the art, for example, as shown in the U.S. Pat. to Bishop No. 2,868,139. A second power chain 28 is provided in overlying relation to a portion of the track 26 and has pushers thereon adapted to pick up the carrier and move it along the track 26.

Referring more specifically to FIG. 4, one of the succeeding trolleys, such as trolley 18 of the carrier 15, includes a second pusher dog 30 that is mounted for vertical movement in the body of trolley 18 and is movable between an upper operative pushing position and a lower inoperative position. Pusher 30 has laterally extending projections 31 thereon which extend transversely from the lower end of pusher dog 30. However, in the case of the transfer of the carrier from the track 21 to the track 26 by positioning of the switch tongue 27, a cam 32 on one or both sides of the track in advance of the transfer area is provided on track 21 and is engaged by one or both of the projections 31 to cam the pusher dog 30 vertically upwardly to the position shown in FIG. 4 and thereby be in position for engagement with a pusher 13 which will push the carrier 15 partially through the switching or transfer area into position for engagement of the leading pusher dog 24 with the pusher of a secondary chain 28 along second track 26.

When the switch tongue 27 is actuated to divert the carrier, the pusher 13 which is in engagement with the pusher dog 24 will disengage from the pusher dog 24 as the foremost trolley of carrier 15 is diverted to the track 26. The carrier 15 will then be momentarily stopped. However, by this time, the pusher dog 30 will have been moved upwardly so that a succeeding pusher 13 of the power chain will engage the pusher dog 30 and cause the carrier 15 to be moved further along the track 26 sufficiently to permit dog 24 to be picked up by a pusher of the second power chain 28. As the carrier is moved along track 26, cam 33 will engage a pro-

jection 31 of the pusher dog to cam it down out of the path of the pusher 13 of chain 28.

A carrier which is not switched off is pushed all the way through the switching area by engagement of its front dog 24 with a pusher 13 of the power chain, so that the trailing dog 30 moves through this area without being in contact with a pusher 13. A third cam 33a is provided on main track 22 beyond the transfer area to cam second dog 30 down after the carrier is pulled through the transfer area.

Throughout the portion of the system wherein the transfer is achieved, the relative positions vertically of the power track 12 and carrier tracks 21, 26 remain constant and are not changed.

The invention is also applicable to the transfer of the carrier from one powered conveyor to another, for example, from a faster to a slower conveyor or from a slower conveyor to a faster conveyor. Specifically, as shown in FIG. 3, the carrier is adapted to move along a track 40 in a portion between spaced power conveyors 41, 42, each of which has pushers 43, 44. As the conveyor 41 moves over its turn shown as sprocket 45, the pusher 43 thereon which is in engagement with the pusher dog 24 of the carrier becomes disengaged interrupting or causing a stoppage of the carrier. Prior to this point, cam 32a on the track 40 has been engaged by the second pusher dog 30 of the carrier to move the second pusher dog upwardly into the path of a succeeding pusher 43 which then pushes the carrier across the gap between the conveyors 41, 42 bringing the leading pusher dog 24 into position for engagement with the pusher 44 of the succeeding conveyor 42. As the carrier is pulled across the space between the conveyors 41, 42, the second pusher dog 30 is depressed by engagement with the cam 33*b*.

As shown in FIG. 6, a spring loaded detent 50 in the form of a ball is adapted to engage one of two recesses 51 in the second pusher dog 30 to releasably hold the second pusher dog 30 in each of its positions, namely, its pusher engaging position and its inoperative position.

In the form of the invention shown in FIGS. 7–9, brakes 55 (one in each side) in the form of a generally rectangular block with curved edges 56 are pivoted eccentrically as at 57 on the carrier and are urged by gravity into engagement with the wheels 22 to function as a one-way brake permitting forward movement of the carrier but preventing rearward or retrograde movement of the carrier. The second pusher dog 30a is provided with a pin 58 that extends through an opening 59 in the carrier into engagement with a notch 60 on the brakes 55. When the second pusher dog 30a is in its upper or operative position, the pin 58 functions to hold the brake 55 out of contact with the wheels so that retrograde movement of the carrier is not impeded. In this form of the invention, a single projection 31 is provided for engagement with the cams 32, 33.

In the form of the invention shown in FIGS. 10-12, the carrier with the second pusher dog is substantially identical to that shown in FIGS. 7–9 except that the second pusher dog 30*b* has its projection 31*b* on the upper end thereof so that the cam 32*c* functions to raise the second pusher dog while the cam 33*c* functions to lower the dog as in the previous form of the invention. The projections 31*b* comprise a single member that is mounted for limited transverse movement in the second pusher dog 30*b*, movement being limited by washers 60 that are spaced apart a distance to permit limited movement.

In the form of the invention shown in FIG. 13, the dog 30*b* has its projections 31*c* similarly mounted for limited transverse movement but, in addition, springs 61 function between the body of the pusher dog 30*b* and enlarged ends on the projection or bar 31*c* to centrally locate the bar.

I claim:

1. In a conveyor system, the combination comprising
means defining a first load supporting track,
a first conveyor having a portion thereof adjacent said track and including longitudinally spaced pusher members,
a plurality of carriers for movement along said track,
each said carrier having a first pusher dog,
each said carrier having a second pusher dog,
means for mounting said second pusher dog on said carrier for movement to and from a position where it may be engaged by a pusher member on the conveyor,
means on said carrier for releasably holding said second pusher dog in position for engagement by a pusher member,
a second load supporting track,
means for guiding said carrier between said first and second load supporting tracks,
means in advance of the area of said last-mentioned means for moving said second pusher dog into position for engagement with a pusher member of the conveyor whereby when a carrier is moved to said intermediate transfer portion, a pusher member of said conveyor becomes disengaged from said first dog and a succeeding pusher member engages said second dog to push said carrier across said intermediate transfer portion,
and means beyond said area for moving said second pusher dog into position out of the path of a pusher member,
said means on said carrier for releasably holding said second pusher dog being independent of said means in advance of the area and said means beyond the area.

2. The combination set forth in claim 1 wherein said means in advance of the area for moving the second pusher dog comprises a first cam and a projection on said second pusher dog adapted to engage the first cam,
said projection being mounted for yieldable transverse movement with respect to said carrier,
said means beyond said area comprising a second cam.

3. The combination set forth in claim 2 wherein said projection comprises a transversely extending member on the upper end of said second pusher dog.

4. The combination set forth in claim 2 wherein said projection comprises a transversely extending member on the lower end of said second pusher dog.

5. The combination set forth in claim 2 wherein said projection comprises a bar that extends transversely with respect to said carrier on opposite sides thereof.

6. The combination set forth in claim 1 including means for releasably holding said second pusher dog in each of said positions.

7. The combination set forth in claim 1 wherein said second pusher dog is mounted for generally vertical straight line movement.

8. The combination set forth in claim 1 including a third cam positioned along said first supporting track to engage said second pusher dog and insure it being held in position out of the path of the pusher member.

9. In a conveyor system, the combination comprising
means defining a first overhead load supporting track,
a first conveyor having a portion thereof adjacent said track and including longitudinally spaced pusher members,
a plurality of carriers for movement along said track,
each said carrier comprising a plurality of interconnected trolleys,
one of said trolleys having a first pusher dog,
another of said trolleys of each said carrier having a second pusher dog,
means for mounting said second pusher dog on said carrier for movement to and from position where it may be engaged by a pusher member on the conveyor,
means on the carrier for releasably holding said second pusher dog in position for engagement by a pusher member,
a second overhead load supporting track,
overhead means for guiding said carrier between said first and second load supporting tracks,
means in advance of the area of said last-mentioned means for moving said second pusher dog into position for engagement with a pusher member of the conveyor whereby when a carrier is moved to said intermediate transfer portion, a pusher member of said conveyor becomes disengaged from said first pusher dog and a succeeding pusher member engages said second pusher dog to push said carrier across said intermediate transfer portion,
and means beyond said area for moving said second pusher dog into position out of the path of a pusher member,
said means on said carrier for releasably holding said second pusher dog being independent of said means in advance of the area and said means beyond the area.

10. The combination set forth in claim 9 wherein said means in advance of the area for moving the second pusher dog comprises a first cam and a projection on said second pusher dog adapted to engage the first cam,
said means beyond said area comprising a second cam.

11. The combination set forth in claim 10 wherein said projection comprises a transversely extending member on the upper end of said second pusher dog.

12. The combination set forth in claim 10 wherein said projection comprises a transversely extending member on the lower end of said second pusher dog.

13. The combination set forth in claim 10 wherein said projection comprises a bar that extends transversely with respect to said carrier on opposite sides thereof.

14. The combination set forth in claim 10 including means for releasably holding said second pusher dog in each of said positions.

15. In a conveyor system, the combination comprising
means defining a first load supporting track,
a first conveyor having a portion thereof adjacent said track and including longitudinally spaced pusher members,
a plurality of carriers for movement along said track,
each said carrier having a first pusher dog,
each said carrier having a second pusher dog,
means for mounting said second pusher dog on said carrier for movement to and from a position where it may be engaged by a pusher member on the conveyor,
means on said carrier for releasably holding said second pusher dog in position for engagement by a pusher member,
a second load supporting track,
means for guiding said carrier between said first and second load supporting tracks,
means in advance of the area of said last-mentioned means for moving said second pusher dog into position for engagement with a pusher member of the conveyor whereby when a carrier is moved to said intermediate transfer portion, a pusher member of said conveyor becomes disengaged from said first dog and a succeeding pusher member engages said second dog to push said carrier across said intermediate transfer portion,
and means beyond said area for moving said second pusher dog into position out of the path of a pusher member,
means for releasably retaining said second pusher dog in position for engagement by a pusher member
comprising a spring loaded detent on said carrier,
and a recess on said second pusher dog engaged by said detent.

16. In a conveyor system, the combination comprising
means defining a first load supporting track,
a first conveyor having a portion thereof adjacent said track and including longitudinally spaced pusher members,
a plurality of carriers for movement along said track,
each said carrier having a first pusher dog,
each said carrier having a second pusher dog,
means for mounting said second pusher dog on said carrier for movement to and from a position where it may be engaged by a pusher member on the conveyor,
means on said carrier for releasably holding said second pusher dog in position for engagement by a pusher member,
a second load supporting track,
means for guiding said carrier between said first and second load supporting tracks,
means in advance of the area of said last-mentioned means for moving said second pusher dog into position for engagement with a pusher member of the conveyor whereby when a carrier is moved to said intermediate transfer portion, a pusher member of said conveyor becomes disengaged from said first dog and a succeeding pusher member engages said second dog to push said carrier across said intermediate transfer portion,
and means beyond said area for moving said second pusher dog into position out of the path of a pusher member,
means for releasably holding said second pusher dog in each of said positions
comprising a pair of spring loaded detents on said carrier,

and a recess on said second pusher dog selectively engaged by said detent when said second pusher dog is in each of said positions.

17. In a conveyor system, the combination comprising

means defining a first overhead load supporting track,

a first conveyor having a portion thereof adjacent said track and including longitudinally spaced pusher members,

a plurality of carriers for movement along said track,

each said carrier comprising a plurality of interconnected trolleys,

one of said trolleys having a first pusher dog,

another of said trolleys of each said carrier having a second pusher dog,

means for mounting said second pusher dog on said carrier for movement to and from position where it may be engaged by a pusher member on the conveyor,

a second overhead load supporting track,

overhead means for guiding said carrier between said first and second load supporting tracks,

means in advance of the area of said last-mentioned means for moving said second pusher dog into position for engagement with a pusher member of the conveyor whereby when a carrier is moved to said intermediate transfer portion, a pusher member of said conveyor becomes disengaged from said first pusher dog and a succeeding pusher member engages said second pusher dog to push said carrier across said intermediate transfer portion,

and means beyond said area for moving said second pusher dog into position out of the path of a pusher member,

said means in advance of the area for moving the second pusher dog comprising a first cam and a projection on said second pusher dog adapted to engage the first cam,

said means beyond said area comprising a second cam,

means for releasably retaining said second pusher dog in position for engagement by a pusher member

comprising a spring loaded detent on said carrier,

and a recess on said second pusher dog engaged by said detent.

18. In a conveyor system, the combination comprising

means defining a first overhead load supporting track,

a first conveyor having a portion thereof adjacent said track and including longitudinally spaced pusher members,

a plurality of carriers for movement along said track,

each said carrier comprising a plurality of interconnected trolleys,

one of said trolleys having a first pusher dog,

another of said trolleys of each said carrier having a second pusher dog,

means for mounting said second pusher dog on said carrier for movement to and from position where it may be engaged by a pusher member on the conveyor,

a second overhead load supporting track,

overhead means for guiding said carrier between said first and second load supporting tracks,

means in advance of the area of said last-mentioned means for moving said second pusher dog into position for engagement with a pusher member of the conveyor whereby when a carrier is moved to said intermediate transfer portion, a pusher member of said conveyor becomes disengaged from said first pusher dog and a succeeding pusher member engages said second pusher dog to push said carrier across said intermediate transfer portion,

and means beyond said area for moving said second pusher dog into position out of the path of a pusher member,

said means in advance of the area for moving the second pusher dog comprising a first cam and a projection on said second pusher dog adapted to engage the first cam,

said means beyond said area comprising a second cam,

means for releasably holding said second pusher dog in each of said positions

comprising a pair of spring loaded detents on said carrier,

and a recess on said second pusher dog selectively engaged by said detent when said second pusher dog is in each of said positions.

* * * * *