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Coleson et al.

[11] **3,913,494**

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[54] **CONVEYOR SYSTEMS**

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[73] Assignee: **Hytrac Conveyors Limited**, Leicester, England

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[52] **U.S. Cl.** ..... **104/172 S**; 104/89

[51] **Int. Cl.²** **B61B 13/00**

[58] **Field of Search** ..... 104/172 R, 172 B, 172 BT, 104/172 C, 172 S, 89; 105/148

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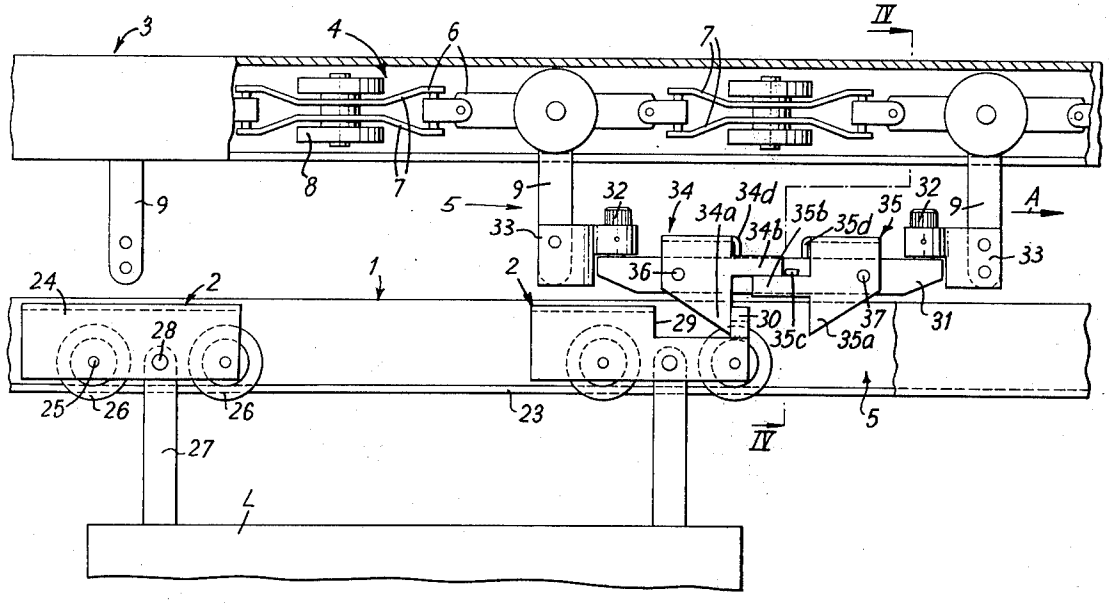
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Primary Examiner—M. Henson Wood, Jr.
Assistant Examiner—Randolph A. Reese
Attorney, Agent, or Firm—Larson, Taylor & Hinds

[57] **ABSTRACT**

Power and free type conveyor system, wherein driving conveyor carries dogs to drive free carriers in a trackway. Each dog comprises a bar fitted with the pivoted latches. One latch drives appropriate carriers while the other is positioned to be lifted in the event that it meets a stationary carrier in the trackway and is arranged to thereupon lift the driving latch and disengage the drive.

7 Claims, 4 Drawing Figures



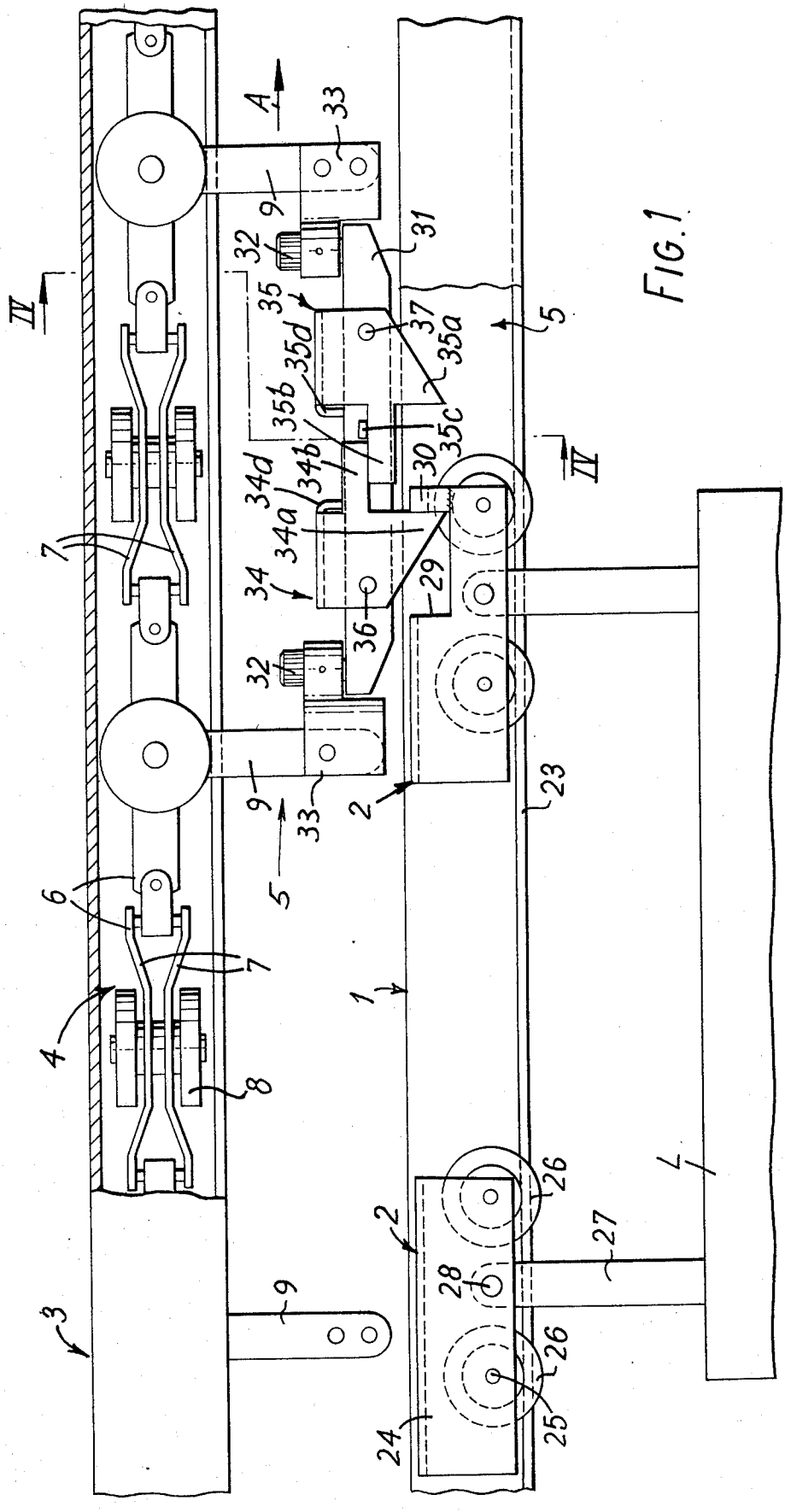

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FIG. 1

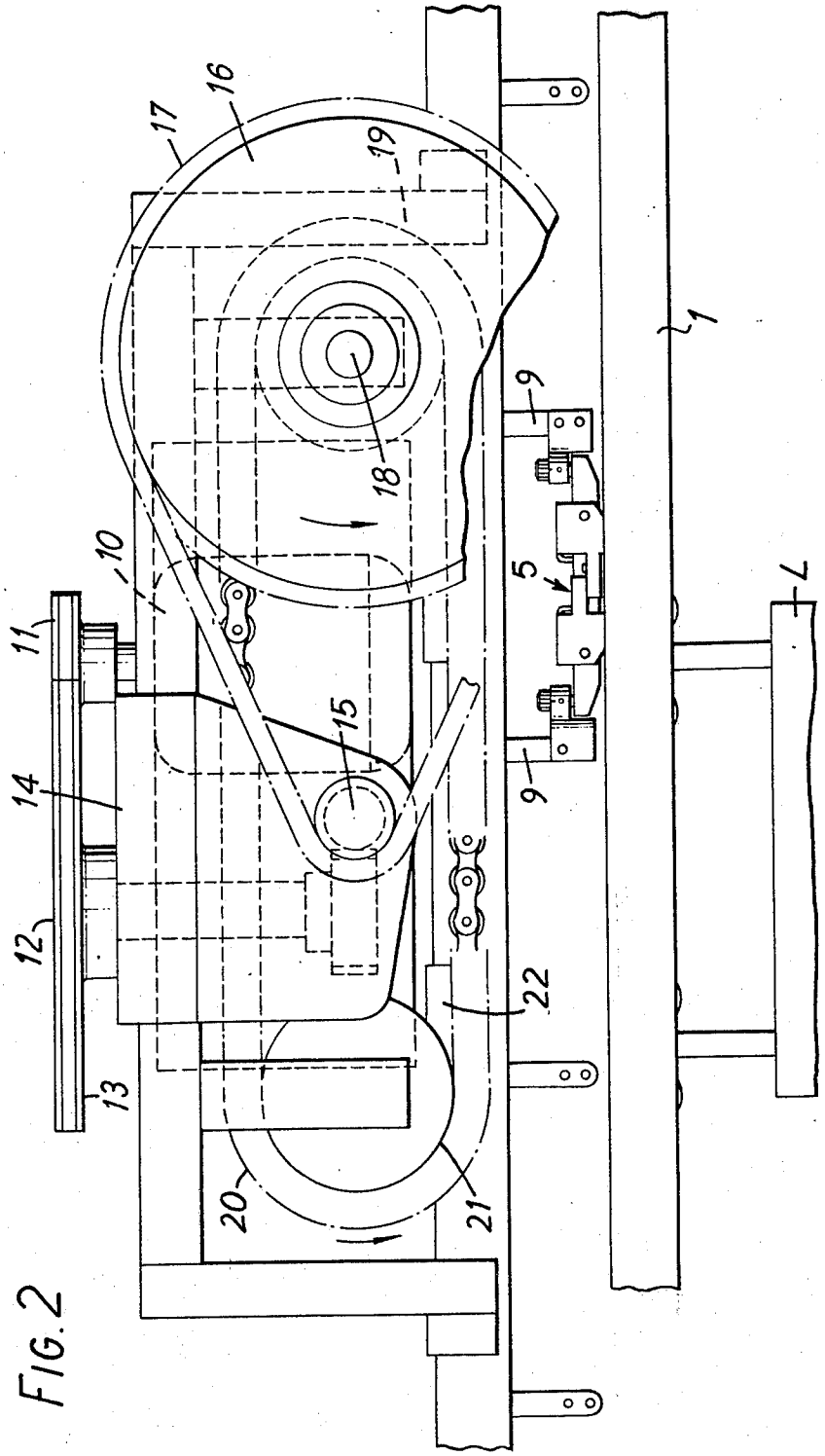


FIG. 2

FIG. 3

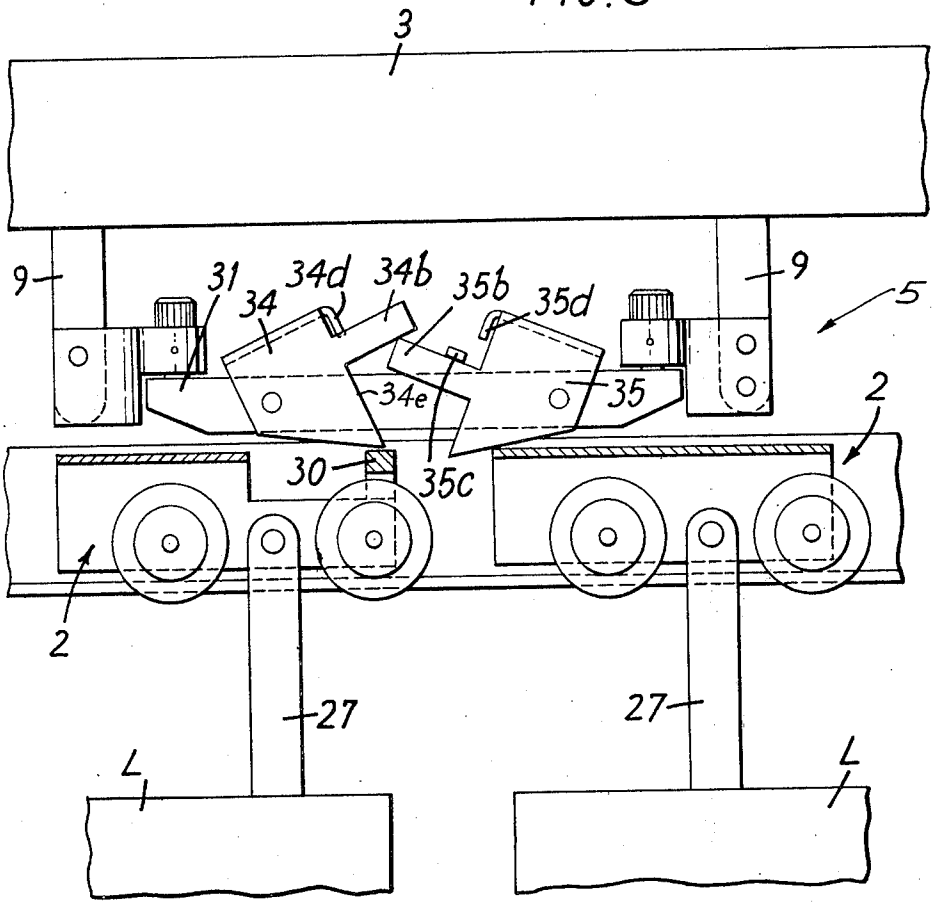
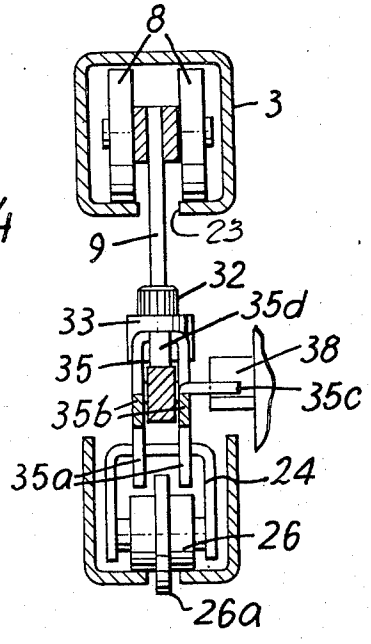

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34
34d
34b
35b
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34e
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35c
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27
27
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FIG. 4


8
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23
32
35d
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38
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35c
35b
35a
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26a

CONVEYOR SYSTEMS

This invention relates to conveyor systems of the so-called 'power and free' type, comprising a plurality of load carriers mounted for free movement in a trackway, an elongate driving element which in use travels adjacent the trackway, and means for drivably connecting the driving element with one or more of the load carriers so that the latter are propelled along in the trackway by the element.

In existing systems of this type, the driving element is normally mounted above the trackway and engages the carriers from above, the work or goods being suspended from the carriers. Each carrier has an upstanding drive dog which engages with a depending catch on the driving element when the carrier is to be driven. The dogs and catches are so designed that, if a carrier which is being driven by the driving element abuts against a stationary carrier, the drive dog on the driven carrier disengages from the catch on the driving element and the carrier comes to rest. It will be appreciated, by virture of this arrangement, that a plurality of carriers can be caused to accumulate at a selected location in the trackway, e.g., for loading or to allow an operation to be performed on the work or goods carried thereby.

Conventional systems as described in the preceding paragraph have the disadvantage that the drive dogs and catches are normally of complex construction and are thus expensive. Moreover, they tend to be noisy in use and to cause jostling of the load carriers, with the result that the work or goods carried by adjacent carriers swing against one another and may consequently be damaged.

It is an object of the present invention to provide an improved conveyor system of the type herein referred to.

According to the invention, the drive element of the system carries at least one drive dog comprising a first pivoted latch member which is arranged to normally project from said element for driving engagement with a load carrier in the trackway, and a second pivoted latch member positioned in advance of the first latch member in the direction of movement of the driving element and arranged to project from the dog for contact with load carriers in the trackway, the second latch member being adapted to be pivoted out of its normal position in the event that it meets an obstruction (such as a stationary carrier) in its path and being engaged with the first latch member so as to thereupon pivot the latter out of its normal driving position and disengage the drive.

It will be appreciated that this drive dog arrangement is particularly simple and thus relatively inexpensive to manufacture. Moreover, in practice, it is found to operate efficiently, producing a low level of noise. A further advantage is that the drive dog in the system of the invention will satisfactorily engage a carrier without the need for resistance to the movement of the carrier, as is required for successful locking of the drive dogs and catches in some conventional systems.

When the system provided by the invention is in use (assuming the dog is initially clear of any carriers), the drive dog will be carried around the system by the driving element with the latch members in their normal positions ready to drive. The first carrier encountered in the path of the finger will initially displace the leading

latch member which, in turn, will move the other latch member out of its driving position. However, as soon as the leading latch member clears the carrier, the driving latch will return to its operative position and engage and drive the carrier. On reaching, say, a stationary load carrier, the leading latch member will be deflected out of its normal position, thereby lifting the driving latch member and disengaging the drive.

It will be appreciated that this arrangement allows a batch of stationary carriers to be accumulated at an appropriate point in the system. Thus, as each fresh carrier is propelled into the batch from elsewhere in the system by a drive dog the leading latch member of the dog will be deflected out of its operative position by contact with the rearmost stationary carrier and the drive to the "fresh" carrier will be disengaged. The dog will then pass on to the next carrier in the batch but the drive will not re-engage because the leading latch member will be maintained in its deflected condition and hold the driving latch member inoperative until the last carrier of the batch is reached. The latch members will then revert to their normal positions and commence driving on the last carrier.

It will be appreciated that a plurality of drive dogs will normally be employed in the system provided by the invention, one to each carrier to be driven.

Although there is no limitation in this respect, the arrangement will normally be such that the drive element is disposed above the carriers, the dog or dogs engaging the latter from above. In this event, the latch members will be biassed into their normal positions by gravity. In other cases, spring biassing may be employed.

Conveniently, the latch member will be provided with an arm which projects towards the other latch, the arm on the leading latch being disposed below the arm on the other latch so that when the leading latch is pivoted out of its normal position by engagement with an obstruction in the trackway it lifts the arm of the other latch to pivot the latter out of its normal driving position.

In order that the invention may be more clearly understood and readily carried into practice, reference will now be made to the accompanying drawings which illustrate one embodiment thereof, by way of example, and in which:

FIG. 1 is a side view partly in section, of part of a conveyor system constructed according to this embodiment of the invention,

FIG. 2 is a side view of another part of the system showing the drive unit, and

FIG. 3 is a side view, similar to FIG. 1, which illustrates the method of disengaging drive to the individual carriers of the system.

FIG. 4 is a transverse sectional view of line IV—IV of FIG. 1.

The system shown in the drawings comprises a first trackway 1 in which a plurality of load carriers 2 are freely movable. A second trackway 3 is mounted parallel to and above trackway 1 and carries an elongate driving conveyor element 4, the direction of movement of which is indicated by arrow A in FIG. 1.

A plurality of drive dogs 5 (only one of which is shown in the drawings) depend from conveyor element 4 for driving engagement with the load carriers 2 as will hereinafter be described.

In the present example of the invention conveyor element 4 is of the form described and claimed in U.S. Pat.

No. 3,637,067, although it is of course to be understood that there is no limitation in this respect. Element 4 comprises a plurality of links 6 made up of a pair of side members 7 carrying wheels 8 which run on the inside of the trackway. As can be seen alternate links are arranged with the wheels 8 vertical whilst the wheels of the intervening links are horizontal.

The axles between the vertical wheels of conveyor element 4 each carry a pendant 9 which depends through a slot 40 in the bottom of trackway 3. The drive dogs 5 are bolted to selected ones of these pendants.

FIG. 2 shows the drive unit for conveyor element 4. It comprises a motor 10 disposed at the far side of trackway 3 in the drawing with its drive shaft vertical. A pulley 11 mounted on the output shaft of motor 10 drives, via a belt 12, a further pulley 13 on the input shaft of a gearbox 14 at the near side of trackway 3 in the drawing. The output shaft of the gearbox carries a sprocket 15 which drives a further sprocket 16 via a chain 17. Sprocket 16 is mounted on a horizontal drive shaft 18 which forms the main driving shaft of the drive unit.

Mounted on shaft 18, one on each side of trackway 3 are a pair of drive sprockets 19 for a pair of parallel drive chains 20 which run in endless paths around idler sprockets 21 on opposite sides of trackway 3. Drive dogs 22 mounted between chains 20 are arranged to engage drive element 4 to propel the chain along all as described in the patent specification aforesaid.

Referring back to FIGS. 1,3 and 4 of the drawings it will be seen that trackway 1 is of U-shape, being formed with a longitudinal slot 23 in its base. Each carrier 2 in trackway 1 comprises a body 24 of inverted U-shape, between the side limbs of which are mounted a pair of spaced axles 25 carrying wheels 26. As can be seen from FIG. 4, each axle 25 carries a single wide wheel 26 which is formed around its periphery with a rib 26*a* arranged to project through the slot 23 in trackway 1. Depending from each carrier 2 is a load-supporting link 27 which at its upper end is mounted on a pin 28 extending between the side limbs of the carrier.

In the particular arrangement shown in the drawings the load carriers are used in pairs to carry a single load denoted L mounted between the links 27. It will be noted that the leading carrier (considered in the direction of travel of the driving element 4) has its body cut away at 29 to accommodate the drive dog and is provided at its leading end with a transverse bar 30 welded betweem the side walls of the body, behind which the drive dog engages. This arrangement ensures that a drive dog will only engage and drive on the leading carrier in each pair. The upper surfaces of the load carriers are planar. The driven load carrier includes a cut out portion extending between bar member 30 located adjacent the leading end of the load carrier and a rear portion extending from the cut out portion to the trailing end of the load carrier. The rear portion extends longitudinally a distance greater than the spacing between the latch members on the drive dog so that, as the drive dog approaches a stationary load carrier, the driving latch member is lifted by the second latch member and is held upwards out of its driving position for disengagement from the driveable load carrier. The spacing between the latch members is greater than the longitudinal thickness of bar member 30 such that, when the second latch member is forward of bar member 30, the driving latch member is adapted to project downwards into the cut out portion for driving engagement with bar member 30.

It is, however, to be understood that the carriers need not essentially be used in pairs and that individual carriers may be used for individual loads. In this event each carrier will be of the same form as the leading carrier in FIG. 1.

In any event, each of the drive dogs 5 comprises a horizontal, longitudinally extending bar 31 which, at each end, is pivotally connected by a screw 32 to a bracket 33 itself secured to one of the pendants 9 depending from the driving conveyor element 4. Thus, in this embodiment, each drive dog is connected between two adjacent pendants 9 on the conveyor element 4.

Pivotally mounted on the bar 31 are a pair of latches 34, 35, the pivot points being indicated at 36, 37 respectively. Latch 34 constitutes a driving latch and is controlled by latch 35 as will be explained. Each latch comprises a body of inverted U-shape (see FIG. 4) the lower portions of the sidewalls of which define wedge-shaped formations 34*a*, 35*a* which engage the load carriers. It will be noted that the latches are arranged in opposed positions so that the inclined edges of their wedge shaped portions 34*a*, 35*a* extend in directions which converge downwardly. Projecting from each latch towards the other at each side of the bar 31 is an arm 34*b*, 35*b*, the arms being arranged so that the two arms 34*b* on latch 34 rest on the arms 35*b* of the other latch. Moreover, one of the arms 35*b* has a laterally projecting finger 35*c* by which the latch can be lifted as will be described.

In addition, the base of the U-section body of each latch 34, 35 is shaped to provide a downwardly directed tongue 34*d*, 35*d* which rests on the bar 31 to define the normal position of the latch. In these normal positions, the vertical edges 34*e* of latch 34 form the driving surfaces of the latch and engage behind the transverse bar 30 at the front end of the leading carrier 2. It will be appreciated that, in this condition, latch 34, moving with the drive element 4, will drive the leading carrier 2 which, by way of the load, will tow the rear carrier. The torque acting on latch 34 at this time will be exerted in the clockwise direction about pivot 36 and will be resisted by tongue 34*d*.

FIG. 3 illustrates how the drive is disengaged when the drive dog meets a preceeding stationary carrier in the trackway 1. As can be seen, the inclined surfaces of the wedge shaped portions 35*a* of latch 35 ride up on the rear end of the stationary carrier at this time, thereby turning the latch in the clockwise direction about pivot 37. This raises the arms 35*b* of latch 35 to in turn lift the arms 34*b* of latch 34 and pivot the latter in the anti-clockwise direction about pivot 36, to effectively raise the wedge shaped lower portions of latch 34 and disengage the drive to the carrier. It will be apparent from FIGS. 1 and 3 that driving latch 34 is free to pivot upwardly independently of latch member 35.

It will be appreciated that a similar effect will occur in the event of latch 35 encountering any other type of obstruction in or adjacent the trackway. The laterally projecting finger 35*c* on latch 35 can be used to turn the latch in similar fashion by means of a cam (indicated by way of example at 38 in FIG. 4). Other cam means, e.g., an electro-magnetically operated arm, can be used to produce a similar effect.

In any event, once the obstruction has passed, both latches return to the positions shown in FIG. 1 under gravity and the drive will re-commence the next time a stationary "leading" carrier is encountered. At this time, latch 35 will be lifted and will in turn lift latch 34 as shown in FIG. 3, but as soon as latch 35 has cleared the bar 30 it will fall back under the action of gravity and allow latch 34 to fall down behind the bar and take up the drive again.

By virtue of the above described arrangement therefore, the carriers 2 can be caused to accumulate in groups or batches at selected locations around the trackway, as the drive to a particular carrier will be disengaged in the event that the associated drive dog meets a preceding stationary carrier (or other obstacle) in the trackway.

It will, of course, be appreciated that, whilst the enclosed drawings show a conveyor system in which the drive dogs 5 engage the load carriers from above, the invention could equally well be applied to a system in which the drive dogs engage the carriers from the side or from below. In such arrangements, it may be necessary for springs to be provided to bias the latches 34, 35.

We claim:

1. A conveyor system comprising a plurality of load carriers mounted for free movement in a trackway, an elongate driving element which in use travels above the trackway and means for disengageably connecting said element with at least one of the load carriers so that the latter is driven along by the element, wherein the improvement comprises: at least one drive dog on said driving element, the drive dog comprising a first, driving, pivoted latch member which is gravity-loaded to normally project downwards from said element for driving engagement with a load carrier in the trackway beneath said drive dog, and a second pivoted latch member positioned in advance of the first latch member in the direction of movement of the driving element and which is gravity-loaded to project downwards from the dog for contact with a load carrier in the trackway beneath said drive dog, the second latch member being adapted to be pivoted out of its normal position in the event that it meets an obstruction in its path, means on said second latch member in engagement with the first latch member so as to pivot the latter upwardly out of its normal driving position and disengage the drive, said first latch member being movable out of its normal driving position independently of the second latch member, each driveable load carrier comprising a body having a planar upper surface, said upper surface including a cut out portion extending between a bar member adjacent the leading end of said load carrier and a rear portion extending from said cut out portion to the trailing end of said load carrier, said rear portion extending a distance greater than the spacing between the latch members on the drive dog so that, as the drive dog approaches a stationary load carrier, the driving latch member is lifted by said second latch member and held upwards out of its driving position for disengagement from said driveable load carrier, said spacing between said first and second latch members being greater than the thickness of said bar member such that, when the second latch member is forward of said bar member, the driving latch member is adapted to project downwards into said cut out portion for driving engagement with said transverse bar member.

2. A system according to claim 1, wherein each latch member is provided with a arm which projects towards the other member, the arm on the leading latch member being disposed below the arm on the other member so that when the leading latch member is pivoted out of its normal position by engagement with an obstruction in the trackway it lifts the arm of the other latch member to pivot the latter out of its normal driving position.

3. A conveyor system according to claim 2, wherein the arm on the leading latch member is provided with a laterally projecting finger by which the arm can be lifted by means external to the trackway to disengage the drive.

4. A system according to claim 1, wherein an edge of the leading latch member is upwardly inclined in the direction of movement of the drive dog so as to ride up the rear end of a preceding stationary carrier in the trackway.

5. A system according to claim 1, wherein each latch member is of inverted U-shape and is engaged over and pivoted to a bar-form element, the portions of the U-shape latch members extending below said element constituting the carrier-engaging parts of the members.

6. A system according to claim 5, wherein the drive element is in the form of a chain made up of wheeled links, the drive dog being carried from spaced ones of said links by pendants which are connected to the body of the drive dog.

7. A system according to claim 1, wherein the carriers are arranged to operate in groups of two or more carriers to carry a single load, the group being driven by engagement of the drive dog with the leading carrier only, the other carriers in each group being shaped to preclude driving engagement thereof by said drive dog.

* * * * *