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Ord

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[54] **POWER AND FREE CONVEYOR SYSTEM WITH POSITIVELY CONTROLLED DOG**

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[73] Assignee: **Redman Fisher Engineering Limited,** Tipton, 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 S, 172 R, 172 BT, 104/172 C, 165, 89, 96

[56] **References Cited**

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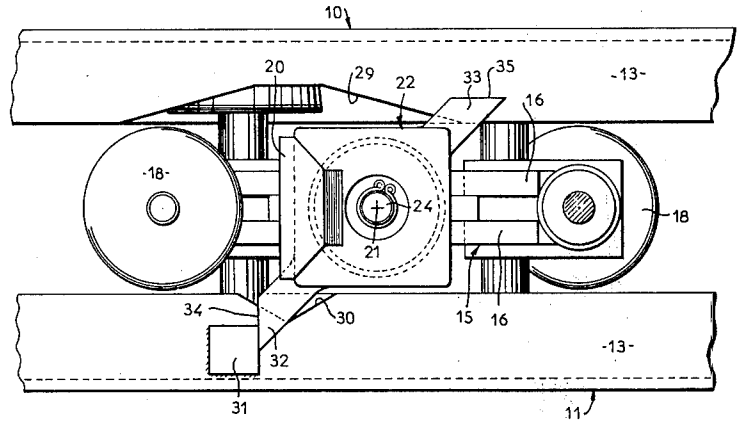
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Assistant Examiner—Randolph A. Reese
Attorney, Agent, or Firm—Spencer & Kaye

[57] **ABSTRACT**

A power and free conveyor includes a trolley with a driving dog pivotable about a vertical axis. The dog can be set by a track-side abutment to either one of operative and inoperative positions. The dog is normally held in a selected position by an element which is fast with the dog and lies in a longitudinally extending slot defined by the track. The slot has wider portions within which the holding element is free to turn and narrower portions within which the holding element cannot turn.

9 Claims, 6 Drawing Figures



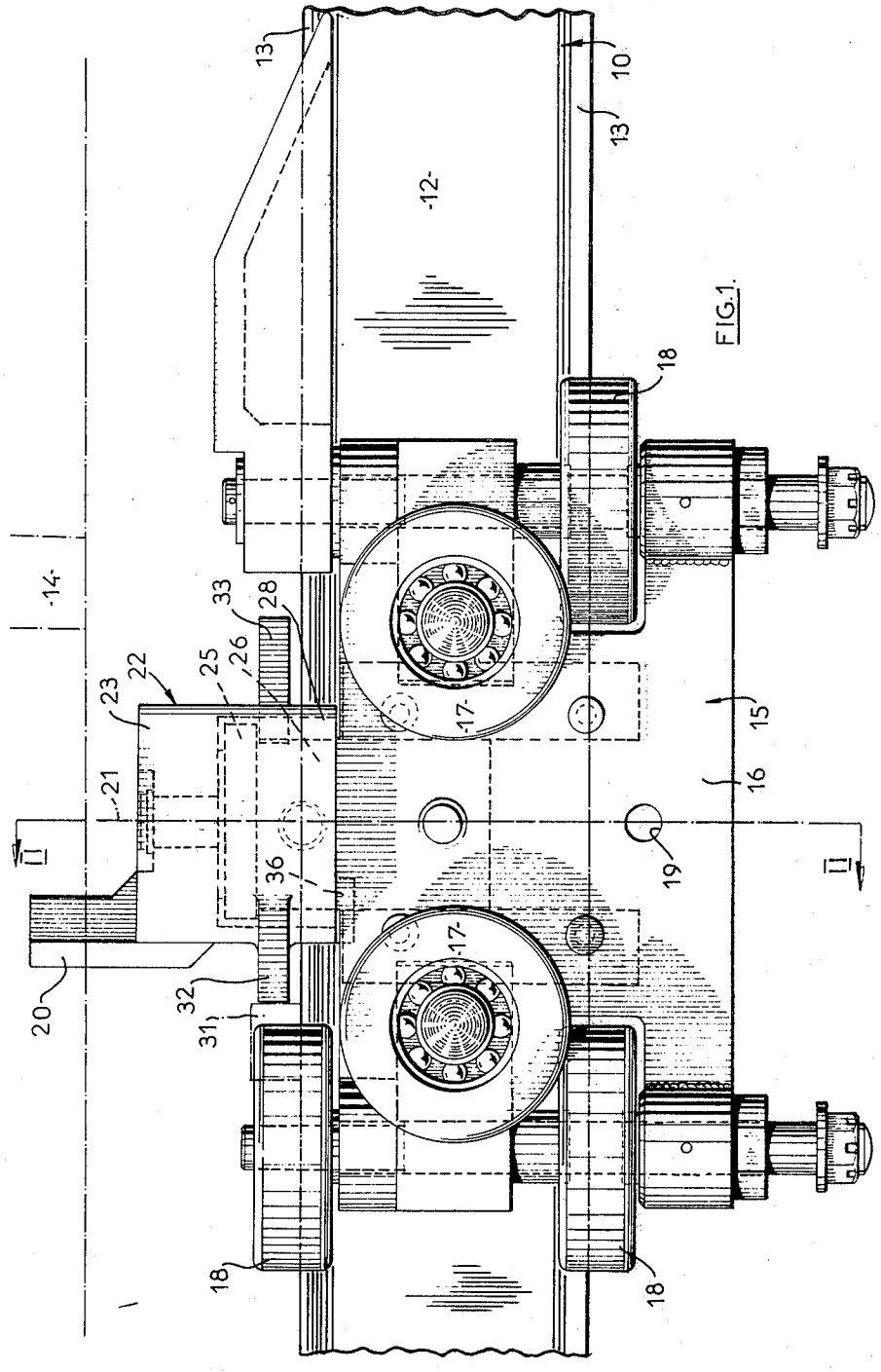
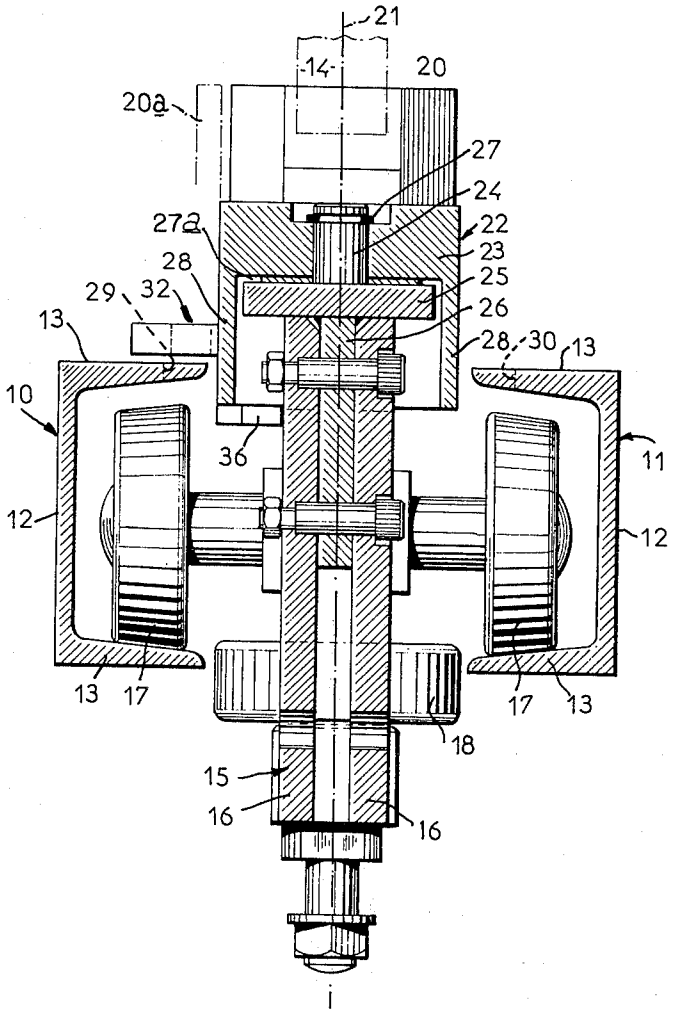

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FIG.1.

FIG. 2.


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20a
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27a
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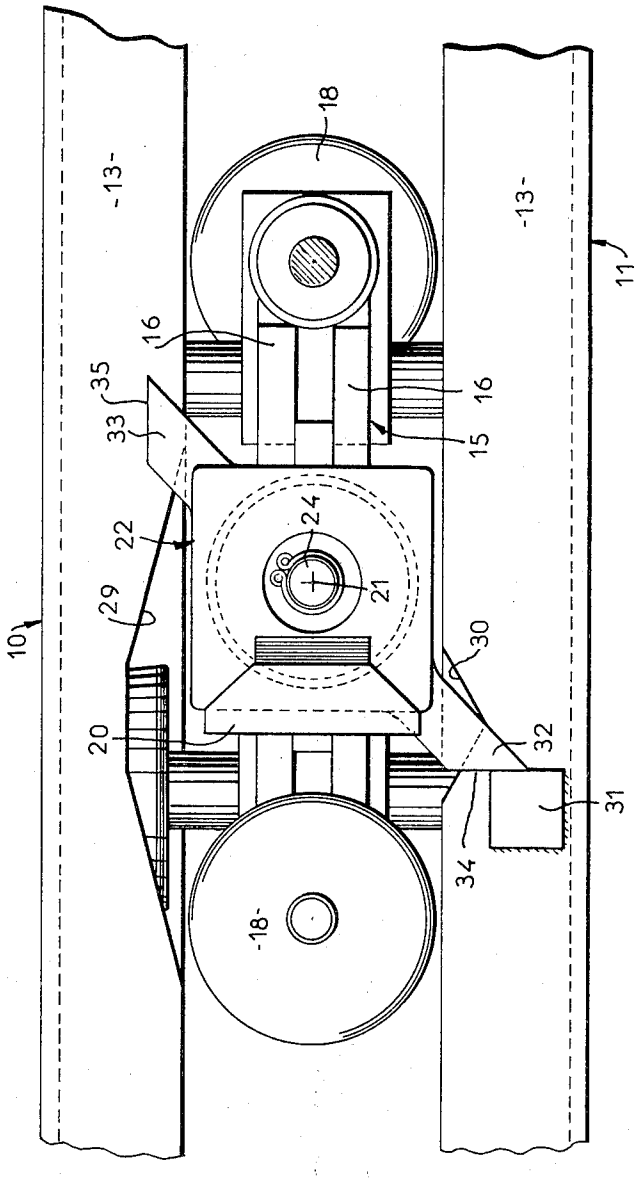


FIG.3.

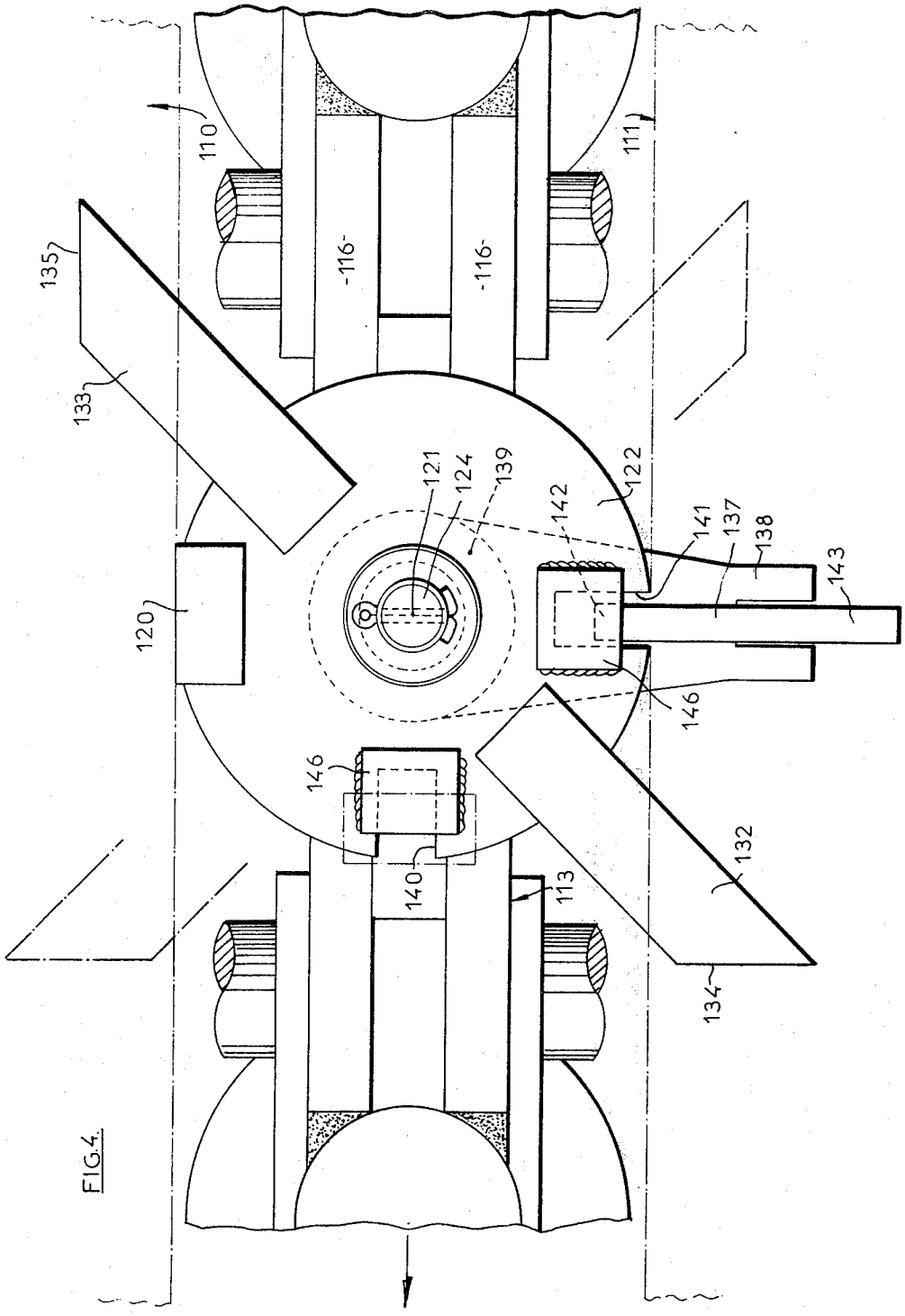

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-116-
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FIG.4.

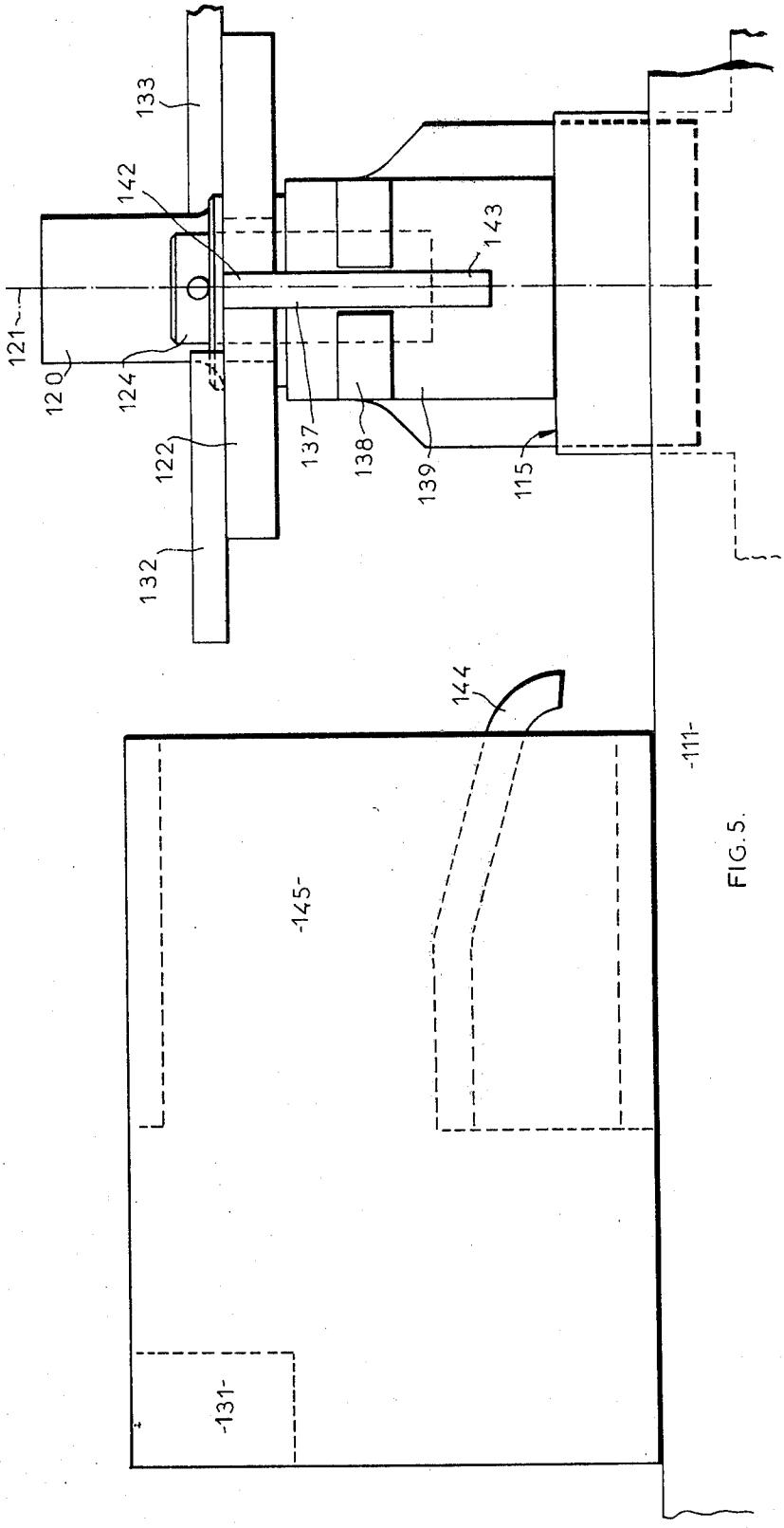


FIG. 5.

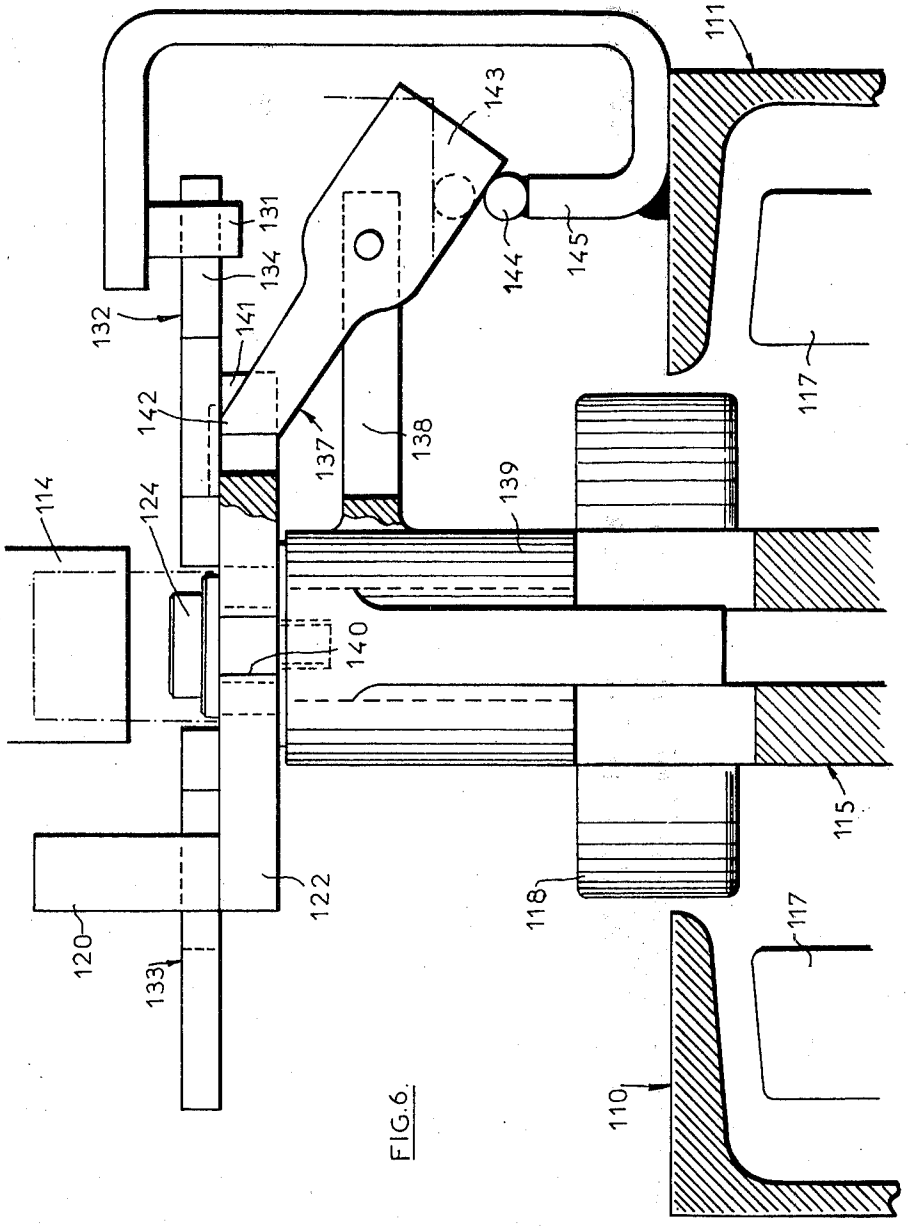

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FIG.6.

POWER AND FREE CONVEYOR SYSTEM WITH POSITIVELY CONTROLLED DOG

BACKGROUND OF THE INVENTION

The invention relates to a conveyor system of the kind comprising a track for supporting for advancement therealong a plurality of trolleys and an elongate power-driven propelling element supported for movement along a path parallel to said track, the propelling element and at least some of the trolleys having dogs which can co-operate to transmit drive from the propelling element to the trolleys.

It is common for the trolleys to be coupled together into one or more trains and in such cases each train is normally driven by engagement between a single driving dog of the train and a co-operating dog of the propelling element. It is normal to provide in each train one or more auxiliary dogs additional to the driving dog through which the train is normally driven. Examples of such auxiliary dogs are a hold-back dog which is engageable with dogs of the propelling element to prevent the train overrunning the propelling element, and an auxiliary driving dog by means of which the train can be driven under circumstances such that the main driving dog is temporarily inoperative.

One circumstance under which the main driving dog may be inoperative is when a train is passing from the control of one propelling element to the control of a further propelling element. The arrangement is normally such that the main driving dog is dis-engaged from the co-operating dog of the first propelling element before it is engaged by a dog of the second propelling element. It is therefore common to provide an auxiliary driving dog by means of which the train can be driven from the first propelling element during the period for which the main driving dog is not engaged by a dog of either propelling element.

To avoid risk of interference of one propelling element with operation of the other propelling element, it is desirable that an auxiliary driving dog should normally be inoperative and should be brought into operation only for the period during which the main driving dog is inoperative. It has therefore been proposed that an auxiliary dog should be mounted on a trolley for movement between operative and inoperative positions and there should be provided at a predetermined position along the track means for moving the auxiliary dog to its operative position. An example of such an arrangement is described in U.S. Patent Specification No. 3,541,352. In this specification there is described an auxiliary dog which is mounted on a trolley for pivoting movement about a horizontal axis and is provided with a cam follower for engagement with a ramp fixed to the track. When the follower engages with the ramp during advancement of the trolley, the auxiliary dog is pivoted upwardly to an operative position. When the follower passes off the ramp, the dog falls back to an inoperative position.

One disadvantage of the arrangement described in U.S. Pat. No. 3,541,352 is that gravitational forces are relied upon to return the auxiliary dog to its inoperative position. It is therefore possible that, if free pivoting of the auxiliary dog is inhibited by, for example, the penetration of foreign matter between the relatively movable bearing surfaces of the pivot, or lack of proper maintenance and lubrication, the auxiliary dog may fail to return to its inoperative position. This may lead to jamming of the conveyor system and possibly to damage thereof.

SUMMARY OF THE INVENTION

It is an object of the present invention to provide a conveyor system of the kind referred to whereof a trolley has a dog which, when the system is in use, is displaced positively in both directions between operative and inoperative positions with respect to the dogs of the propelling element.

According to the present invention there is provided a conveyor system of the kind referred to wherein there is provided on at least one of the trolleys a dog which is settable in a selected one of an operative position and an inoperative position with respect to the driving dogs of the power driven element, there is provided at a first position along the track a first control means for setting the settable dog of said one trolley positively in its operative position when said one trolley passes said first position, and there is provided at a second position along the track second control means for setting the settable dog positively in its inoperative position when said one trolley passes said second position.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 shows in side elevation one trolley of a power and free conveyor system, together with one portion of a track on which the trolley runs,

FIG. 2 shows the trolley and track in section on the line II — II of FIG. 1,

FIG. 3 shows a plan view of the trolley and a portion of the track on which it runs,

FIG. 4 shows in plan view and on an enlarged scale certain parts of a modified version of the trolley of FIG. 1,

FIG. 5 is a view in side elevation and on a scale intermediate those of FIGS. 1 and 4, showing the parts of the modified trolley shown in FIG. 4, together with a part of the track on which the trolley runs and control means mounted on the track, and

FIG. 6 is an end view of the parts shown in FIG. 5 on the same scale as FIG. 5.

DESCRIPTION OF SELECTED EMBODIMENTS

The conveyor system illustrated in FIGS. 1, 2 and 3 comprises a load bearing track comprising two channel section members 10 and 11 which are arranged with their respective webs 12 vertical and with their flanges 13 directed towards one another. A power driven propelling element (not shown) in the form of an endless chain is supported for movement along a path above and parallel to the track 10, 11. A plurality of driving dogs are attached to the chain and project downwardly therefrom towards the gap between the track portions 10 and 11. One such driving dog is indicated at 14 in FIGS. 1 and 2. These driving dogs would normally be spaced at regular intervals along the power driven chain.

The conveyor system further comprises a plurality of trolleys, one only of which is illustrated. The particular trolley shown is intended for use as the trailing trolley of a train of coupled trolleys. The trolley shown has a body 15 comprising two vertical plates 16 arranged in side-by-side spaced relation. Two pairs of running wheels 17 which run on the lower flanges of the track portions 10 and 11 are mounted on the body 15. There are also mounted on the body guide wheels 18 which

are rotatable about respective vertical axes and run between the opposed flanges of the track portions **10** and **11.** An opening **19** is formed in the body to enable a load to be suspended therefrom.

The trolley further includes an auxiliary driving dog **20** which projects upwardly from the body **15** towards the power driven propelling element and which can be engaged by the driving dogs **14.** The auxiliary driving dog **20** is intended to be operative only at times when a main driving dog, normally provided on the leading trolley of a train, is inoperative. Accordingly, the dog **20** is mounted on the trolley for movement between an operative position in which it lies in the path of the driving dogs **14** and an inoperative position in which it is off-set from the path of the dogs **14.** In FIGS. **1** and **3,** the auxiliary driving dog is shown in its operative position and in FIG. **2** the auxiliary driving dog is shown in full lines in its operative position and in broken lines at **20***a* in its inoperative position.

The auxiliary driving dog **20** is arranged for pivotal movement between its operative and inoperative positions about a vertical axis **21.** The dog **20** is rigidly secured to and projects upwardly from a carrier element **22** comprising an upper wall **23** which is of square shape, as viewed in plan, and is formed with a central bearing opening. A pivot **24** is received within the bearing opening of the carrier element **22,** this pivot projecting upwardly from a horizontal plate **25** to which it is secured. The plate **25** is secured to a vertical plate **26** which is received in and bolted to the body **15** of the trolley. An annular washer **27***a* is interposed between the horizontal plate **25** and the wall **23** and the carrier element is retained on the pivot **24** by means of a circlip **27.**

The carrier element **22** further includes lateral walls **28** which project downwardly from the upper wall **23** through the slot defined by the free edges of the upper flanges **13** of the track. The dimensions of the carrier element **22** are such that, as shown in FIG. **3,** a small clearance is normally provided between the lateral walls **28** and the flanges of the track. Owing to the square shape of the carrier element, this small clearance is not sufficient to permit pivoting movement of the carrier element about the axis **21** and the auxiliary driving dog **20** is therefore normally held in one or other of its operative and inoperative positions.

At certain positions along the track, the upper flanges **13** are cut away as shown at **29** and **30** in FIG. **3** to provide sufficient clearance between the flanges and the carrier element **22** to permit pivoting of the dog **20** about the axis **21.**

To bring about pivoting of the dog **20** about the axis **21,** control means is provided adjacent to the cut-outs **29** and **30.** The control means comprises stationary abutments, one of which is shown at **31** in FIG. **3.** For co-operation with the abutment **31** there is provided on the carrier element **22** a striker arm **32.** This striker arm projects radially of the axis **21.** A further striker arm **33** projects from the carrier element **22** in a direction diametrically opposite to that of the arm **32,** the arm **33** being provided for co-operation with abutments similar to the abutment **31** but provided on the other side of the track.

As shown in FIG. **3,** when the dog **20** occupies its operative position, the striker arms **32, 33** project in directions inclined to the direction of travel at 45°. The free end face **34** of the arm **32** then extends perpendicular to the direction of travel for face-to-face engagement with the abutment **31.** When the arm **32** is engaged with the abutment **31** and the trolley continues to move past the abutment, the carrier element **22** turns about the axis **21,** in an anti-clockwise direction as viewed in FIG. **3,** through an angle of 90°. The face **34** of the arm **32** is then parallel to the direction of travel and the arm just clears the abutment **31** so that the abutment does not prevent passage of the trolley.

The free end face **35** of the arm **33** is perpendicular to the end face **34** and when the latter is parallel to the direction of travel, face **35** is perpendicular thereto and facing forwardly. Thus, when the dog **20** is in its inoperative position and the trolley moves past an abutment on the side of the track opposite to the abutment **31,** the arm **33** will be engaged and will cause the carrier element **22** to pivot through an angle of 90° in the clockwise direction, as viewed in FIG. **3,** thereby returning the auxiliary dog **20** to its operative position.

It will be noted that the auxiliary dog **20** is moved in both directions between its operative and inoperative positions positively. Reliance is not placed on gravitational or other forces which merely bias the auxiliary dog towards one or other of its positions. Furthermore, when the auxiliary dog has been set by the control means either to its operative position or to its inoperative position, it does not tend to move out of such position until it is moved once more by the control means.

A stop **36** projects from the lower extremity of one of the lateral walls **28** for engagement with the body **15** of the trolley to limit pivoting movement of the carrier element **22** about the axis **21** to a range of approximately 90°. Whilst the particular example of trolley shown in FIGS. **1** to **3** is arranged for pivoting of the auxiliary dog in opposite directions between its operative and inoperative positions, it will be appreciated that the trolley could alternatively be arranged for unidirectional movement of the auxiliary dog, in which case the dog would be adapted to co-operate with the driving dogs **14** both when it is in a position before the axis **21** and when in a position behind the axis **21.**

In FIGS. **4, 5** and **6** there is illustrated a modified version of the trolley shown in FIGS. **1, 2** and **3,** which modified trolley has an alternative arrangement for holding the auxiliary dog against pivoting movement other than at times when the dog is required to be moved between its operative and inoperative positions. In FIGS. **4, 5** and **6,** parts corresponding to those previously described with reference to FIGS. **1, 2** and **3** are indicated by like reference numerals with the prefix **1** and the preceding description is deemed to apply thereto, except for the differences hereinafter mentioned.

The carrier element **122** of the trolley shown in FIGS. **5, 6** and **7** is in the form of a circular plate which is disposed horizontally and is mounted on a vertical pivot **124.** Striker arms **132** and **133** are welded onto the plate **122** at the upper side thereof and project in diametrically opposite directions for co-operation with abutments **131** rigidly secured to the track. The auxiliary dog **120** is also rigidly secured to the plate **122** at the upper side thereof and projects upwardly from the plate.

For holding the carrier plate **122** in a position to which it is set, there is provided holding means in the form of a latch **137.** The latch is pivotally mounted on a support **138** for movement relative thereto about a

horizontal axis which is off-set laterally from the axis **121.** The support **138** is rigidly secured to a bush **139** in which the pivot **124** is mounted, this bush being rigidly secured to the body **113.** Two notches **140, 141** are formed in the periphery of the plate **122** to receive an end portion **142** of the latch, when the latter is in the holding position shown in FIG. **5.** In this holding position, the latch prevents pivotal movement of the dog **120** about the axis **121.** A further end portion **143** of the latch is considerably more massive than the end portion **142** and, since these end portions are spaced approximately equally on opposite sides of the latch pivot, the end portion **143** biases the end portion **142** upwardly into its holding position.

For moving the latch **137** to its releasing position, the control means further comprises a cam **144** which is fixed relative to the track portion **111** and is positioned for engagement with the end portion **143** of the latch. The cam presents towards an approaching latch an upwardly inclined surface up which the end portion **143** is drawn as a trolley moves past the cam. Accordingly, the cam causes the end portion **142** to move downwardly out of the notch in which it is engaged to a releasing position in which it is clear of the plate **122.** The cam **144** is arranged to hold the latch in its releasing position whilst an adjacent abutment **131** is engaged by one of the striker arms **132, 133.** The latch moves out of engagement with the cam when the notch has moved out of register with the end portion **142.** This end portion is then urged into engagement with the underside of the plate **122** until the other notch is brought into register, whereupon the end portion enters the notch to hold the plate **122** once more against pivoting movement.

A cam **144** for co-operation with the latch **137** is provided at one side of the track on the track portion **111** near to each abutment **131,** irrespective of whether the abutment is provided at the same side of the track as the cam, or at the opposite side of the track. Where an abutment and a cam are mounted at the same side of the track, they may be mounted on a common bracket **145,** as shown in FIGS. **5** and **6.** Where the abutment and cam are on opposite sides of the track, they would be provided with individual brackets.

Upward movement of the end portion **142** of the latch within each of the notches **140, 141** is limited by a cap **146** which extends over the notch at the upper side of the plate **122.**

The trolleys illustrated in FIGS. **1** through **3** and **4** through **6** may be further modified by arranging the auxiliary dog for pivoting movement about an axis which is inclined to the vertical and lies in a vertical plane which extends in the direction of travel. With such a modification, pivoting of the dog would cause it to move upwardly and downwardly, as well as laterally, so that in its inoperative position it may lie below the path of travel of the driving dogs **14,** rather than beside such path.

I claim:

1. In a conveyor system comprising a track, a plurality of trolleys which run on the track, a power driven element supported for movement along a path parallel to the track, a plurality of driving dogs on the power driven element and dogs on at least some of the trolleys for co-operation with the driving dogs on the power driven element, the improvement wherein: there is provided on at least one of said trolleys a dog which is settable in a selected one of an operative position and an inoperative position with respect to the driving dogs of the power driven element and in a generally horizontal plane, there is provided at a first position along the track first control means for acting on the settable dog of said one trolley when said one trolley passes said first position in such a manner as to set the dog positively in its operative position, and there is provided at a second position along the track second control means for acting on the settable dog when said one trolley passes said second position in such a manner as to set the dog positively in its inoperative position.

2. In a conveyor system comprising a track, a plurality of trolleys which run on the track, a power driven element supported for movement along a path parallel to the track, a plurality of driving dogs on the power driven element and dogs on at least some of the trolleys for co-operation with the driving dogs on the power driven element, the improvement wherein:

there is provided on at least one of said trolleys a dog which is settable in a selected one of an operative position and an inoperative position with respect to the driving dogs of the power driven element, said settable dog is mounted on said one trolley for movement about a pivot axis which is substantially vertical when the trolley is on a horizontal length of track,

there is provided at a first position along the track first control means for setting the settable dog of said one trolley positively in its operative position when said one trolley passes said first position, and there is provided at a second position along the track second control means for setting the settable dog positively in its inoperative position when said one trolley passes said second position.

3. The improvement according to claim **2** wherein said settable dog is rigidly connected to at least one arm which projects radially of said pivot axis for engagement with the control means.

4. The improvement according to claim **3** wherein the control means comprises a plurality of abutments spaced from one another along the track.

5. The improvement according to claim **3** wherein the settable dog is rigidly connected to two arms which project in diametrically opposite directions with respect to the pivot axis for engagement with the control means.

6. The improvement according to claim **2** wherein stop means is provided for limiting pivotal movement of the settable dog to a range of approximately 90°.

7. The improvement according to claim **2** wherein:

holding means is provided for preventing pivotal movement of the settable dog during periods when the dog is required to remain in one of its operative and inoperative positions,

the holding means comprises an element rigidly secured to the settable dog, the track defines a longitudinally extending slot,

said element normally lies within said slot, there is clearance between said element and the boundaries of said slot,

along parts of the track, said clearance is insufficient to permit pivoting of said element with the settable dog about said axis, and

along further parts of the track, said clearance is sufficient to permit pivoting of said element with the settable dog about said axis.

8. The improvement according to claim 2 wherein:

holding means is provided for preventing pivotal movement of the settable dog during periods when the dog is required to remain in one of its operative and inoperative positions,

the holding means comprises a latch, said latch is mounted on the trolley for movement between holding and releasing positions in the former of which it holds the dog in one of the operative and inoperative positions and in the latter of which positions of the latch the dog is free to pivot, and

the control means is arranged for displacing the latch to its releasing position preparatory to displacing the dog between its operative and inoperative positions.

9. The improvement according to claim 8 wherein said latch is pivotally mounted on the trolley and the control means comprises a cam which engages with the latch as the trolley passes the cam to pivot the latch to its releasing position.

* * * * *