

[54] TROLLEY FOR MOVABLE WALL PANELS

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[22] Filed: Aug. 20, 1973

[21] Appl. No.: 390,115

[52] U.S. Cl. 16/97, 49/409, 16/88, 16/94 R, 16/105

[51] Int. Cl. A47h 15/00

[58] Field of Search 49/409; 16/88, 89, 94, 16/95, 96, 97, 98, 104, 105

[56] References Cited

UNITED STATES PATENTS

1,024,502	4/1912	Elliott	16/94 R
1,889,112	11/1932	Shoemaker	49/409 X
2,807,058	9/1957	Morgan	16/95 R X
3,181,274	5/1965	Izenour	16/56 R X
3,253,552	5/1966	Stein	16/98 X
3,462,792	8/1969	Greco	16/88
3,708,916	1/1973	Karp, Jr. et al.	49/409

FOREIGN PATENTS OR APPLICATIONS

33,235 10/1921 Norway 16/98

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[57] ABSTRACT

A trolley for a panel system of intersecting tracks adapted to support the panels across gaps at the intersections and provide for right angle movement into intersecting tracks includes a body supporting a pair of wheels and three rearwardly and three forwardly positioned roller balls or casters, the balls being arranged in a circle in common with the rolling points of the wheels and in a plane in common with the wheels. In the normal running condition the wheels and four of the balls are in engagement with the track providing fore and aft stability. In transverse stacking movement, all the six balls engage the track. The fore and aft spacing of the balls provides bridging support across the gaps of intersecting tracks. The weight of the panel is carried on a pendant bolt supported directly on the wheel axis so that there is no force tending to tip the trolley downwardly into the gap of the intersecting track. A circular guide plate on the trolley maintains the pendant bolt within the track slot and prevents jamming of the trolley when negotiating a turn.

6 Claims, 8 Drawing Figures

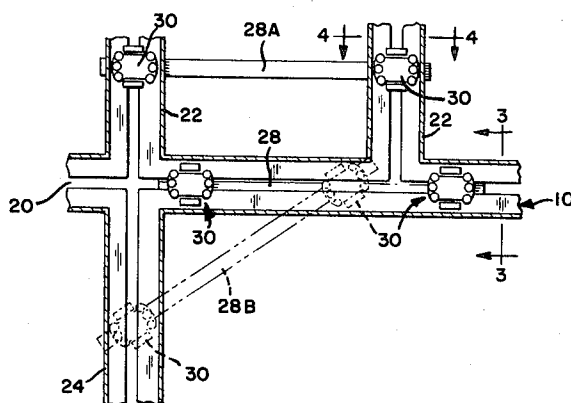


FIG-1

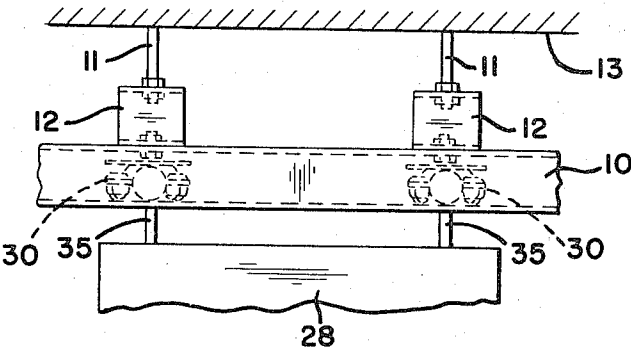


FIG-2

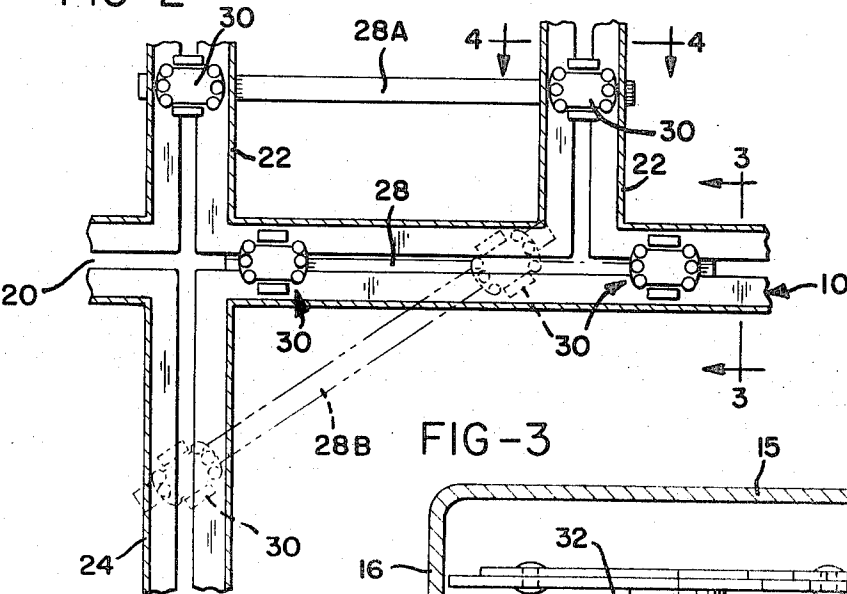


FIG-3

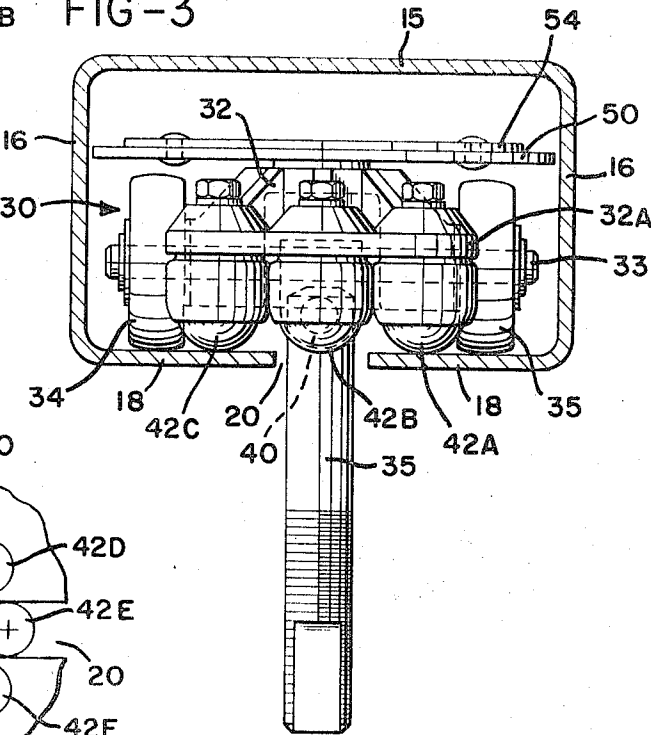


FIG-8

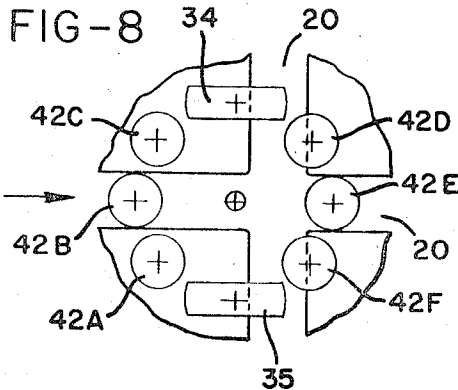


FIG-4

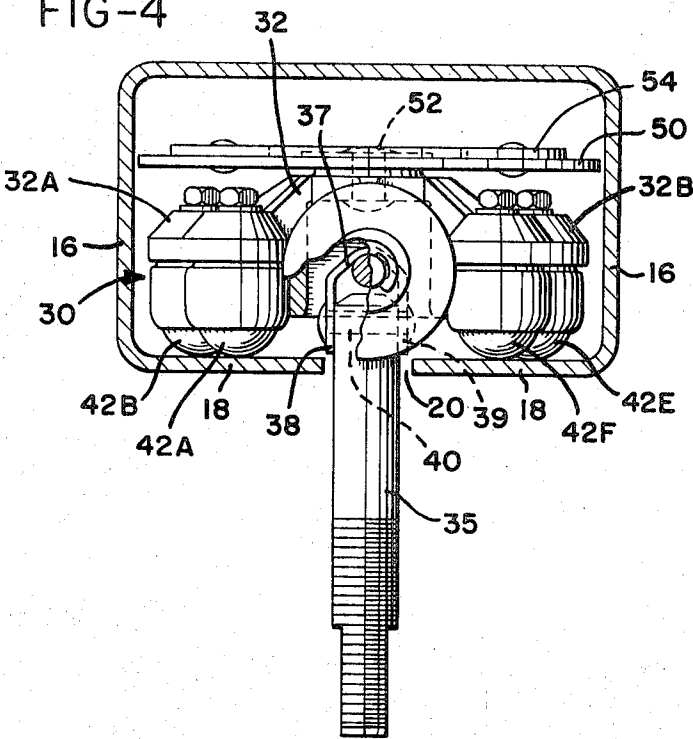


FIG-5

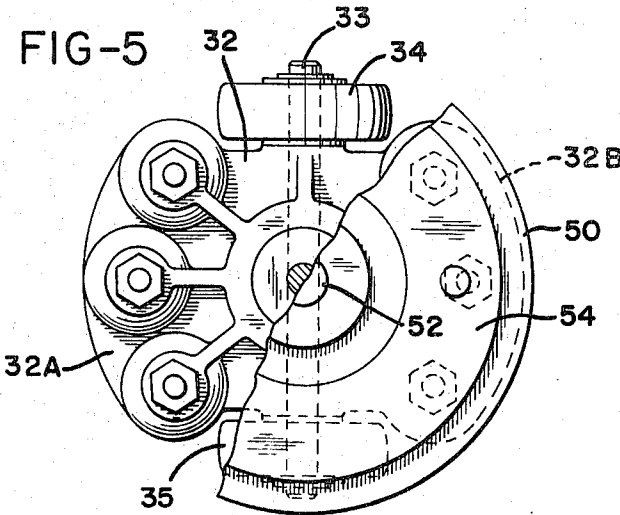


FIG-6

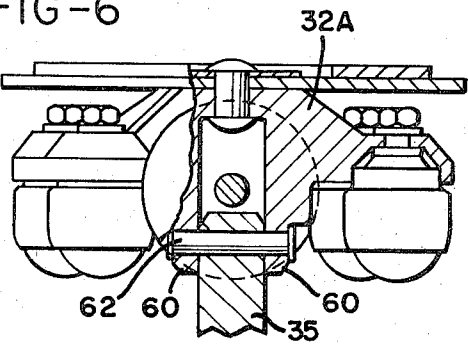
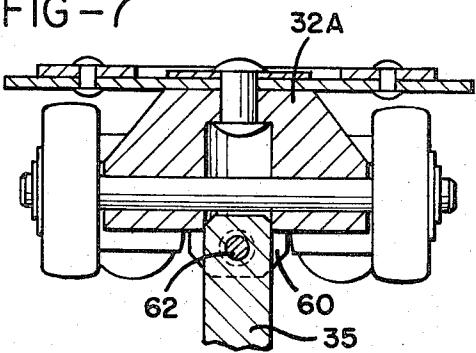


FIG-7



TROLLEY FOR MOVABLE WALL PANELS

BACKGROUND OF THE INVENTION

In movable panel systems of the type adapted for use in the hotels, clubs, convention halls, and the like, for temporary division of large rooms into small rooms or the like, the overhead tracks on which trolleys ride commonly include turns and intersections so that the panels may either be stored or moved to a different location. In many instances, the panels are quite heavy and may extend from the floor to a ceiling as high as 20 feet or more. It is therefore important that the trolleys be able to negotiate intersections with a minimum of effort, since they are usually manipulated from the floor by hand.

A number of trolley structures have been developed for negotiating right-hand turns and/or intersections and the like. For example, the trolley disclosed in U.S. pat. No. 1,889,112 of 1932 includes two pairs of wheels at right angles to each other, with a guide means for keeping the wheels aligned with the track. When reaching an intersection, however, the wheels drop into and rest in the track slots between the tracks. As a result, considerable force is required to move the trolley horizontally onto the next track. The force required includes a vertical lifting force and a concurrent horizontal force, and consequently it is difficult and awkward to negotiate heavy wall panels around a right-angle turn with this type of trolley.

In U.S. pat. No. 3,708,916 of 1973, assigned to the same assignee as this invention, a trolley body is formed with a support surface positioned slightly above the rolling contact surface of the trolley wheels. The support surface permits sliding movement of the trolley through the intersection gap while preventing the trolley wheels from falling into the track slot. In one embodiment, four trolley wheels are positioned mutually at right angles with the support surface in the arcuate spaces between the wheels. In another embodiment, two trolley wheels in combination with centering and guide rollers are combined with a support plate, which plate carries a layer of low-friction material.

Other types of trolley arrangements are disclosed in U.S. pat. Nos. 3,181,274 of 1965, 3,253,552 of 1966, and 3,462,792 of 1969. These structures utilize exclusively a plurality of spaced spherical bearing members attached to a support plate about a circular path. A sufficient number of bearing members must be used so that, while negotiating an intersection, there are more bearing members engaging the track than there are bearing members above the track slots, to prevent the bearing members from dropping into the slots.

SUMMARY OF THE INVENTION

The present invention is directed to a trolley system which combines the best features of a wheel trolley and a ball trolley. The trolley body supports a pair of wheels which provide the primary support during normal traversing or running. The body also supports symmetrically arranged groups of fore and aft ball bearing casters or roller balls which have their running surfaces in substantially the same plane as that of the wheels and which are preferably arranged symmetrically, and in a common circle, the circumference of which includes the rolling contact points of the wheels. In one embodiment, the pendant bolt is attached to the trolley on the

wheel axle, and in another embodiment it is carried directly on the trolley body.

The fore and aft balls are spaced so that two each of these groups provide stability to the trolley when in normal running conditions, and fully bridge the gap at the track intersections. In each embodiment the weight of the panel is carried so centrally that there is no rotational force component tending to tip the balls into the approaching slots at the intersections. The balls exclusively support the trolley for movement into right-angle intersecting track sections which are commonly used for parallel stacking purposes. The balls in combination with the wheels support the panel when negotiating a turn of the panel into an intersecting track.

The trolley includes means for guiding the same in the track to prevent contact of the pendant bolt with the sides of the track and thus to prevent jamming of the trolley, particularly when negotiating a turn. Preferably the guide means includes a circular plate positioned in overlying relationship to the wheels and balls, having a circumference which forms a close running fit with the track walls.

In the preferred embodiments three balls are supported on the circumference of a circle along the lead edge of the trolley and three balls are similarly supported on the trailing edge of the trolley, the distance between the closest lead and trail ball measured along a cord line being greater than the width of the slot at the intersection, thus providing full and uninterrupted support for the trolley when crossing an intersection.

An important object of the invention is the provision of a trolley for a movable wall panel system which incorporates both wheel and ball supports.

Another object of the invention is the provision of a trolley which has wheels for supporting the panel in the normal running condition and has balls which stabilize the trolley, providing support across intersections and providing for trolley movement into intersecting track portions.

Another object of the invention is the provision of a trolley which incorporates two wheels and six ball supports, with three balls ahead of the wheels and three balls behind the wheels in a common running plane and arranged substantially in a common circle.

These and other objects and advantages of the invention will be apparent from the following description, the accompanying drawings and the appended claims.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a fragmentary side view of a wall panel and track system employing trolleys according to the present invention;

FIG. 2 is a schematic view of a track system to which the present invention may be employed showing the manner in which the trolleys and a supported panel move along a straightaway, negotiate a corner, and move sideways into a parallel stacking arrangement;

FIG. 3 is an enlarged vertical section through the track showing an end view of one of the trolleys taken generally along the lines 3—3 of FIG. 2;

FIG. 4 is a further vertical section looking generally along the lines 4—4 of FIG. 2 showing the trolley partially in section;

FIG. 5 is a plan view of the trolley with a portion of the guide plate being broken away to expose details of the trolley body;

FIG. 6 is a partially broken away view of a modification of the trolley body for directly supporting the pendant bolt and eliminating fore and aft pivotal movement;

FIG. 7 is a section through the body of FIG. 6 taken on a plane including the wheel axis; and

FIG. 8 is a diagram showing the manner in which the trolley crosses an intersecting track.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to FIGS. 1 and 3, the track system to which the present invention is employed includes a generally C-shaped metal track 10 which is supported by hanger bolts 11 and a series of inverted track segments 12 from a ceiling or other overhead support 13. The track and track support arrangements is essentially as shown in the U.S. pat. No. 3,708,916, previously identified.

The track 10 is generally C-shaped in section, and thus includes a top 15, depending parallel spaced side walls 16, and inwardly directed trolley wheel support flanges 18 which define a slot 20 therebetween. As shown in FIG. 2, the track 10 is formed in section, and for some installations, may include a pair of right-angle intersecting branches 22 for the purpose of providing a parallel stacking or a storage area for the panels. Further, the track system may be formed with intersecting track branches or sections such as illustrated at 24, for the purpose of forming a grid or network of tracks, providing versatility for the movement or placement of the panels.

A typical wall panel 28 to which the present invention is applied is shown in fragmentary view in FIG. 2 as being supported fore and aft on a pair of identical trolleys 30. The trolleys 30 support the wall panel 28 for movement along the system of intersecting tracks, a portion of which is diagrammed in FIG. 2. The trolleys 30 thus provide for sideways movement of the panels into the stacking branches 22 as shown by the panel 28A of FIG. 2 and for traversing movement around a corner as shown in broken lines by the panel 28B.

The details of the trolley 30 are best seen by reference to FIGS. 3, 4, and 5 from which it will be observed that the trolley is formed with a body 32 which supports a transverse wheel axle 33. A pair of trolley wheels 34 and 35 are supported on the axle 33. The lateral spacing of the wheels 34 and 35 is such as to run on the upper surfaces of the track flanges 18. The wheels 34 and 35 provide the normal running support for the trolley.

A panel-supporting pendant bolt 35 is supported substantially on the axis of the wheels in this embodiment by suspending the same from the axle 33. The bolt extends through the slot 20 between the flanges 18 and is rigidly fixed to the top of the panel 28. The pendant bolt 35 is supported on the axle 33 by an inverted U-shaped saddle strap 37 which is formed with a pair of depending sides 38 and 39, as shown in FIG. 4. A transverse pin 40 extends through the saddle between the sides 38 and 39 and through an opening formed in the top of the pendant bolt 35. The pin 40 permits limited pivotal or aligning movement of the pendant bolt 35 on the axis of the pin and transverse to the axis of the wheels.

The trolley body 32 includes portions 32A and 32B which are symmetrically formed on either side of the wheel axis and in which extend respectively forwardly

and rearwardly of the axle 33. Each of the portions are formed with pockets to receive a plurality of roller balls 42A through F mounted on the body. The roller balls 42 may comprise ball bearing casters of commercial quality marketed by the Schatz Manufacturing Company, Poughkeepsie, N.Y. 12602 as part No. Sc 107X1A.

The body 32 supports the roller balls so that their lower rolling surfaces are substantially in a plane common with that of the wheels 34 and 35. In plan view, the balls 42 are mounted along the circumference of a common circle which includes the rolling points of the wheels on the track flanges 18. The arcuate spacing of the balls 42 is such that the forward balls 42A and 42C, as viewed in FIG. 5, overlie the track flanges in a normal running condition of the trolley. Similarly, the trailing balls 42D and 42F overlie and run on the track flanges, so that when the trolley is traversing in the normal direction as shown with respect to the panel 28 in FIGS. 1 and 2, the trolley is supported primarily on the wheels and is also supported by the roller balls identified. Thus, the roller balls 42A, C, D, and F provide stability to the trolley when it is running normally on the wheels.

However, the roller balls particularly provide for sideways movement of the trolley into parallel stacking sections 22, and in this condition all six of the roller balls engage the track flanges while the wheels 34 and 35 are in alignment with the slot 28 as shown in FIGS. 2 and 4.

An important feature of the trolley 30 is that it is adapted to support the panel when crossing an intersection. This condition is illustrated diagrammatically in FIG. 8. It will be seen that the fore and aft spacing of the balls 42A, 42C, and 42D, 42F from the wheels is greater than the gap formed by the intersecting track slot 20. Accordingly, the lead balls will first come in contact with the track across the gap of the intersecting slot to provide support for the trolley prior to the time that the wheels depart the preceding track flanges. Similarly, the wheels will land on the succeeding track flange across the gap prior to the time that the trailing balls leave the track flanges. Since the weight of the panel is carried directly on the axis of the wheels by the axle 33, there is no tendency for the body to tilt or cause the balls to dip or otherwise drop into the intersecting slots. Accordingly, the trolley 30 supports the panel for effortless movement across an intersecting track.

The spacing relation of the individual balls with respect to the axis of the wheels also provides for continuous support of the trolley while it is negotiating a turn, such as illustrated by the position of the panel 28B in FIG. 2.

In this condition, while there may be some temporary sideways movement of the wheels, the trolley itself is at all times supported fore and aft by at least two of the three fore and aft roller balls, providing stability of the trolley and permitting substantially effortless tracking.

The trolley also includes guide means carried on the body having a peripheral edge in close running relation to the track walls 16 to prevent the jamming of the pendant bolt 35 when the trolley and the panel are negotiating a turn. The guide means preferably include a circular metal plate 50 which is mounted on the top of the body by a rivet 52. The diameter of the plate 50 is

slightly less than the spaced apart width of the track walls 16. A hardboard annular disc 54 is carried on top of the plate 50 for sound quieting purposes. The plate 50 thus assures that the pendant bolt will always be centered or substantially centered within the slot 20, and this is a particularly important condition when the panel is negotiating a turn, such as shown by the panel 28B in FIG. 2.

In some cases it may be preferable to minimize or eliminate pivotal movement of the trolley bolt 35 in a direction transverse to the wheel axis in order to maintain an improved equilibrium of the trolley 30 when the wheels are riding on the track, and thus to stabilize the trolley when the caster balls are passing across a track intersection. The embodiment of the trolley shown in FIGS. 6 and 7 has a somewhat modified body 32A in that it is formed with a pair of downwardly depending pendant bolt support flanges 60. The flanges 60 are oriented in the fore and aft direction with respect to each other and support therebetween a pin 62. The flanges 60 are proportioned to receive the upper end of the bolt 35 therebetween with the pin 60 extending through the opening formed in the top of the bolt 35. The upper end of the bolt 35 is thus supported at a location which is slightly below the axis of the wheels centrally of the trolley body and in a vertical plane which includes the axle 33. While limited transverse movement is provided for the bolt 35 about the pin 62, the bolt is held by the flanges 60 and the pin 62 against relative fore and aft movement. In this manner the body 32A is maintained in a level position by the bolt 35 while a trolley is traversing a track slot.

While the forms of apparatus herein described constitute preferred embodiments of the invention, it is to be understood that the invention is not limited to these precise forms of apparatus, and that changes may be made therein without departing from the scope of the invention.

What is claimed is:

1. A trolley for supporting a wall panel for movement along a system of tracks in which track sections are formed with parallel, spaced trolley-wheel supporting flanges defining a slot and spaced track walls and in which tracks are formed with intersections, comprising a trolley body, a pair of wheels mounted on for rotation on said body on a common axis and adapted to run on said track flanges, a panel-supporting pendant bolt, means supporting said bolt substantially on the axis of said wheels while restraining said bolt against relative fore and aft movement and rotational movement with respect to said body, said trolley body having portions which extend forwardly and rearwardly of said axle, a plurality of rolling balls carried on each of said portions having their lower portions substantially in a common plane including the rolling contact line of said wheels, the fore and aft spacing of said balls being less than the width of the track walls to provide for sideways movement of the trolley on said balls along an intersecting track, and spacing of said balls from said wheels being greater than the width of the track slots at an intersection providing rolling support for the trolley body when

traversing an intersection.

2. The trolley of claim 1 in which there are three balls on each said forward and rearward portion, means mounting said balls on the circumference of a common circle which circle includes the rolling points of the wheels, the balls arcuately nearest said wheels normally engaging the track flanges simultaneously with said wheels providing fore and aft stability to the trolley when running on the wheels, and all six of the balls being positioned to engage the track flanges and support the trolley when running sideways in an intersecting track section.

3. The trolley of claim 1 further comprising a circular guide plate carried by said body over said wheels having a peripheral edge in close running relation to the track walls to prevent jamming of the pendant bolt when the trolley and panel are negotiating a turn about an intersection.

4. The trolley of claim 1 in which there are three said balls on said forward portion and three balls on said rearward portion mounting on the circumference of a common circle which circle passes through the rolling points of the wheels.

5. In a system of wall panels in which a plurality of rigid panels are each suspended on a pair of trolleys for movement along a system of tracks, in which the track sections are formed with parallel, spaced trolley wheel-supporting flanges defining a slot therebetween and spaced track walls, and in which said tracks are formed with intersections, the improvement in trolley construction comprising a body, a pair of wheels mounted on a common axis for rotation on said body and adapted to run on said track flanges, a panel-supporting pendant bolt, means supporting the upper end of said bolt substantially on said axis while restraining said bolt against relative fore and aft movement as well as rotational movement with respect to said body, said body having portions which extend both forwardly and rearwardly of said axle, three rolling balls mounted on said forwardly extending portion and three rolling balls mounted on said rearwardly extending portion, said balls being arranged in a circle which circle includes the rolling points of said wheels with the fore and aft spacing of said balls being less than the spacing of the track walls to provide for sideways movement of the trolley exclusively on said balls along an intersecting track, the fore and aft spacing of the balls arcuately nearest said wheels being greater than the width of the track slot at an intersection to provide rolling support for the trolley body when the trolley wheels are at the intersection, guide means on said body including a circular plate in overlying relation to said wheels, and said plate having a diameter which exceeds said circle and which is somewhat less than said wall spacing to prevent jamming of said pendant bolt in said track slot when said trolley and panel are negotiating a turn through an intersection.

6. The trolley of claim 5 further comprising a layer of sound deadening material on said plate.

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