United States Patent

[11] 3,583,327

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[54] **TRACK**
11 Claims, 5 Drawing Figs.

[52] **U.S. Cl.** **104/120,** 105/145, 198/126
[51] **Int. Cl.** **B61b 5/02,** E01b 25/00
[50] **Field of Search** 198/126, 117, 109, 119; 104/106, 107, 110, 118, 119, 120, 121; 52/648, 726; 105/145

[56] **References Cited**

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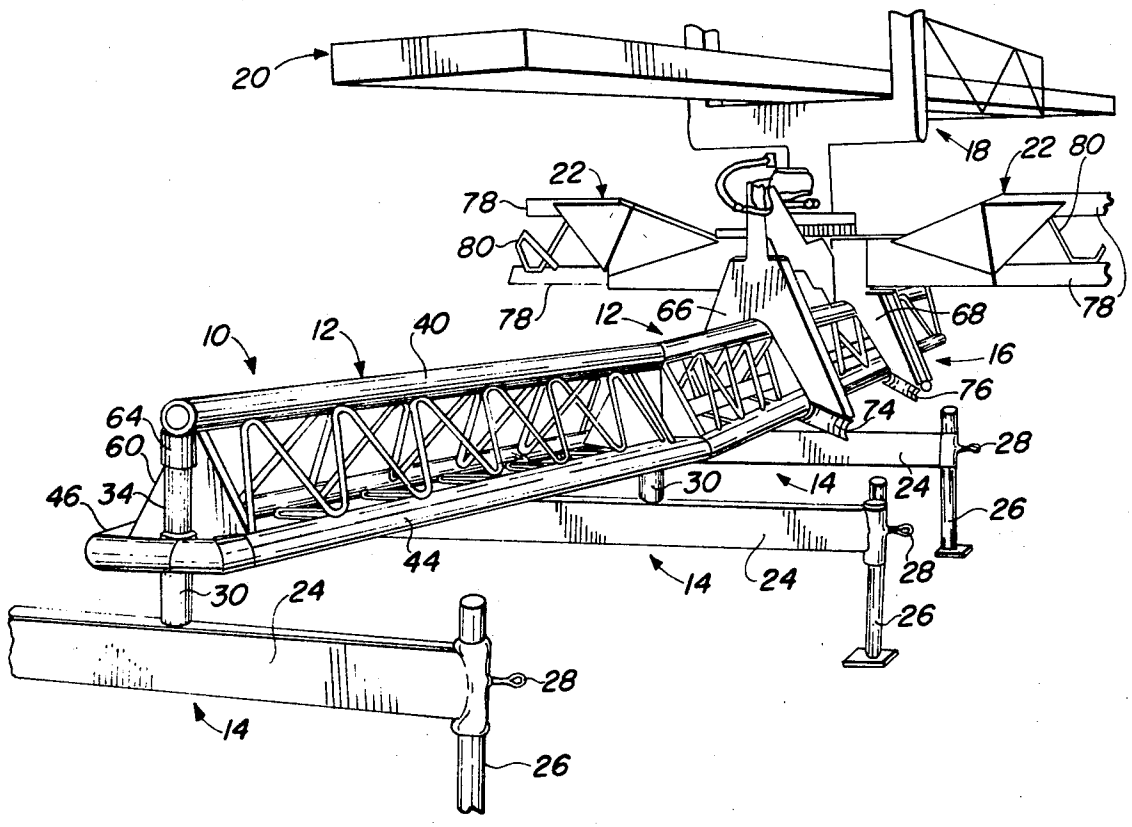
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2,850,243	9/1958	Robb	104/118
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Primary Examiner—Evon C. Blunk
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ABSTRACT: An improved track system for movable apparatus for handling materials such as conveyor apparatus for distributing concrete mix and the like, comprises a plurality of track sections pivotally linked together, with each section comprising a tubular upper member mounted by means of struts on two parallel tubular lower members. The lower members are curved inwardly at one end and are beveled inwardly at the other end, so that two joined sections will mate and will form a substantially continuous outer surface even when the two sections are arranged obliquely. A carriage for the track comprises at least one inverted V-shaped member riding along the track on a load caster mounted at the apex of the member. Guide casters mounted at the ends of the legs of the member ride along the lower tubular members and provide lateral stability for the apparatus mounted on the carriage.



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SHEET 1 OF 3

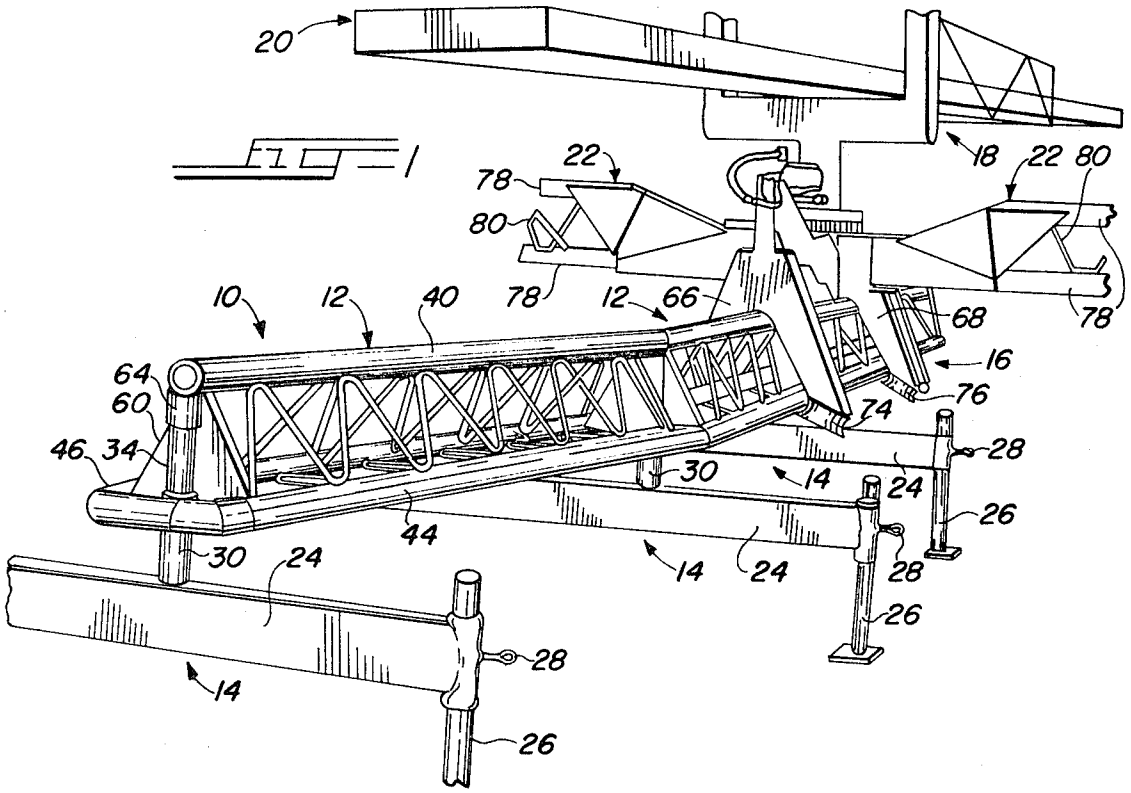


FIG-1

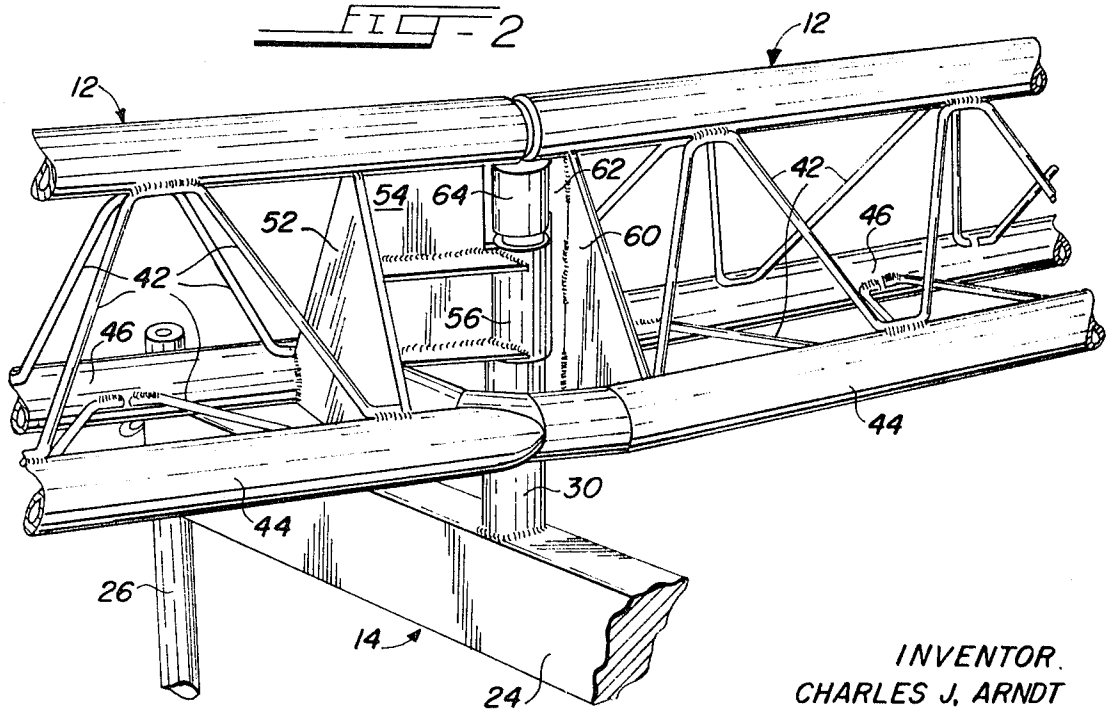


FIG-2

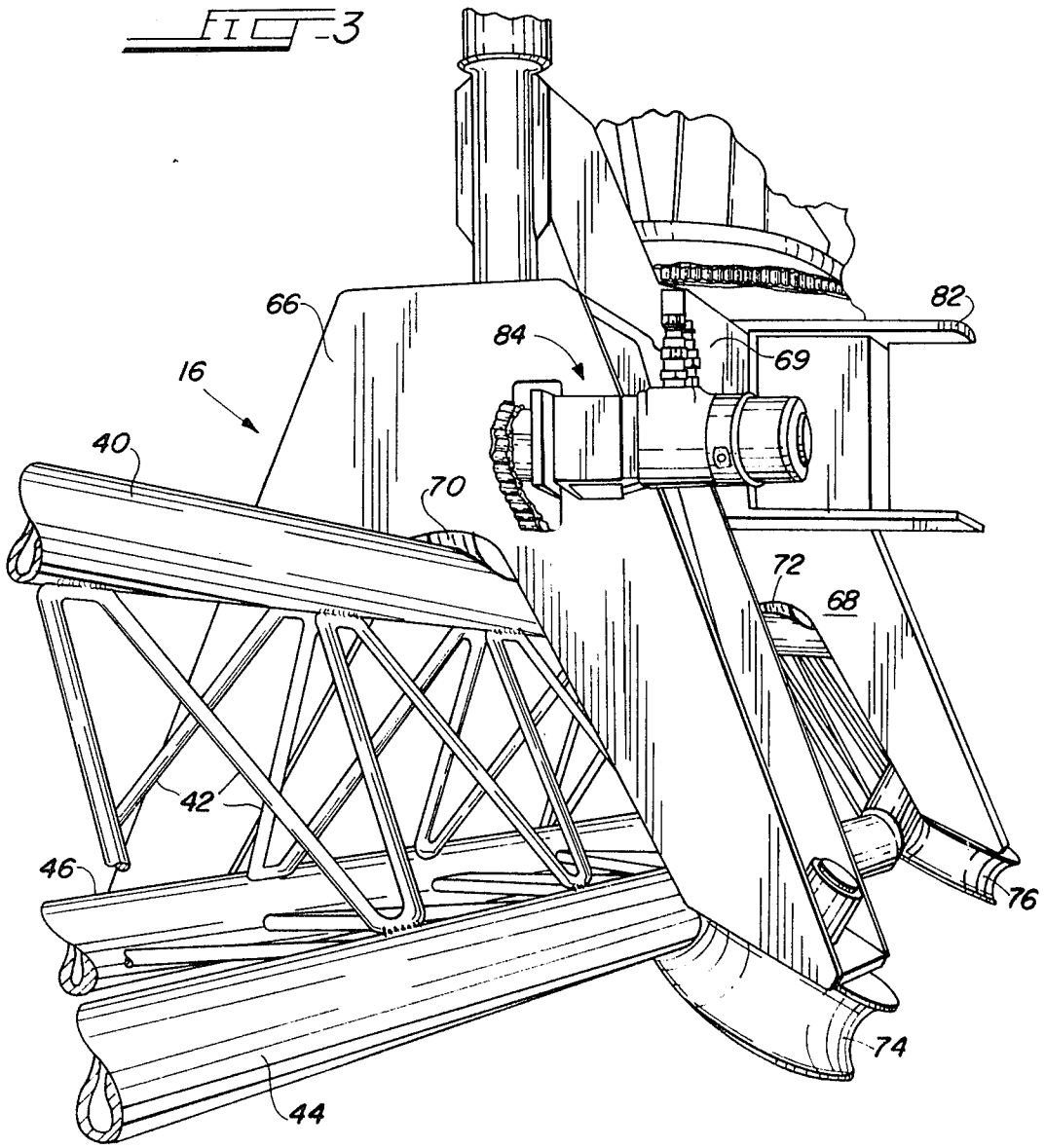
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FIG-3



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FIG 4

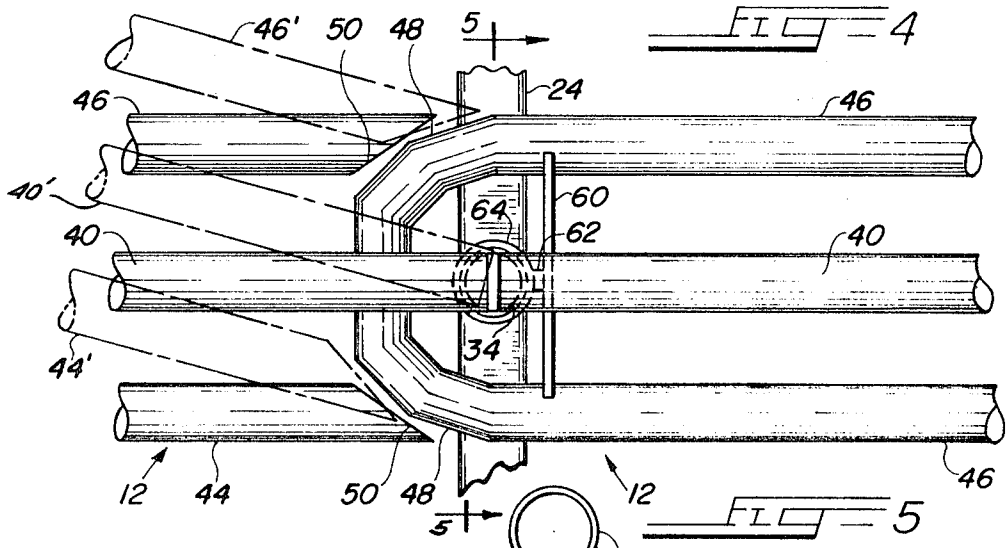
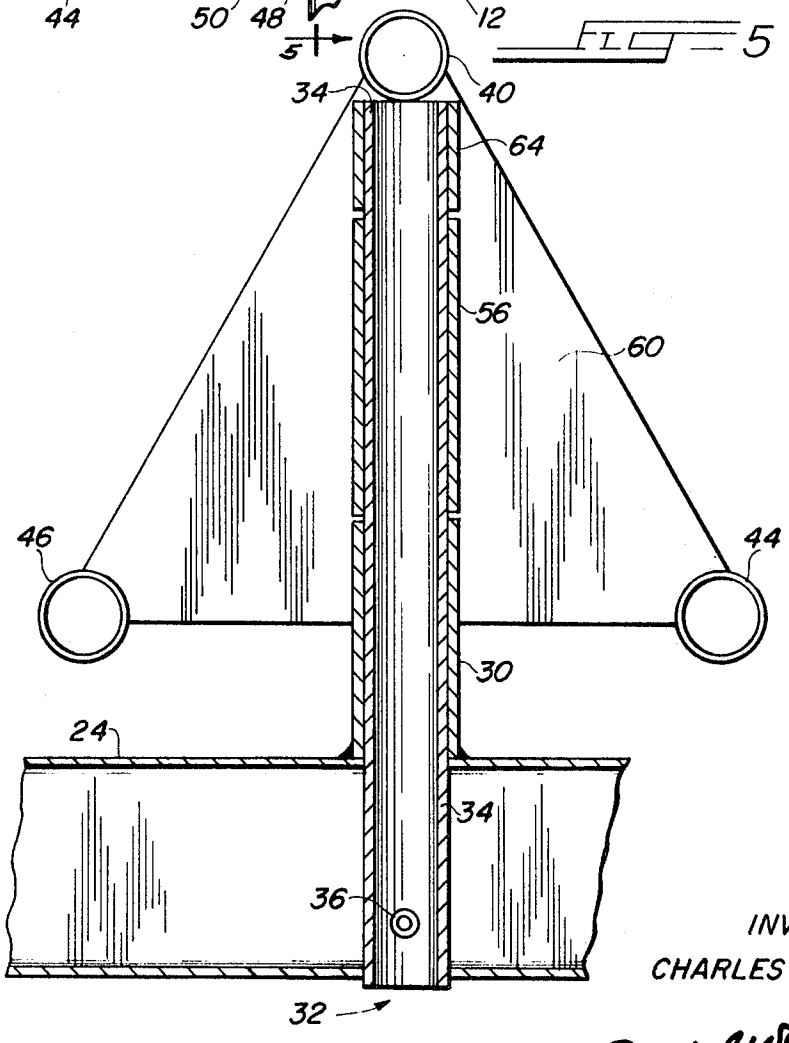


FIG 5



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TRACK

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates generally to track systems and more particularly to track systems for movable apparatus for handling materials, such as concrete mix-distributing apparatus and the like.

2. Description of the Prior Art

Movable material-handling apparatus has found increasing usefulness in construction applications. One example of such equipment is described in Oury et al. U.S. Pat. No. 3,343,651, wherein an apparatus for distributing concrete mix at the terminal end of a concrete-conveying system is shown. This apparatus is movably mounted on a track system comprising a plurality of rail members fastened together end-to-end, thus adding versatility to the terminal conveyor and permitting concrete mix to be distributed into areas which would otherwise be inaccessible to a conveyor apparatus.

Such prior art track systems, however, have several disadvantages that make the apparatus less versatile and less movable than is desirable for many applications. First of all, the track sections of the prior art are heavy steel rails that are quite unwieldly and difficult to move, and the linking means may be somewhat difficult to disengage. Thus, it is difficult to make alterations in the track layout and to add and delete sections from the system. Another disadvantage with the prior art systems is that there is a lack of continuity between adjoining rail sections, resulting in a rough or bumpy effect when the system moves from one section of track to the other. The lack of continuity between adjoining track sections likewise restricts the versatility of the track system, because, if adjoining sections of track are not substantially in alignment, the entire concrete-distributing apparatus will tend to run off the track as the equipment passes from section to section.

Another disadvantage with the track systems of the prior art is that the track itself provides little or no lateral stability for the concrete-distributing system. The prior art systems employ machinery carriages which have small casters that ride along the side of the rails as the system moves along the track, but such casters provide little or no resistance to torque forces directly exerted on the carriages and against the rails. Outriggers are employed in most movable materials-handling systems to prevent the equipment from falling off the track when the equipment is in position for operation on the track, but such outriggers generally are not mounted on tracks themselves, so they must be raised whenever the equipment is moved along the track. With only the minimal stabilizing force provided by the track itself, the materials-handling systems of the prior art were therefore very unstable while they were being moved from one station to another along the track. Consequently, such systems were moved only when absolutely necessary and, then, only with the utmost of caution.

Accordingly, one of the primary objects of the present invention is to provide a track system comprising a plurality of track sections wherein substantial continuity is maintained between adjacent sections.

Another object of the present invention is to provide a track system where the sections may be joined together at oblique angles without disrupting the continuity of the tracks.

A further object of the present invention is to provide a track system that is stronger yet lighter than prior art systems.

Another object of the present invention is to provide a track system wherein the sections thereof may be connected and disconnected easily.

A further object of the present invention is to provide a track system that provides greater lateral stability for the equipment mounted thereon than prior art track systems.

SUMMARY OF THE INVENTION

In accordance with the present invention, an improved track system for movable materials-handling equipment, particularly apparatus for distributing concrete mix and the like,

comprises a plurality of track sections pivotally linked together end-to-end, about a vertical pivot axis, with each track section comprising a lower member constructed from two parallel tubular legs fastened together a fixed distance apart and a tubular upper member mounted on the lower member parallel to and an equal distance from each of the legs of the lower member.

At one end of the lower member, the legs are curved inwardly and joined, thus forming a member with a generally U-shaped end, which has as its center a point on the vertical pivot axis. At the other end of the lower member, the legs are beveled inwardly, so that the beveled end of one section of track will fit over and mate with the curved end of another section of track and will provide a continuous outer surface between two joined sections of track, even when the two sections are arranged obliquely.

One end of the upper member terminates adjacent the vertical pivot axis and the other of the upper members terminates at a point such that the upper member of one section of track will end adjacent the upper member of another section of track when two sections of track are linked together, thus insuring substantial continuity between the upper members of adjoining sections. Linking means are provided so that juxtaposed sections of track will be pivotable about the vertical axis.

Advantageously, a track system of the foregoing type is used in combination with carriage means comprising at least one inverted V-shaped member having a load caster adapted to ride on the upper member of each track section and having a guide caster, adapted to ride along the lower legs of the track sections, provided at the end of each leg of the inverted V-shaped member.

By constructing the track system in this fashion numerous advantages are achieved. The resultant track sections are both lighter and stronger than prior art systems and provide much more lateral stability for the materials-handling equipment mounted thereon, especially when the equipment is being moved from one section to another along the track. Moreover, because the substantial continuity of the track system between adjacent sections is not affected by the angles at which the track sections are placed, the track sections of the present invention may be arranged at greater oblique angles than the sections of the prior art systems. This continuity of adjacent track sections and the added strength and lateral stability of the system provide both a considerable safety advantage and a considerable convenience advantage over any of the prior art systems.

Still another advantage of the present system is that the sections may be connected and disconnected easily. The lightness of the subject track system and the ease with which adjoining sections of track can be linked and unlinked makes it a simple task to move the track system as the need therefor arises, adding, deleting, or moving adjacent track sections whenever necessary.

All in all, the track system of the present invention provides a substantial advantage in safety, maneuverability, and cost over anything heretofore known in the art.

DESCRIPTION OF THE DRAWING

FIG. 1 is a perspective view of a track system constructed in accordance with the present invention, showing schematically a concrete-distributing apparatus mounted thereon;

FIG. 2 is a perspective view of the track system of the present invention showing the connection between two sections of track linked together;

FIG. 3 is a perspective view showing the manner in which a carriage for materials-handling equipment rides along the track;

FIG. 4 is a top plan view showing how the continuity of the track is preserved when the two sections of track are arranged obliquely; and

FIG. 5 is a sectional view taken along line 5–5 in FIG. 4.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Although the present invention may be utilized in any type of industrial application where mobility of materials-handling apparatus or other types of heavy machinery is desired, for purposes of illustration, the present invention will be described in the context of an apparatus for distributing concrete mix, such as the apparatus shown in Oury et al. U.S. Pat. No. 3,343,651.

Referring now to the drawings and more particularly to FIG. 1, a track system 10 constructed in accordance with the present invention comprises a plurality of sections 12 and is shown mounted on bases 14. A carriage 16 rides along the track 10 and carries a support structure 18 for a conveyor 20 (shown schematically in FIG. 1). The support structure 18 for the conveyor 20 is mounted on a frame 69 (hereinafter described). Conveyor 20, which is shown schematically in FIG. 1, may be of the type shown in the above-cited Oury et al. Patent. Of course any other type of materials-handling apparatus or similar type of equipment could be adapted easily to the present system.

In the preferred embodiment of the present invention, a drive mechanisms designated generally by the numeral 84, is employed to move the carriage and attach the conveyor system along the track.

A pair of outriggers 22 (partially shown in FIG. 1) provide lateral stability for the concrete-distributing system when the apparatus is in position for operation. These outriggers serve the same purpose as the outriggers shown in the above-cited Oury et al. patent but employ the same type of tubular structure used in the track system of the present invention in order to minimize the weight of these members. Each outrigger comprises three parallel tubular members 78, which are fastened together by struts 80. As shown in FIG. 3, each outrigger is mounted on a frame 69 by means of a bracket 82.

As best shown in FIGS. 1 and 5, each base 14 comprises a transverse beam 24, which is mounted on a pair of adjustable legs 26. Eye bolts 28 screwed into beams 14 hold the adjustable legs 26 at the height desired. A cylindrical sleeve 30 also forms a part of base 14. As shown in FIG. 5, a sleeve 30 is welded on the top of beam 24 in coaxial alignment with a vertical opening 32 in the beam.

A king pin 34 (see FIG. 5) may be inserted through the underside of the opening 32 in the beam so that it extends through the sleeve 30 and protrudes upward therefrom. In the preferred embodiment, king pin 34 is formed from steel tubing having a diameter slightly smaller than the inside diameter of the sleeve 30. King pin 32 may be held in place in the base by means of a pin 36 in the side of beam 17 or by some other such fastening means.

Each track section 12 comprises a lower member 38 and an upper member 40, which are fastened together by means of struts 42. Lower member 38 comprises a pair of parallel tubular legs 44 and 46, which are fastened together by means of additional struts 42. The left end 48 of each leg (FIG. 1 orientation) is curved inwardly and joins with the left end of the opposite leg, thus forming a U-shaped member having a generally circular closed end. The right end 50 of each leg (FIG. 1 orientation) is beveled inwardly, so that when two sections of track are linked together, the curved ends 48 of one section of track mate with the beveled ends 50 of the adjoining sections of track, thus presenting an outer surface that is substantially continuous between the adjoining sections of track. As shown by the positions occupied by legs 44' and 46' in FIG. 4, this substantial continuity between adjoining sections of track is maintained even though the two sections of track are arranged at an oblique angle. It is, of course, an important feature of the present invention that the track be substantially continuous between adjoining sections, inasmuch as a lack of continuity between adjoining sections has proved to be a definite safety hazard in the prior art track systems. The unique male-female construction of the track sections of the present invention, therefore provides a substantial advantage over the systems of the prior art.

Upper member 40 is also a tubular member and is mounted by means of struts 42 in parallel with both lower legs 44 and 46 at an equal distance from each leg. The upper member extends to the left (FIG. 1 orientation) to the axis of king pin 32 and extends to the right to a point such that, when two sections are joined together, the right end of one section will terminate adjacent the left end of the adjoining section, thus providing, again, substantial continuity between joined sections of track, even when the sections are arranged obliquely, as shown by the position of member 40' in FIG. 4.

Because of the unique construction of this track system, a combination of maximum strength and minimum weight are achieved by constructing the track from tubular members of different wall thickness. In the preferred embodiment of the subject invention, seamless steel tubing having an outside diameter of 3 inches is employed for all three tubes, but the wall thickness of the upper tube is three-sixteenths inch, while the wall thickness of the lower tubes need only be one-eighth inch.

The means for linking adjacent sections of track together is shown in FIG. 2. At the right end of each section (FIG. 2 orientation), a transverse triangular plate 52 is attached by its vertices to each of the three tubular members of section 12. A vertically disposed rectangular plate 54 is attached along one edge to triangular plate 52 and extends perpendicularly therefrom toward the right end of the section. A sleeve 56 is mounted on the end of vertical plate 54 such that its axis is in a vertical direction. Sleeve 56 has the same inside diameter as sleeve 30 of base 14 and is mounted in such a position that it is coaxial with sleeve 30 when the beveled ends 50 of one section are immediately adjacent the curved ends 48 of the section being joined thereto. Horizontal flanges 58 extend from triangular plate 52 to the sleeve 56 and provide additional support for the sleeve.

The means provided at the left end of section 12 (FIGS. 1, 2, and 4 orientation) for linking sections together comprise a triangular plate 60 which is attached by its vertices to each of the tubular members of section 12. A vertical spacer 62 is fastened to the left side of the plate, and this spacer is in turn attached to sleeve 30 of base 14. A vertical sleeve 64 is attached to the upper portion of spacer 62 in coaxial alignment with sleeve 30. Sleeve 64 has the same inside diameter as sleeve 30.

The positioning of the vertical axis of sleeves 30 and 64 with respect to the outer surface of the curved ends 50 of the section is an important feature of the present invention, because the common axis must be positioned correctly in order to have two sections of linked track be pivotable with respect to one another. In order that the beveled ends 50 of one section be rotatable about a vertical axis without contacting the curved ends 48 of the adjoining section, the common vertical axis of two sections must pass through a point in the plane of the two lower tubular members which is equidistant from each point on the curved ends 48 of the lower legs, at least from those portions of the curved ends 48 that might become adjacent to the beveled ends 50 of the adjoining section. It should be noted that the middle portion of the closed end of the U-shaped member will never become adjacent to the beveled ends of an adjoining section, so the curvature of this portion is not important. Alternatively, this portion of the lower member could be deleted, leaving a gap between the curved ends 48 of the lower legs, without affecting the operation of the track.

In order to maximize the advantages of the present track system a novel carriage mechanism 14 has been devised and is shown in detail in FIG. 3. Carriage 14 comprises a pair of inverted V-shaped members 66 and 68 which are joined together and held a fixed distance apart along the track by means of a frame 69. The carriage rides along the track on a pair of load casters 70 and 72, which are mounted at the apex of V-shaped members 66 and 68, respectively, in the manner shown in FIG. 3. Guide casters 74 and 76 are rotatably mounted on the inside surfaces of the ends of both legs of members 66 and 68, respectively, and ride along the lower tu-

bular members of the track system. The guide casters are aligned so that the axes of rotation are approximately perpendicular to the surfaces of the legs on which they are mounted. Ideally, these guide casters should be positioned so that any lateral force exerted on the carriage which is transmitted through the casters to the track structure is directed toward the center of the triangular track structure (i.e., the direction in which the track has its greatest strength). This means that in the preferred embodiment of the present invention, the guide casters will ride partially on the underside of the lower tubes.

One important aspect of the present invention is the manner in which the track and carriage combination maintain the lateral as well as the longitudinal stability of the machinery mounted and even when the equipment is being moved along the track and the outriggers **22** are raised. Since the guide casters are mounted at the ends of the legs of members **66** and **68**, the entire length of these legs acts as a lever, which the guide casters and track system may utilize to resist any unbalancing lateral force exerted on the carriage. Such leverage is not available in the track and carriage systems of the prior art and it is doubtful if the casters and rail structures of a prior art system could be made sufficiently strong to resist any appreciable lateral force exerted on the carriage without the benefit of such leverage. As stated previously, this ability to resist lateral force is especially important when the apparatus is being moved along the track, inasmuch as the outriggers customarily employed with such apparatus to maintain lateral stability during operation must necessarily be lifted when the machinery is moved along the track.

The present system is also more stable in the longitudinal direction than the systems of the prior art. Since the guide casters of the present invention are disposed partially beneath the track structure, any longitudinal force exerted on the carriage will be resisted by the track structure itself which will exert a downward force on the guide casters, thus preventing the structure from tipping. The guide casters of the prior art, on the other hand, merely rode along the side of the track, so that the track itself could not exert any downward force on the guide casters in order to prevent the structure from tipping in a longitudinal direction.

I claim:

1. A track section adapted for use in a track system comprising a plurality of such sections being pivotally mounted to one another for relative movement about a vertical axis, the said track section comprising:

a lower member, including a pair of parallel tubular legs fixed together, each leg being curved inwardly at one end thereof about the vertical axis and each leg being beveled inwardly at its other end such that the beveled ends of the said legs and the inwardly curved tubular legs of the lower member of an adjacent section pivotally linked thereto form substantially continuous outer surfaces between the legs of the track sections; and

a tubular upper member fixed to the tubular legs of the lower member and substantially parallel to and equidistant therefrom.

2. A track system comprising a plurality of track sections linked together end-to-end, each such track section comprising:

a lower member including a pair of parallel tubular legs fixed together, each leg being curved inwardly about a vertical axis at one end and each leg being beveled inwardly at its other end such that the beveled ends of the said legs and the inwardly curved legs of the lower member of an adjacent track section form substantially continuous outer surfaces between the legs of adjacent track sections; and

a tubular upper member fixed to the tubular legs of the lower member and substantially parallel to and equidistant therefrom; and

linking means adapted to connect adjacent sections of the track for relative pivotal movement about the vertical pivot axis.

3. A track system, as claimed in claim **1**, wherein the vertical pivot axis of each such track section passes through a plane passing through the legs of the lower member at a point that is substantially equidistant from at least those portions of the curved ends of the legs of the lower member capable of being positioned adjacent the beveled ends of the legs of the lower member of a track section positioned adjacent thereto.

4. A track system, as claimed in claim **3**, wherein each section of the track further comprises:

a first hollow sleeve of a given inside diameter disposed at one end of the section such that its axis is coaxial with the vertical axis; and

a second hollow sleeve of said given inside diameter disposed at the other end of the section such that it is in alignment with and abuts the first hollow sleeve of an adjacent section; and

wherein the linking means comprises a pin having a diameter smaller than the said given inside diameter of the hollow sleeves and that projects into both sleeves.

5. An improvement as claimed in claim **4**, wherein the linking means is mounted on a base.

6. An improvement, as claimed in claim **5**, wherein the base comprises a generally horizontal member provided with adjustable legs at each end thereof and having a vertical opening therein, and wherein the first sleeve is mounted on the horizontal member.

7. An improvement, as claimed in claim **6**, wherein a third hollow sleeve of said given diameter is mounted above and in coaxial alignment with said first sleeve so that the first and third sleeves of one track section bracket the second sleeve of an adjacent section, and wherein the pin is removably insertable into the sleeves through the underside of the vertical opening in the horizontal member.

8. An improvement, as claimed in claim **1**, wherein the legs of the lower member take the form of a U-shaped member having a pair of hollow tubular legs, with the legs of the U-shaped member being beveled inwardly at the open end thereof.

9. A combination track and carriage system comprising a plurality of track sections linked together end-to-end, each such track section comprising:

a lower member including a pair of parallel tubular legs fixed together, each leg being curved inwardly about a vertical axis at one end and each leg being beveled inwardly at its other end such that the beveled ends of the said legs and the inwardly curved legs of the lower member of an adjacent track section form substantially continuous outer surfaces between the legs of adjacent track sections;

a tubular upper member fixed to the tubular legs of the lower member and substantially parallel to and equidistant therefrom;

linking means adapted to connect adjacent sections of the track for relative pivotal movement about the vertical pivot axis; and

carriage means comprising:

at least one inverted V-shaped member having a pair of legs;

a load caster rotatably mounted on each inverted V-shaped member at its apex, said load caster means being adapted to ride on the upper members of the track sections; and

a guide caster rotatably mounted on the ends of each of the legs of the V-shaped member and adapted to ride along the lower legs of the track sections.

10. A combination, as claimed in claim **9**, wherein the carriage means comprises a pair of inverted V-shaped members joined together by a frame.

11. A combination, as claimed in claim **10**, wherein the carriage means further comprises stabilizing means.

UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,583,327 Dated June 8, 1971

Inventor(s) Charles J. Arndt

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Claim 1, Column 5, line 43, after "sections", insert --disposed end to end, the ends of adjacent track sections--.

Signed and sealed this 26th day of October 1971.

(SEAL)
Attest:

EDWARD M.FLETCHER,JR.
Attesting Officer

ROBERT GOTTSCHALK
Acting Commissioner of Patents

FORM PO-1050 (10-69)

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