United States Patent [19]

Hartwig

[11] **3,840,112**

[45] **Oct. 8, 1974**

[54] **GUIDE MEANS FOR TRAVELING GRATE CONVEYOR**

[75] Inventor: **Walter J. Hartwig,** Hartland, Wis.

[73] Assignee: **Allis-Chalmers Corporation,** Milwaukee, Wis.

[22] Filed: **Feb. 20, 1973**

[21] Appl. No.: **334,150**

[52] **U.S. Cl.**..... **198/202,** 198/196, 198/201

[51] **Int. Cl.**..... **B65g 15/62**

[58] **Field of Search**..... 198/202, 196, 201

[56] **References Cited**

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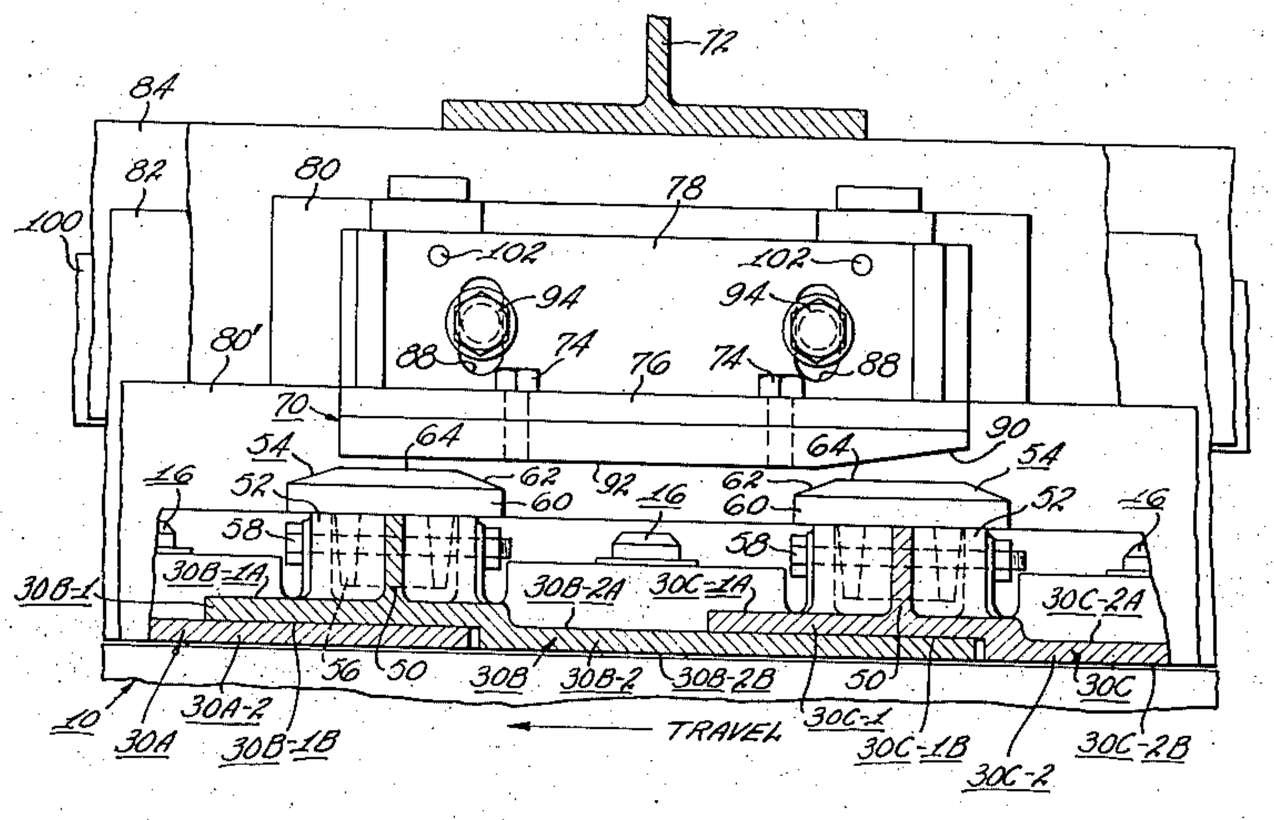
Primary Examiner—Richard A. Schacher
Assistant Examiner—Richard K. Thomson
Attorney, Agent, or Firm—Robert C. Sullivan

[57] **ABSTRACT**

There is provided in accordance with an embodiment of the invention a guide means for a traveling grate conveyor strand or the like including detachable thrust buttons carried by the side plates of the grate conveyor (one thrust button per side plate). The thrust buttons cooperate with stationary thrust plates or thrust shoes positioned along the path of travel of both the upper and lower runs of the grate conveyor strand. Normally, there is a predetermined clearance between the thrust surface of the thrust buttons and the cooperating facing thrust surface of the stationary thrust plate or shoe. However, if a condition of drift or misalignment of the conveyor strand prevails, the thrust buttons will engage the thrust shoes to limit the drift or misalignment of the moving conveyor strand, with the wear upon the cooperating thrust buttons and thrust shoes providing an indication of the drift or misalignment of the traveling grate conveyor strand.

13 Claims, 7 Drawing Figures



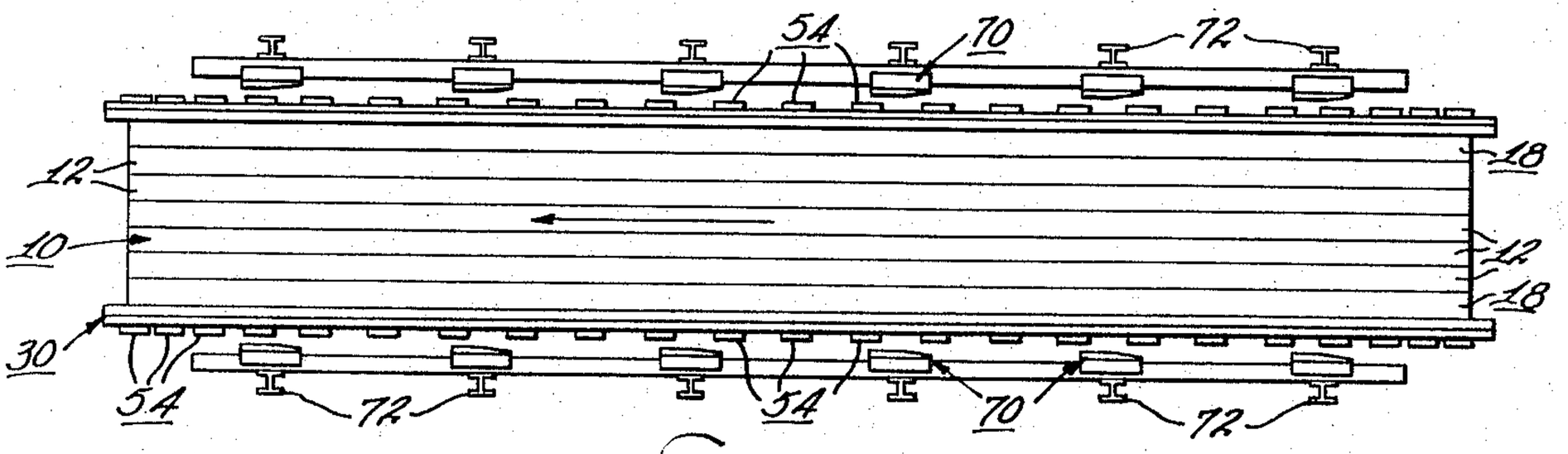


Fig. 1

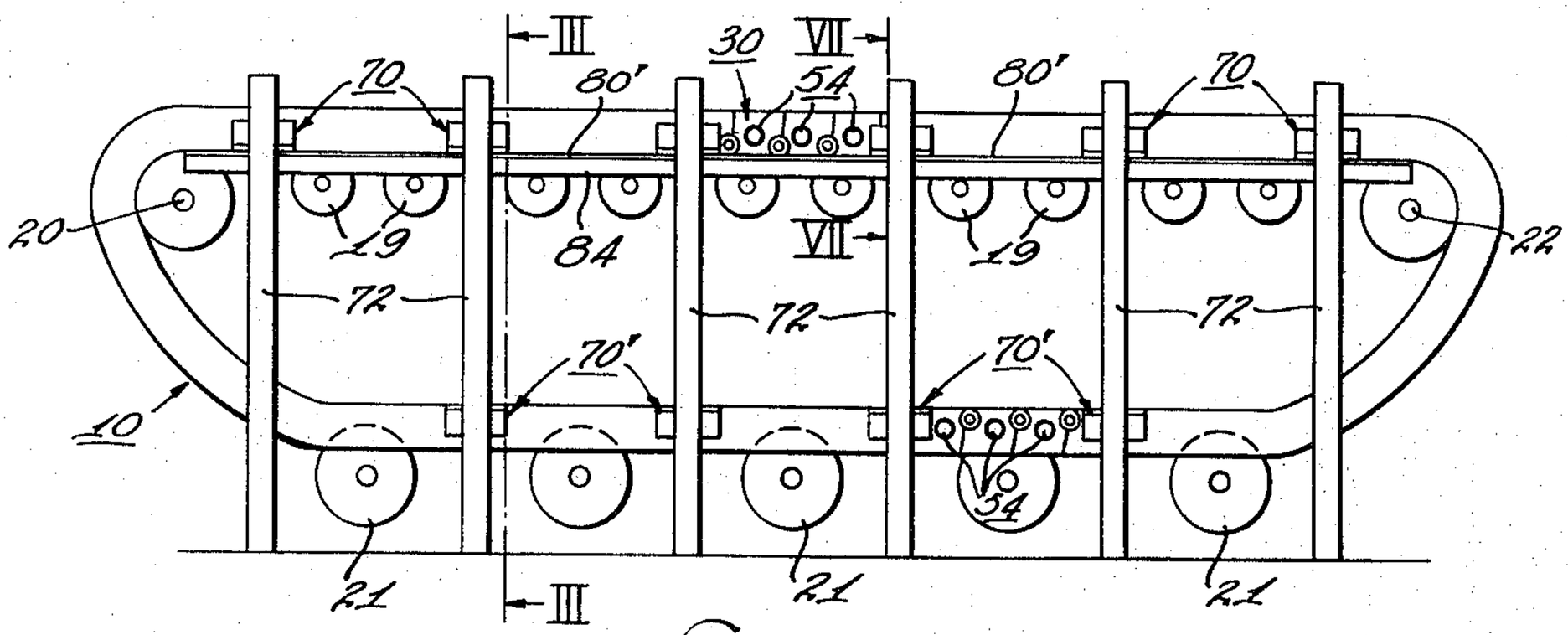


Fig. 2

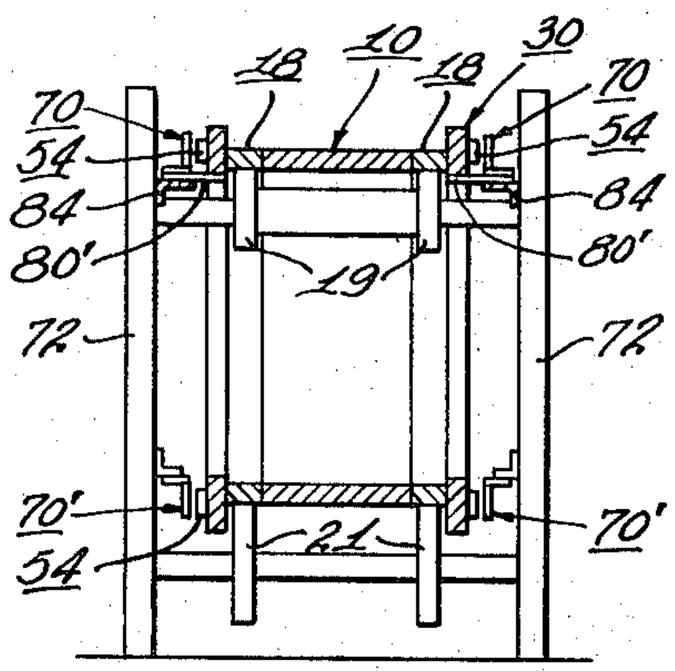


Fig. 3

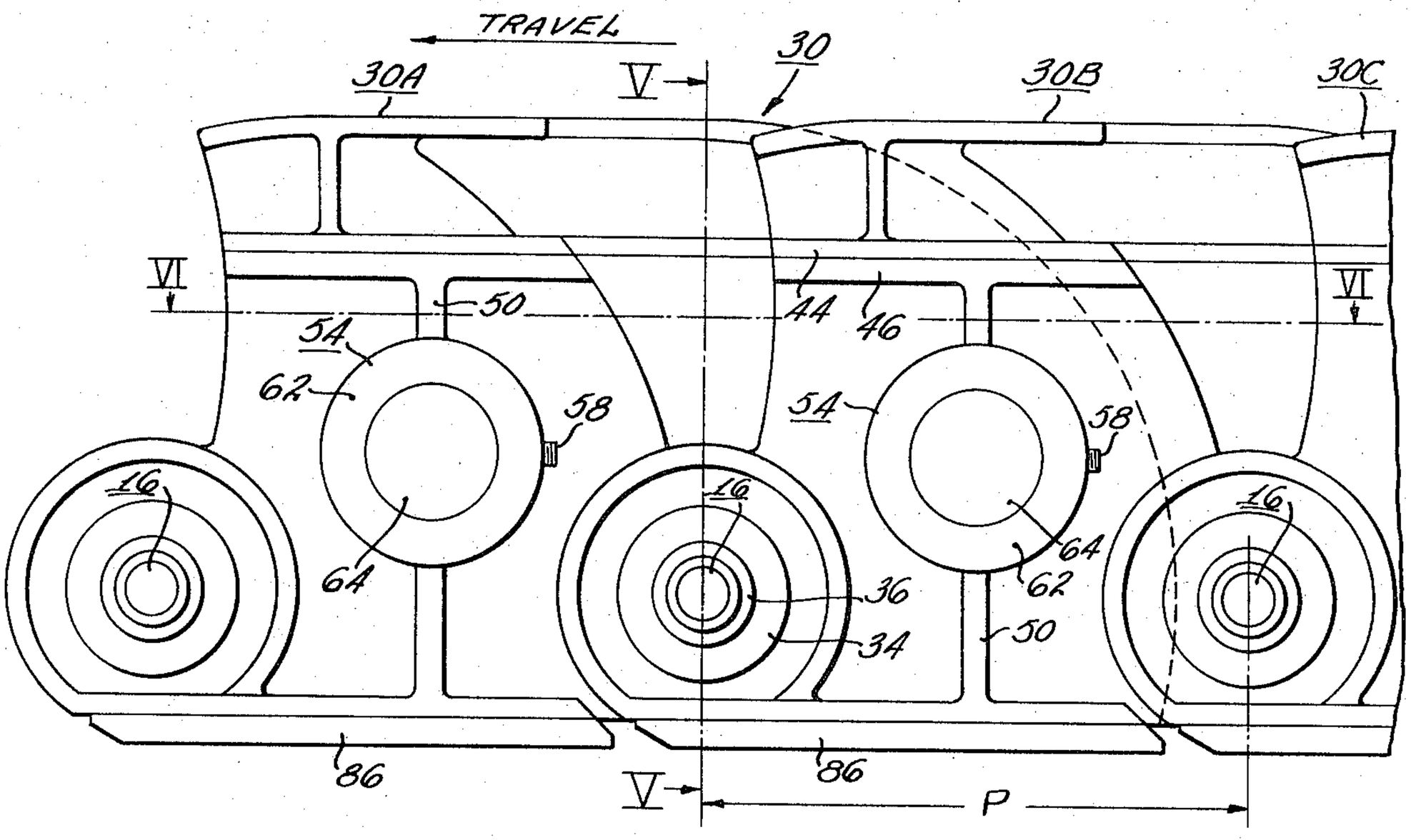
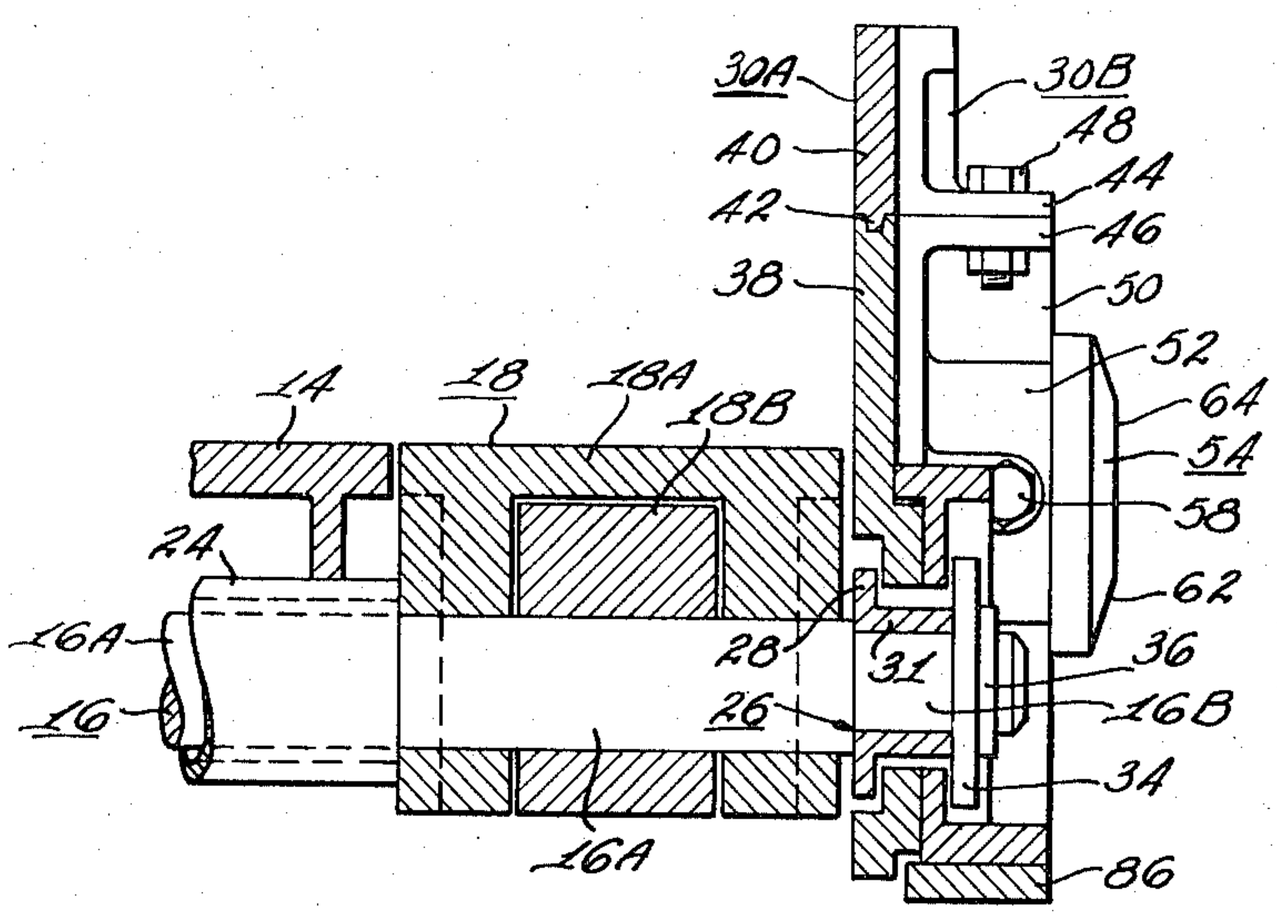

TRAVEL
30A
V
30
30B
30C
VI
50
44
46
54
62
58
16
64
36
34
86
P

Fig.4


30A
30B
48
40
44
42
46
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64
14
18
18A
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36
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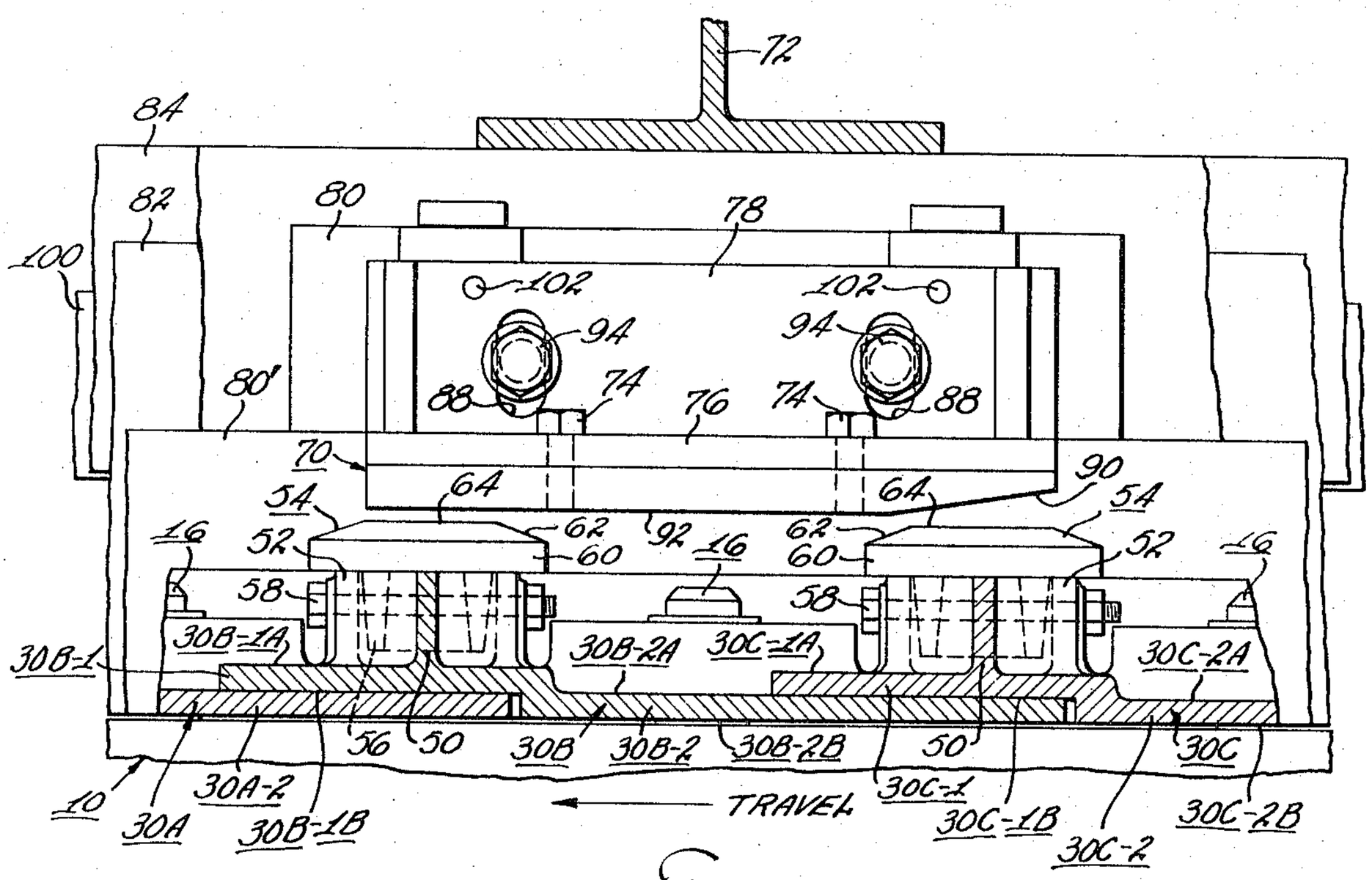
16B
34
16A
86

Fig.5


72
84
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102
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74
76
80'
70
64
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92
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52
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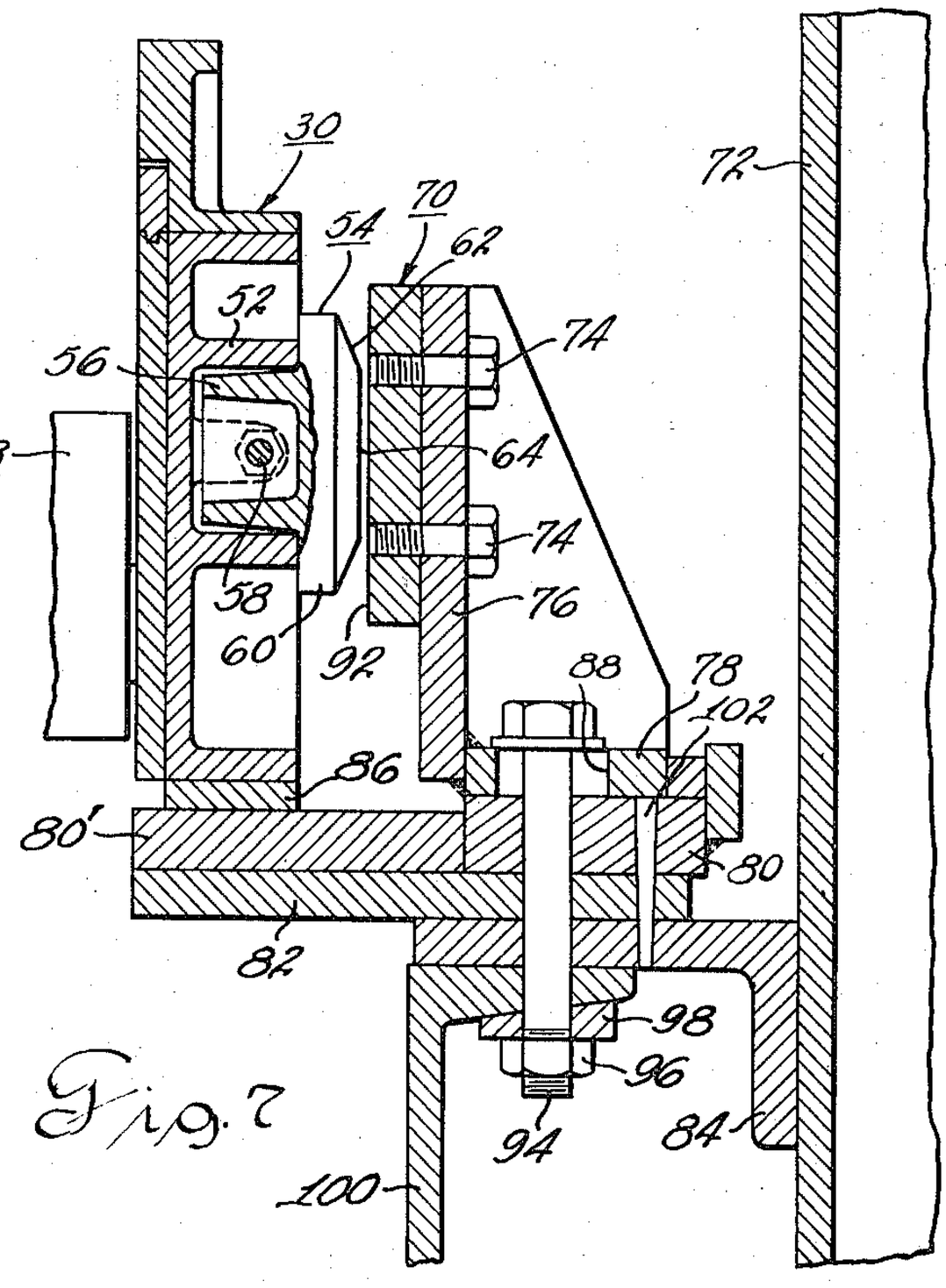
58
30B-1A
30B-2A
30C-1A
30C-2A
30B-1
56
50
30B
30B-2
30B-2B
30C
10
30A
30A-2
30B-1B
TRAVEL
30C-1
30C-1B
30C-2
30C-2B

Fig. 6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96
94
84
100
72

Fig. 7

GUIDE MEANS FOR TRAVELING GRATE CONVEYOR

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to traveling grates of the type used to convey material through a dryer, a furnace, a cooler, or the like, and more particularly to means for guiding the traveling grate conveyor strand along a predetermined path of travel. .

2. Description of the Prior Art

Grate conveyors of the type used to convey pelletized ore or the like typically may extend for a length of about 150 to 200 feet from the head shaft sprocket to the tail shaft sprocket thereof. Such a conveyor typically may have a lateral width of about 15 feet to 18 feet. Even assuming that the head and tail shafts at the opposite ends of the conveyor are properly positioned in parallel relation to each other, various other factors may cause drift of the moving grate conveyor strand to one side or the other. Possible factors which may cause a drift or misalignment of the conveyor strand include variations in the circumferential length of the conveyor strand side-to-side (right to left), misaligned slide bases or misaligned carrying idlers underlying the conveyor chains, and also variation in dragging friction side-to-side of the conveyor can also cause a drifting of the conveyor to either side.

In an effort to correct drift or misalignment, it has been known in the prior art to utilize toothed guide rollers engaging transversely spaced conveyor chains which form part of the conveyor strand. However, the use of a toothed guide roller engaging a conveyor chain to restrict drift of the conveyor strand is not always satisfactory.

The term "conveyor strand" as used herein is intended to collectively include the entire movable part of the conveyor assembly including the conveyor grates, chains, side plates and supports which move therewith, such as thru rods and tie rods.

STATEMENT OF THE INVENTION

Accordingly, it is an object of the present invention to provide an improved means for guiding a grate conveyor strand along a predetermined path of travel.

It is another object of the invention to provide a guide means adapted to be mounted on the side plates of a grate conveyor strand or the like and adapted to cooperate with stationary thrust plates or thrust shoes positioned at spaced locations along the path of travel of both the upper and lower runs of the traveling grate conveyor strand.

It is another object of the invention to provide a guide means for a traveling grate conveyor strand or the like including thrust button members or the like carried by the conveyor strand and adapted to engage cooperating stationary thrust plates or shoes only when the conveyor strand is in a condition of "drift" or misalignment, whereby to serve as means for limiting the drift of the conveyor strand and also to serve as an indicator that a condition of "drift" or misalignment prevails.

In achievement of these objectives, there is provided in accordance with an embodiment of the invention a guide means for a traveling grate conveyor strand or the like including detachable thrust buttons carried by

the side plate of the grate conveyor (one thrust button per side plate). The thrust buttons cooperate with stationary thrust plates or thrust shoes positioned along the path of travel of both the upper and lower runs of the grate conveyor strand. Normally, there is a predetermined clearance between the thrust surface of the thrust buttons and the cooperating facing thrust surface of the stationary thrust plate or shoe. However, if a condition of drift or misalignment of the conveyor strand prevails, the thrust buttons will engage the thrust shoes to limit the drift or misalignment of the moving conveyor strand, with the wear upon the cooperating thrust buttons and thrust shoes providing an indication of the drift or misalignment of the traveling grate conveyor strand.

Further objects and advantages of the invention will become apparent from the following description taken in conjunction with the accompanying drawings in which:

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a schematic top plan view of a grate conveyor incorporating the guide means of the invention;

FIG. **2** is a schematic view in side elevation showing the upper and lower runs of the grate conveyor of FIG. **1** cooperating with thrust shoes positioned along the path of movement of the upper and lower runs of the conveyor strand;

FIG. **3** is a view in transverse section taken substantially along section line III—III of FIG. **2**;

FIG. **4** is a view in side elevation of a pair of side plates of a grate conveyor showing the thrust buttons mounted on the side plates;

FIG. **5** is a view in transverse section taken substantially along section line V—V of FIG. **4**, showing the relation of the side plates of a grate conveyor to the conveyor chain and to the conveyor grates, in a typical installation;

FIG. **6** is a top plan view partially in section (substantially along the line VI—VI of FIG. **4**), showing details of the cooperative relation of the thrust buttons of the side plates of the moving conveyor with one of the stationary thrust plates; and

FIG. **7** is a view in vertical section taken substantially along section line VII—VII of FIG. **2**.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to FIGS. **1**, **2**, **3** and **5**, there is schematically indicated a traveling grate conveyor strand generally indicated at **10** of the type, for example, used in a Grate-Kiln system and comprising a plurality of rows **12** each comprising a plurality of pivotally mounted grate members **14** (FIG. **5**) mounted on transversely extending thru rods **16** or alternatively on transversely extending tie rods (not shown) which in turn are suitably supported by conveyor chains **18** which extend lengthwise along the opposite lateral edges of the grate conveyor. The grate conveyor strand passes around a head shaft generally indicated at **20** at one end of the conveyor structure and around a tail shaft **22** located at the opposite end of the conveyor structure. The opposite laterally spaced conveyor chains **18** pass around toothed sprockets on the respective head and tail shafts **20** and **22**.

Along the path of travel of the upper run of the conveyor strand, the chains **18** are supported by guide rollers **19**; while along the path of travel of the lower run of the conveyor, the chains are supported by guide rollers **21.**

Referring now to the more detailed views of FIGS. **4** and **5,** there is shown a portion of the upper run of the grate conveyor strand, including a plurality of conveyor grates **14** supported by corresponding pipe spacers **24** which are respectively coaxially mounted about a corresponding support means in the form of a thru rod generally indicated at **16** which extends for the entire transverse width of the conveyor strand. Thru rod **16** includes a larger diameter portion **16A** and a reduced diameter end portion **16B**. Pipe spacer **24** is shown mounted coaxially about the thru rod portion **16A**, and a grate **14** is shown pivotally mounted on the pipe spacer **24.** A pair of pivotally connected conventional one-piece chain castings **18A** and **18B** are pivotally connected to each other on the thru rod portion **16A** next to and laterally outwardly of the grate **14.** chain castings **18A** and **18B** constituting two links in the chain **18.**

A spool member generally indicated as **26** is journaled for pivotal movement on the reduced diameter end portion **16B** of the thru rod **16.** The spool member **26** includes an integral flange **28** which is loosely keyed to side plate **30A.**

The plurality of pivotally connected similar side plates generally indicated at **30** and specifically designated at **30A, 30B, 30C,** etc., contiguous each laterally outer edge of the grate conveyor strand collectively define a side wall along the entire length of each respective lateral edge of the conveyor strand, which plates move with the conveyor strand. Thus, as best seen in FIGS. **4** and **5** each side wall comprises a plurality of pivotally interconnected similar plate members each generally indicated at **30** and specifically including the pivotally connected plate members designated at **30A, 30B** and **30C** in FIGS. **4** and **5** which are similar to each other and which together form part of one of the side walls of the grate conveyor strand.

The spool **26** and the side plate **30A** are capable of pivotal movement together as a unit relative to the reduced diameter end portion **16B** of thru rod **16.**

Spool **26** also includes a cylindrical body portion **31.** A washer **34** which seats on the peripheral surface of reduced diameter portion **16B** through rod **16** is secured in place by snap ring retainer **36** in an abutting relation to the laterally outer end (right-hand end in FIG. **5**) of cylindrical body portion **31** of spool **26.** Washer **34** in effect serves as the opposite flange of the spool **26.** Washer **34** is preferably of 360° extent. Snap ring **36** is received in a groove in the peripheral surface of the reduced diameter extension **16B** of thru rod **16** to retain washer **34** at a fixed lateral spacing from flange **28** of spool **26.** Plate **30B** is pivotally movable relative to plate **30A** about the axis of the cylindrical shoulder **31** of the spool **26.**

As best seen in FIGS. **4** and **5,** a single side plate member **30** comprises a lower plate portion generally indicated at **38** and an upper plate portion generally indicated at **40.** Lower plate portion **38** may be made of a material such as cast iron, for example, while upper plate portion **40** may be of a material such as stainless steel which can withstand higher temperatures than the material of lower plate portion **38.** The reason for providing a two-piece construction including the plate portions **38** and **40** as just described is that the upper portion **40** of the plate **30** is frequently exposed to substantially higher temperatures than the lower portion **38** of plate **30.** That is, the upper portion of plate **30** including the portion thereof where the upper plate portion **40** is located may at times be exposed to temperatures of the order of magnitude of 2,000° Fahrenheit when the grate conveyor is being used, for example, to convey pelletized ore or the like through drying or preheating zones, whereas the lower portion of the plate member **30** where the lower plate portion **38** is located may only be exposed to temperatures, for example, of the order of magnitude of 1,200° Fahrenheit. The upper and lower plate portions **40** and **38** are connected to each other by a tongue-in-groove connection indicated at **42** which extends for a portion of the length of the respective facing edges of the upper and lower members **40** and **38,** respectively. The remaining portion of the length of the upper and lower members **40** and **38** are provided with cooperating flanges **44** and **46,** respectively, which are secured together by bolts **48.**

As best seen in the view of FIG. **6,** the side plates **30B, 30C,** etc., are so contoured as to interfit in an overlapped or nested relation with respect to each other. Thus, the laterally outwardly facing surface of side plate **30B** has a surface portion **30B–1A** and a surface portion **30B—2A** which is countersunk with respect to the surface portion **30B–1A**; while the laterally inwardly facing surface of side plate **30B** has a surface portion **30B–1B** lying generally laterally opposite surface portion **30B–1A** and a surface portion **30B–2B** which lies generally laterally opposite surface portion **30B—2A.** Viewed from the laterally inner side of the side plates, surface portion **30B—1B** is countersunk relative to surface portion **30B–2B.** The generally opposite surface portions **30B–1A** and **30B–1B** bound the plate portion indicated at **30B–1**; while the generally opposite surface portions **30B–2A** and **30B–2B** bound the plate portion **30B—2.** Plate portions **30B–1** and **30B–2** lie substantially in laterally offset planes.

Similarly, the laterally outwardly facing surface of the side plate **30C** includes a surface portion **30C–1A** and a surface portion **30C–2A** which is countersunk with respect to the surface portion **30C–1A**; while the laterally inwardly facing surface of side plate **30C** has a surface portion **30C–1B** lying substantially laterally opposite surface portion **30C–1A** and a surface portion **30C–2B** which lies substantially laterally opposite the surface portion **30C–2A.** Viewed from the laterally inner side of the side plates, surface portion **30C–1B** is countersunk relative to surface portion **30C–2B.**

The substantially laterally opposite surface portions **30C–1A** and **30C–1B** bound the plate portion indicated at **30C–1**; while the substantially laterally opposite surface portions **30C–2A** and **30C–2B** bound the plate portion indicated at **30C–2.** Plate portions **30C–1** and **30C–2** lie in laterally offset planes.

The contiguous pivotally connected side plates such as **30B** and **30C** are in overlapped nested relation to each other in such manner that when viewed from the laterally outer side of the conveyor, portion **30B–2** of plate **30B** lies laterally behind portion **30C–1** of plate **30C** and plate portion **30B–1** lies laterally forwardly of portion **30A–2** of side plate **30A.**

Each side plate is provided with a pair of pivot apertures in longitudinally spaced relation to each other,

one of which lies laterally forwardly of a pivot aperture of one pivotally connected side plate, and the other of which lies laterally behind a pivot aperture of another pivotally connected side plate.

The thrust buttons **54** are mounted on and extend laterally outwardly from the laterally outer portion of each respective side plate such as the plate portion **30B–1** of plate **30B**, plate portion **30C–1** of plate **30C**, etc.

For a more detailed description of the pivoted connection between contiguous side plates such as **30A**, **30B**, etc., and of the construction of the side plates, reference is made to my co-pending U.S. Pat. application Ser. No. 290,634, filed Sept. 20, 1972, and entitled "Stabilized Side Plate Construction For Grate Conveyor."

The outer face of each side plate member **30** is provided intermediate the length of the respective plate member with a vertical reinforcing rib **50** and intermediate the height thereof, each rib **50** is contoured to define a hollow cylindrical socket-like member **52** for receiving a thrust member in the form of the thrust button generally indicated at **54.** The vertical axis of rib **50** and hence of socket member **52** is preferably located substantially at the mid-point of the pitch distance P (FIG. 4) between the longitudinally opposite pivotal connections of a given plate member **30.**

Also, the horizontal center line of the socket member **52** and hence of the thrust button **54** received therein is located a significant distance below the upper edge of the side plates **30** to exert proper thrust action and to prevent tilting of the side plates under the influence of the thrust reaction forces between the thrust buttons **54** and the stationary thrust plates **70** to be described.

The horizontal center line of the thrust button **54** should preferably lie in a horizontal plane slightly below the horizontal plane in which the upper surface of grates **14** and chains **18** lie, as best seen in FIG. **5.**

As best seen in FIGS. **6** and **7**, the thrust button **54** includes a hollow shank portion **56** adapted to be received in the socket **52** formed on the outer surface of each respective conveyor side plate. The thrust button **54** is detachably secured in fixed position in the socket **52** by suitable fastening means such as a bolt **58** or the like. The thrust button **54** also includes what might be termed a base portion **60** of generally cylindrical shape extending from shank portion **56** and lying laterally outwardly of socket **52**, and a bevelled or chamfered outer portion **62** extending from cylindrical base portion **60** and which terminates in a flat outer end portion or thrust surface **64.** The thrust button generally indicated at **54** is preferably made of a bearing material such as commerically available bearing iron having a high graphite content. Alternatively, thrust button **54** may be made of bronze, also a bearing material. If thrust button **54** is made of a bearing material such as bearing iron or bronze, the thrust plates **70** (to be described) with which the thrust buttons **54** cooperate should be of a hard metal such as steel.

Instead of making the thrust buttons **54** of a bearing metal and the cooperating thrust plates **70** of a hard metal, the materials used may be reversed. That is, the thrust buttons **54** may be made of a hard metal such as steel and the thrust plate **70** may be made of a bearing metal such as bearing iron having a high graphite content, or bronze. Thus, one of the cooperating thrust members (either the thrust buttons **54** or the thrust plate **70**) should be of a bearing material or metal, while the other thrust member (either the thrust buttons or the thrust plate) should be of a hard metal.

Preferably, each side plate **30** on each side of the moving conveyor strand is provided with a thrust button **54** suitably secured thereto in the manner just described. The distance between centers of the thrust buttons of contiguous side plates on the same side of a typical conveyor installation is 10 inches to 12 inches.

The thrust means or thrust plates which cooperate with the thrust buttons **54,** hereinbefore described, are generally indicated at **70** and are supported at spaced intervals such as **8** to **10** foot intervals along the longitudinal path of movement of the conveyor by vertical posts or columns **72** as will now be described. Each thrust plate **70** is detachably secured by bolts **74** to an upright member **76** which is welded or otherwise suitably secured to a horizontal plate member **78.** The horizontal plate **78** is adapted to be bolted to plates **80** and **82,** which, in turn, rest upon an angle member **84** which is suitably secured to the vertical post or column **72.** The plate or "pressure bar" **80′** which lies in the same horizontal plane as the plate **80** and is supported by plate **82** underlies the wear shoe **86** carried by the lower end of the side plate **30.** Pressure bar **80′** is secured to plate **82** by suitable bolts (not shown). Thus, the plate or "pressure bar" **80′** serves as a support rail or the like for the conveyor side plates **30** and thus for the conveyor strand as it moves along the upper run of the path of travel of the conveyor strand since the pressure bar **80′** extends for all or a substantial part of the length of the upper run of the conveyor strand in underlying relation to the wear shoes **86** on side plates **30** as seen in FIG. **7.** The horizontal plate **78** to which the vertical upright support **76** for the thrust plate **70** is attached is provided with enlarged apertures **88** therein (FIGS. **6** and **7**) to permit lateral adjustment of the position of the connected plates **76–78** relative to thrust buttons **54** and thus to permit adjustment of the clearance between the vertical thrust surface **92** of thrust plate **70** and the facing thrust surface **64** of the thrust button **54.**

The support plates **76** and **78** which support each respective thrust plate **70** are rigidly but adjustably secured in position by bolts **94** which pass through the oversized apertures **88** of the plate **78** and through aligned apertures in the plates **80, 82** and also through an aperture in the angle member **84,** which is secured to the support column **72.** The lower end of each bolt **94** is tightened in position by a suitable nut **96** which engages a washer **98** interposed between the under surface of the support **100** and the nut **96.** Dowel pins **102** when in place maintain the plates **80, 82** and the angle member **84** in assembled relation with respect to each other independently of bolts **94,** thereby permitting bolts **94** to be loosened to permit adjustment of the position of the connected members **76–78.**

The members **80′, 82, 84** and **100** extend for substantially the full length of the upper run of the conveyor. The subassembly comprising members **70, 76, 78, 80** is located contiguous one of the respective vertical posts or columns **72,** a plurality of each subassemblies being provided for the plurality of posts **72.**

It will be noted that the end of a respective thrust plate **70** first engaged by any given thrust button **54** is

chamfered or bevelled as indicated at **90** (FIG. **6**). The chamfered surface **90** on the thrust plate cooperates with the chamfered or bevelled surface **62** on the respective thrust buttons to provide an easy "lead-in" of the thrust button **54** relative to the thrust plate **90,** assuming there is a drift or misalignment of the conveyor strand. After a given thrust button **54** has reached the end of the chamfered or bevelled surface **90** of the thrust plate, the main flat thrust surface **64** of the button then is in a position to engage the main flat vertical thrust surface **92** of the thrust plate. As previously explained, however, if the conveyor is properly aligned and is not subjected to any factors which cause a drift of the conveyor strand, there will normally be an operating clearance of, for example, one-fourth inch between the cooperating thrust surfaces **64** and **92** of the thrust buttons **54** and thrust plates **70,** respectively.

If the conveyor strand **10** is misaligned or has a drift toward one side in its movement, there will be a wear on the corresponding thrust buttons and on the corresponding thrust shoes which will indicate the undesirable condition. Upon noting such wear, the causes of the conveyor strand drift or misalignment may be corrected, if desired; or, alternatively, the drift or misalignment may be accepted or tolerated and the thrust buttons and/or thrust plates **70** may be replaced as required. The cooperative relation between the thrust buttons **54** and the thrust plates **70** also serves to limit the "drift" movement of the conveyor strand **10.**

Along the lower run of the conveyor strand, the thrust buttons **54** carried by the side plates of the conveyor strand cooperate with thrust plates **70'** mounted on posts **72** at a vertical level corresponding to the path of movement of the thrust buttons moving along the lower run of the conveyor strand. Thrust plates **70'** are similar to and are mounted in a manner generally similar to the thrust plates **70** previously described, although the supporting members do not span the space between adjacent posts **72,** as in the case of the arrangement for the upper run, previously described, but instead are mounted on each individual post **72.** If the conveyor strand is properly aligned and there is no "drift" of the conveyor strand, then there will be a normal operating clearance such as one-fourth inch between the facing thrust surfaces of the thrust buttons **54** and of the thrust plates **70'**. However, a condition of misalignment or drift of the conveyor strand will cause the thrust buttons **54** to engage the thrust plates **70'** in the same manner as previously described in connection with the upper run of the conveyor strand. It might be noted that the lower run of the conveyor strand will drift in an opposite direction to the drift of the upper run of the conveyor strand. That is, if conditions are such as to cause a drift of the upper run of the conveyor strand laterally to the left relative to the normal and correct path of travel of the conveyor strand, then the lower run of the conveyor strand will drift laterally to the right, and vice-versa.

From the foregoing detailed description of the invention, it has been shown how the objects of the invention have been obtained in a preferred manner. However, modifications and equivalents of the disclosed concepts such as readily occur to those skilled in the art are intended to be included within the scope of this invention.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A grate conveyor comprising a movable conveyor strand including grate members forming part of and movable with said strand, side plates forming part of and movable with the conveyor strand and extending in a vertical plane contiguous a lateral edge of said strand along the entire length of said strand whereby to collectively define a side wall for the conveyor strand, means carried by the respective side plates for receiving and supporting a corresponding thrust member, a separate detachable thrust member received by and supported by said means carried by the individual respective side plates and extending laterally outwardly from the respective side plates, the detachable thrust members defining the laterally outermost boundary along a corresponding edge of the moving conveyor strand, support means forming part of said movable strand and pivotally mounting said grate members and said side plates, the respective detachable thrust members having a substantially greater laterally outermost thrust surface area than the area of the laterally outermost surface of any given support means, and a plurality of rigid thrust means stationarily positioned along the path of travel of a given edge of said conveyor strand, said plurality of thrust means being positioned in spaced relation to each other lengthwise of the path of travel of said given edge, each thrust means being in normally laterally spaced relation to the respective thrust members and adapted to be engaged by the respective thrust members if a condition of conveyor strand misalignment or drift prevails, the respective rigid thrust means being individually laterally adjustable relative to the conveyor strand.

2. A grate conveyor as defined in claim **1** in which each side plate which carries a thrust member is provided with a socket, and said thrust member is detachably secured in said socket, said thrust member including a portion thereof lying laterally outwardly of said socket and directed laterally toward said thrust means.

3. A grate conveyor as defined in claim **2** in which said thrust member includes a shank portion received in and detachably secured to said socket, said portion of said thrust member lying outwardly of said socket including a chamfered surface, each respective thrust means including a chamfered surface at the end of said thrust means first approached by a given thrust member, said chamfered surface on said thrust member being adapted to cooperate with said chamfered surface on said thrust means whereby to provide a "lead-in" of said thrust member relative to said thrust means upon a condition of misalignment or drift of said conveyor strand, and a flat thrust surface at the laterally outermost end of said thrust member, said flat surface being adapted to engage a corresponding flat thrust surface on a cooperating thrust means upon completion of the "lead-in" movement of the respective thrust member upon a condition of misalignment or drift of said conveyor strand.

4. A grate conveyor as defined in claim **1** comprising side plates contiguous each of the opposite lateral edges of the conveyor strand, the respective side plates contiguous each of said lateral edges being provided with a corresponding detachable thrust member, and a plurality of indiviudally laterally adjustable thrust

means stationarily positioned along the path of travel of said conveyor strand contiguous each of said opposite lateral edges and adapted to be engaged by the respective thrust members if a condition prevails which causes a drift toward the thrust means contiguous a given lateral side of the conveyor.

5. A grate conveyor as defined in claim **1** in which said movable conveyor strand moves through an upper run and a lower run, and said thrust means are positioned to be engaged by the respective thrust members on both the upper and lower runs of the conveyor strand.

6. A grate conveyor as defined in claim **4** in which said movable conveyor strand moves through an upper run and a lower run and a plurality of individually laterally adjustable thrust means are stationarily positioned along the path of travel of said conveyor strand contiguous each of said opposite lateral edges of both the upper and lower runs of the conveyor strand.

7. A grate conveyor as defined in claim **1** in which cooperating thrust elements comprise said thrust member and said thrust means, and in which one of said cooperating thrust elements is made of bearing material, while the other of said cooperating thrust elements is made of hard metal.

8. A grate conveyor as defined in claim **1** in which substantially each side plate carries a thrust member.

9. A side plate for use with a conveyor apparatus of the type in which said apparatus comprises a movably mounted grate conveyor strand of which said side plate constitutes a part, and in which said apparatus additionally comprises a plurality of rigid thrust means stationarily but individually laterally adjustably positioned along the path of travel of a given edge of said conveyor strand, and in which said conveyor strand includes support means forming part of the movable strand and pivotally mounting said side plate, said side plate being adapted to be mounted on said conveyor strand contiguous a lateral edge of said strand and movable with said conveyor strand whereby a plurality of said side plates collectively define a side wall for said conveyor strand, wherein the improvement comprises means carried by said side plate for receiving a detachable thrust member, and a thrust member detachably secured to and extending laterally outwardly from said side plate in normally laterally spaced relation to said thrust means but adapted to engage said thrust means if a condition of misalignment or drift of the conveyor strand occurs, said thrust member lying along the laterally outermost boundary of a given edge of said conveyor strand and having a substantially greater thrust surface area laterally outermost of said thrust member than the area of the laterally outermost surface of any given support means.

10. A side plate as defined in claim **9** in which said side plate includes a socket, and said thrust member is detachably secured in said socket, said thrust member including a portion thereof lying laterally outwardly of said socket and directed laterally toward said thrust means.

11. A side plate as defined in claim **9** in which said thrust member includes a shank portion received in and detachably secured to said socket, said portion of said thrust member lying outwardly of said socket including a chamfered surface adapted to cooperate with a chamfered surface on said thrust means, whereby to provide a "lead-in" of said thrust member relative to said thrust means upon a condition of misalignment or drift of said conveyor strand, and a flat thrust surface at the laterally outermost end of said thrust member, said flat thrust surface being adapted to engage a corresponding flat thrust surface on said thrust means upon a condition of misalignment or drift of said conveyor strand.

12. A side plate as defined in claim **9** in which said thrust member is made of a bearing material and said thrust means is made of a hard metal.

13. A side plate as defined in claim **9** in which said thrust member is made of a hard metal and said thrust means is made of a bearing material.

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