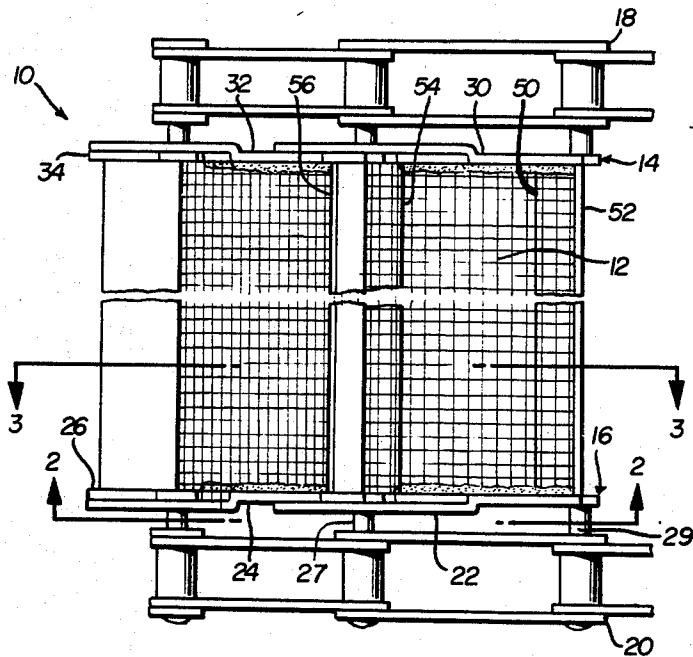


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[21] Appl. No. 771,160
[22] Filed Oct. 28, 1968
[45] Patented Jan. 12, 1971
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Primary Examiner—Edward A. Sroka			
Attorney—Settle, Batchelder and Oltman			

[54] CONVEYOR APPARATUS
11 Claims, 4 Drawing Figs.
[52] U.S. Cl. 198/194,
198/196
[51] Int. Cl. B65g 15/30
[50] Field of Search 198/194,
196, 201

ABSTRACT: A guard structure for a conveyor including link chains secured to side edges of a conveyor web, each chain being made up of pivotally connected plates which act as side guards for the web. The plates overlap each other, but are constructed to prevent the formation of gaps at the side edges of the web through which articles could drop from the web.



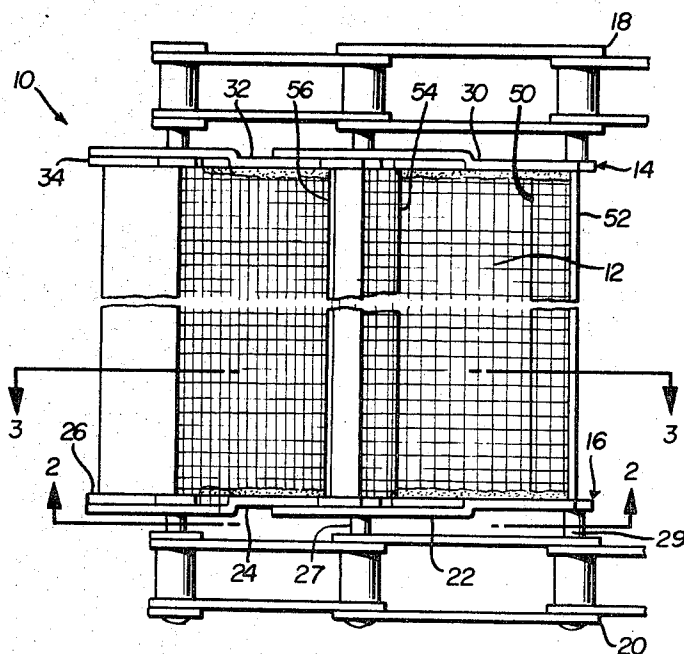


FIG. 1

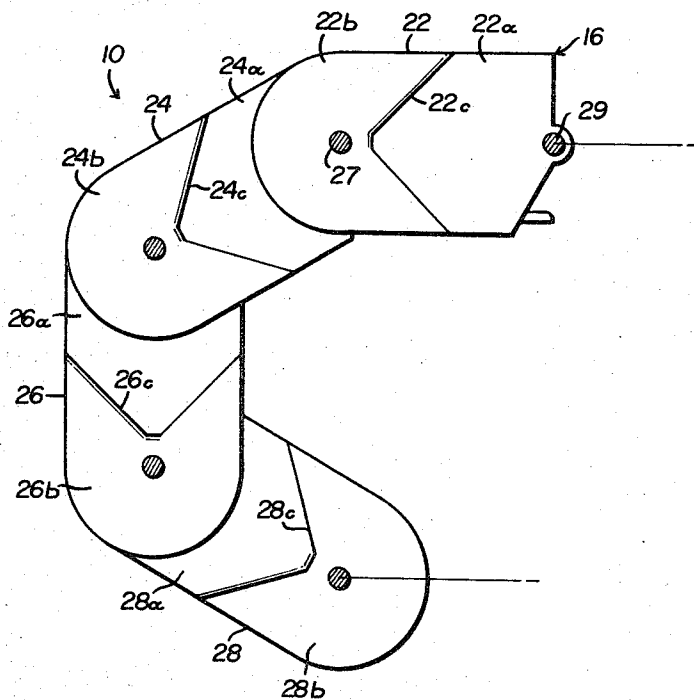


FIG. 2

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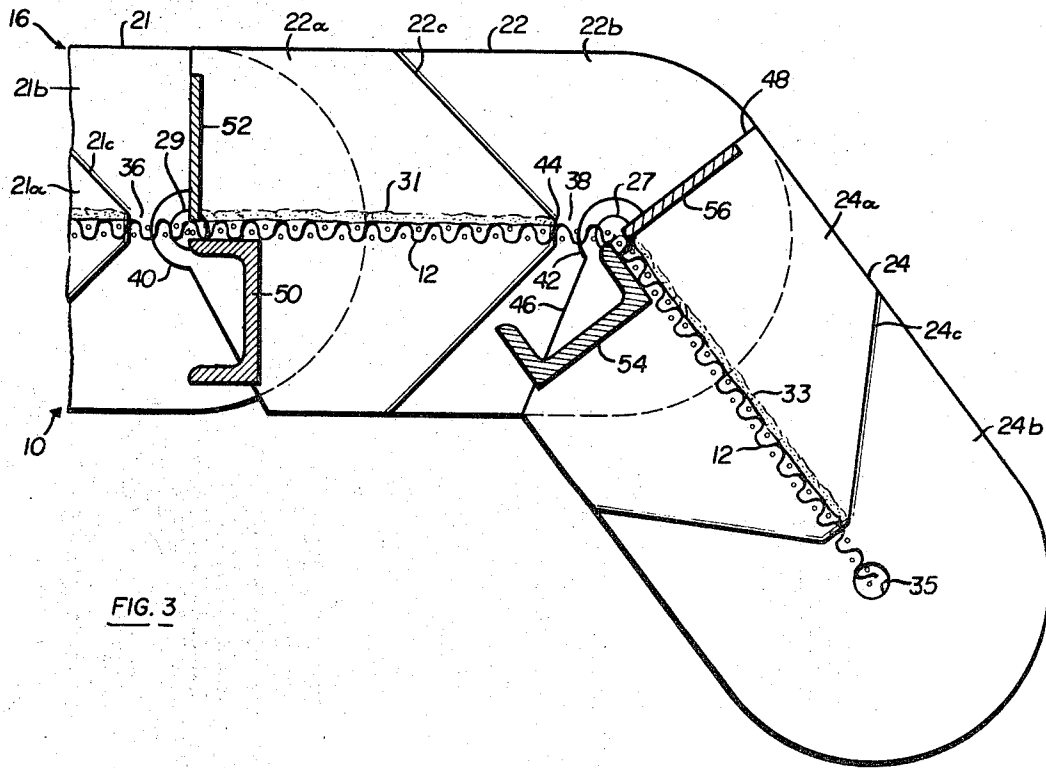


FIG. 3

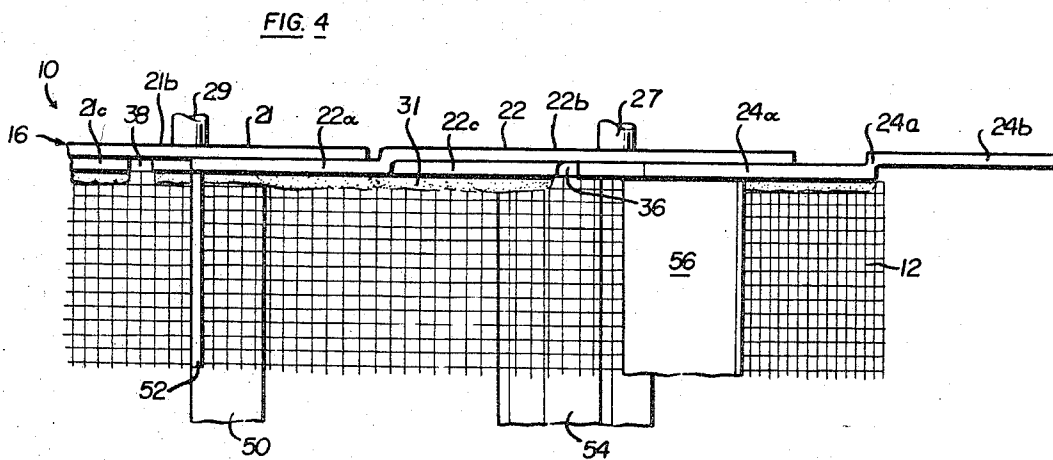


FIG. 4

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CONVEYOR APPARATUS

BACKGROUND OF THE INVENTION

One type of conveyor on which the present invention may be utilized is described in U.S. Pat. No. 3,340,109 issued on Sept. 5, 1967, to the present inventor. This conveyor is utilized transport articles which have been heated in a heat-treating furnace through a quenching bath and upward out of the quenching bath to a discharge point. This particular conveyor travels horizontally for a certain distance, and then changes direction to an upwardly inclined path to carry the articles out of the bath. The conveyor also reverses direction around end sprockets. In order to prevent articles from falling off the sides of the conveyor, it is desirable to provide guards at the side edges of the conveyor web. These guards must be flexible to accommodate the changes of direction of the conveyor web, and where the conveyor goes through a reverse bend as illustrated in the aforementioned patent, the side guards must be flexible in two directions.

It has been proposed to provide flexible side guards for a conveyor web consisting of pivotally connected links which form chains. However, where the links have been attached to the conveyor web, there have been gaps, and there has also been a tendency for the conveyor web to deform or bend in a manner such that the gaps become enlarged sufficiently to allow small articles traveling on the conveyor web to drop through the gaps. In some cases, this has necessitated replacement of the conveyor web within a relatively short time after its original installation.

SUMMARY OF THE INVENTION

The present invention provides a guard structure for the side edges of a conveyor web which is relatively free of gaps and which prevents or minimizes formation of gaps due to deformation of the conveyor web. The guard structure includes a pair of link chains made up of pivotally connected plates each including a first portion welded to a side edge of the conveyor web to provide a side guard and a second portion offset from the first portion and the side edge to provide space for receiving one adjoining plate. Another adjoining plate overlaps the first plate portion on the side thereof opposite the conveyor web, and the plates are pivotally interconnected by spaced pivot means. The welded connection between the first plate portion and the web extends over nearly the entire distance between the pivot means so that only very small gaps remain opposite the pivot means to accommodate bending of the conveyor web when it changes direction. These gaps do not tend to become enlarged. Support members which extend transversely across the web may be sure secured to the web and to pairs of plates which are aligned across the width of the web. An offsetting portion of each plate flares in a manner to provide freedom for pivotal movement of adjoining plates. The invention includes the plate construction.

Accordingly, it is an object of the present invention to provide an improved guard structure for conveyor apparatus.

Another object of the invention is to reduce the tendency for gaps between a conveyor web and a side guard structure for the web to become enlarged sufficiently for articles transported by the web to drop through the gaps.

A further object of the invention is to provide links for guarding the side edges of a conveyor web which links can overlap and be pivotally interconnected, and yet be welded to the web over nearly the entire distance between the pivot points.

Another object of the invention is to provide pivotally interconnected links for guarding the side edges of a conveyor web which can abut against the web leaving only relatively small gaps at the pivot points, and yet which can pivot freely to accommodate changes of direction of the web.

Other objects of this invention will appear in the following description and appended claims, reference being had to the accompanying drawings forming a part of this specification wherein like reference characters designate corresponding parts in the several views.

ON THE DRAWINGS

FIG. 1 is a plan view of a portion of a conveyor apparatus provided with a guard structure in accordance with one embodiment of the invention;

FIG. 2 is a sectional view taken along line 2-2 of FIG. 1 showing part of one link chain included in the guard structure;

FIG. 3 is a sectional view taken along line 3-3 of FIG. 1 showing the opposite side of the link chain of FIG. 2 and also part of the conveyor web and associated supporting members; and

FIG. 4 is an enlarged fragmentary plan view of the structure shown in FIG. 3.

Before explaining the present invention in detail, it is to be understood that the invention is not limited in its application to the details of construction and arrangement of parts illustrated in the accompanying drawings, since the invention is capable of other embodiments and of being practiced or carried out in various ways. Also, it is to be understood that the phraseology or terminology employed herein is for the purpose of description and not of limitation.

AS SHOWN ON THE DRAWINGS

A conveyor apparatus 10, only a portion of which is shown, includes a conveyor web 12 which in this embodiment is a metallic screen belt. It will be understood that the invention can be applied to other types of conveyor webs. The screen web 12 is provided with a guard structure including two link chains 14 and 16 which are secured respectively to the side edges of the screen belt. The chains 14 and 16 are respectively connected to sprocket chains 18 and 20 which are driven by sprockets (not shown) to move the conveyor web 12 along a predetermined path. The portion of the conveyor apparatus 10 which is shown in FIG. 1 is at one end of a conveyor where the screen belt 12 turns and reverses direction. The screen belt 12 would ordinarily reverse direction again at the opposite end of the conveyor, and it is to be understood that the screen belt may go through a reverse bend such that the link chains 14 and 16 must be flexible in two directions.

The portion of the link chain 16 shown in FIG. 2 includes four pivotally connected plates 22, 24, 26 and 28. The opposite side of the same link chain is shown in FIG. 3, but in this view, a portion of another plate 21 is shown in addition to plates 22 and 24. The other link chain 14 shown in FIG. 1 includes identical plates, only three of which identified as 30, 32 and 34 are visible.

Each of the plates includes two planar portions which are offset slightly from each other and which merge together at an offsetting portion. Referring to plate 24 by way of example, one planar portion is 24a, the other planar portion is 24b and the offsetting portion is 24c. The corresponding portions of the other plates are identified by the reference numeral for that plate followed by the letter, a, b or c.

Referring now to FIGS. 3 and 4, it may be seen that portion 22a of plate 22 is welded to the side edge of screen belt 12. Corresponding portions of the other plates are likewise welded to screen belt 12. Portion 22b of plate 22 and the corresponding portions of the other plates are spaced slightly from the side edge of screen belt 12. Portion 24a of plate 24 is received in the space between portion 22b and the side of screen belt 12, and portions 22b and 24a are pivotally connected to each other by means of a pin 27. Portion 21b of plate 21 overlaps portion 22a of plate 22 on the side thereof opposite the screen belt 12, and portions 21b and 22a are pivotally connected to each other by means of a pin 29. The other plates overlap and are pivotally interconnected in the same manner.

It may be seen in FIGS. 3 and 4 that the welded connection at 31 between plate portion 22a and web 12 extends over nearly the entire distance between pins 27 and 29. Similarly, the welded connection at 33 between plate portion 24a and screen belt 12 extends over nearly the entire distance between pin 27 and the aperture 35 in plate portion 24b for receiving the pin of an adjoining plate. Thus, the only unwelded sec-

tions, such as at 36 and 38, of the screen belt are located directly adjacent the pivot pins. The gaps at these unwelded portions 36, 38 of the screen are very small; as shown, they are only slightly larger than the openings in the screen mesh. Thus, articles being carried on the screen belt 12 could not drop through the gaps 36 and 38. The screen belt 12 can bend at these gaps to permit it to change direction, but the screen cannot deform sufficiently at these gaps due to the bending to enlarge the gaps to an extent where articles could drop through the gaps. Thus, the plates provide an effective guard structure for the screen belt 12.

As may be seen in FIG. 3, the plates 21, 22 and 24 extend longitudinally of the screen belt 12 and project a substantial distance above and below the screen belt so as to confine articles on the screen belt. Each plate is symmetrical above and below the screen belt so that the same plates can be used in both link chain 16 and link chain 14 merely by inverting the plates.

The pin 29 may be welded in an aperture in a small projection 40 at one end of plate 22, and this pin passes freely through an aperture in portion 21b of plate 21 to allow relative pivotal movement of plates 21 and 22. Pin 29 is secured to chain link 20 as shown in FIG. 1. Pin 27 may be welded in an aperture in a projecting portion 42 at one end of plate 24, and this pin extends through an aperture in portion 22b of plate 22 to allow relative pivotal movement of plates 22 and 24. Pin 27 is also connected to sprocket chain 20 as shown in FIG. 1. The pins for the other plates are constructed in the same manner.

It may also be seen in FIG. 3 that the offsetting portion 22c of plate 22 is substantially V-shaped with the legs of the V extending toward plate portion 22a. The apex at 44 of offsetting portion 22c is in alignment with pins 27 and 29 and is spaced only a short distance from projecting portion 42 of plate 24. The offsetting portions of the other plates are constructed in the same manner. Although the offsetting portions are V-shaped in this embodiment, they could be curved or otherwise flared with respect to screen belt 12. This flaring of the offsetting portions provides enough space for the adjoining plate to turn without binding. Thus, it may be seen that plate 24 can turn down a substantial distance without rear edge 46 contacting the offsetting portion 22c of plate 22. Similarly, plate 24 can turn upward a substantial distance without rear edge 48 contacting the offsetting portion 22c of plate 22.

Support members for the screen belt are also incorporated in the guard structure. Referring to FIG. 3, a channel-shaped support member 50 is welded at one end to plate 22 and is also welded at spaced portions along its top surface to the screen belt 12. Another support member 52 is welded at one end to plate 22 and also is welded at spaced locations along its lower edge to the top surface of screen belt 12. These same support members 50 and 52 are visible in FIG. 1, and it may be seen here that these support members are both welded at their opposite ends to plate 30 which is aligned with plate 22 across the width of the screen belt 12. Similar support members 54 and 56 are welded to opposite sides of screen belt 12 and to plates 24 and 32. The other plates carry similar support members. These support members support the screen belt and help to concentrate bending of the screen belt to the regions opposite the pivot pins such as pins 27 and 29.

It is apparent from the foregoing description that the invention provides an effective guard structure for a conveyor web which allows bending of the web so that it can change directions, but which prevents the formation of gaps between the guard structure and the conveyor web through which articles could fall from the web. The overlapping plates which are interconnected to form the link chains of the guard structure are constructed to permit substantial pivotal movement of adjoining plates without interference. This pivotal movement can take place in two directions so that reverse bends of the conveyor web are feasible. Effective support is also provided for the conveyor web.

I claim:

1. In a conveyor apparatus including a web means supported for travel a path which changes in direction, a guard structure for said web means comprising a pair of link chains respectively secured to opposite side edges of said web means, each of said link chains comprising a plurality of plates each including a first planar portion longitudinal to said web means and connected in abutting relation to a side edge of said web means along a longitudinal center line of said plates to provide a side guard and a second planar portion parallel therewith and offset from said first planar portion and said side edge, a part of each adjoining plate overlapping each of said second planar portion, first and second pivot means respectively connecting said first and second planar portions pivotally to adjoining plates to allow relative pivotal movement of said plates when said web means changes direction, said first planar portion of each of said plates extending and abutting alongside said web means over a substantial distance between said pivot means.

2. The guard structure as claimed in claim 1 in which pairs of plates in said first and second link chains are aligned across the width of said web means, said guard structure further including a support member connected at opposite ends thereof to said first portions of each of said pairs of plates adjacent to said pivot means therefor, said support member extending across said web means and being secured thereto to support said web means.

3. The guard structure as claimed in claim 2 including another support member for each pair of plates on the opposite side of said web means from said first-named support member and secured to said web means and to said pair of plates.

4. In a conveyor apparatus including a flexible belt arranged to follow a path which changes in direction, a guard structure for said belt comprising first and second link chains respectively secured to opposite side edges of said belt, each of said link chains comprising a plurality of plates connected together pivotally in end-to-end overlapping relationship, each of said plates including a first portion welded to a side edge of said belt and extending longitudinally of said belt to provide a side guard, and a second portion offset from said first portion and said side edge to provide a space where a part of one adjoining plate is received, said first and second portions each having pivot means connecting adjoining plates, and said first and second portions merging together at an offset portion having opposite sides inclined rearwardly in respect to the direction of travel of said link chains to provide freedom for pivotal movement of said plates relative to each other.

5. The guard structure as claimed in claim 4 in which said pivot means for said first portion is located adjacent one end of said plate and said pivot means for said second portion is located adjacent the other end of said plate, said welded connection between said first portion and said web means extending over nearly the entire distance between said pivot means.

6. The guard structure as claimed in claim 4 in which each of said pivot means comprises a pin pivotally connecting said plate to a respective one of said adjoining plates.

7. The guard structure as claimed in claim 6 in which each of said pins is connected to a sprocket chain for advancing said web means.

8. The guard structure as claimed in claim 4 in which said offset extends at an acute angle relative to said web means on each side thereof away from the adjoining plate in said space.

9. A link for a link chain adapted to be attached to a conveyor web to provide a side guard structure, said link comprising a plate having a first planar portion, a second planar portion offset from said first planar portion and parallel thereto, and an offsetting portion joining said first and second planar portions, said offsetting portion is substantially V-shaped and spreads toward said first planar portion, and first and second spaced pivot means for said first and second planar portions for pivotally connecting said plate to adjoining plates to form a link chain, said first planar portion extending nearly the entire distance between said pivot means.

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10. The link as claimed in claim 9 in which said first and second pivot means are located on opposite sides of said offsetting portion in alignment with the apex thereof and with each other.

11. The link as claimed in claim 10 in which said first pivot means includes a pin connected to said first planar portion and said second pivot means includes an aperture in said second planar portion adapted to receive a pin of an adjoining plate.

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