

- [54] **LINK CONVEYOR**
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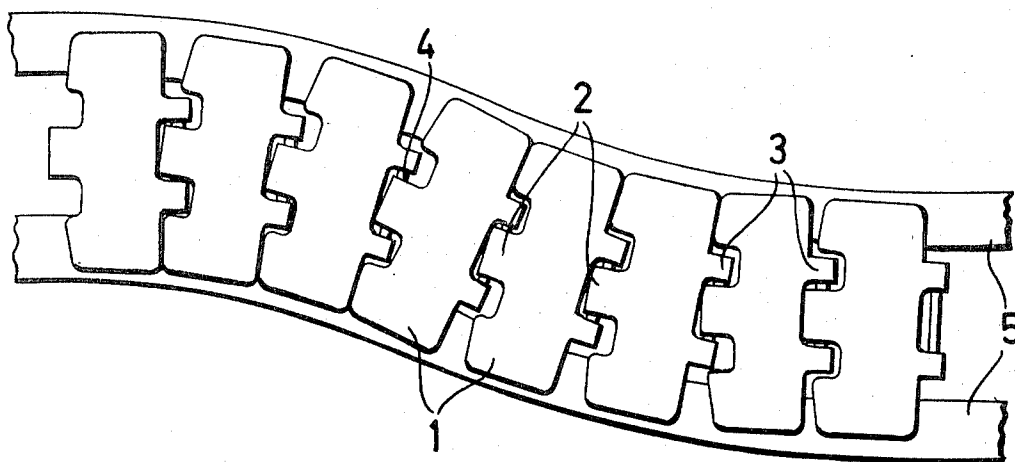
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198/189
- [51] **Int. Cl.**..... **B65g 17/06**
- [58] **Field of Search** ..... 198/189, 195, 193, 196,  
198/202; 59/35, 80, 91; 29/412, 416;  
113/116 V, 116 F, 116 AA

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## [57] ABSTRACT

A link conveyor comprises a series of metal plate links each of which is formed from a sheet metal blank and which are hinged to one another by hinge pins which extend through interengaging hinge eyelets formed from integral parts of the blank on adjacent edges of said links and each link having a pair of guide flanges projecting at right angles from it for guiding it along guide rails, the guide flanges also being formed as integral parts of the sheet metal blank. Preferably the guide flanges are integrally connected to the hinge eyelets projecting from one edge of each link by webs which are pressed flat against the underside of the link.

**9 Claims, 10 Drawing Figures**



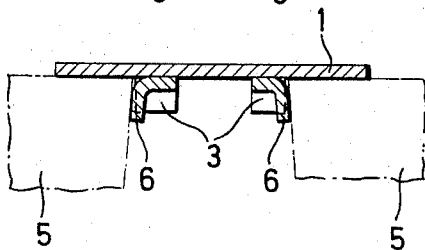
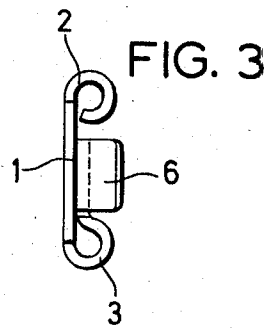
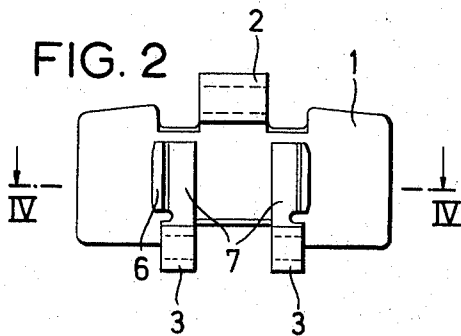
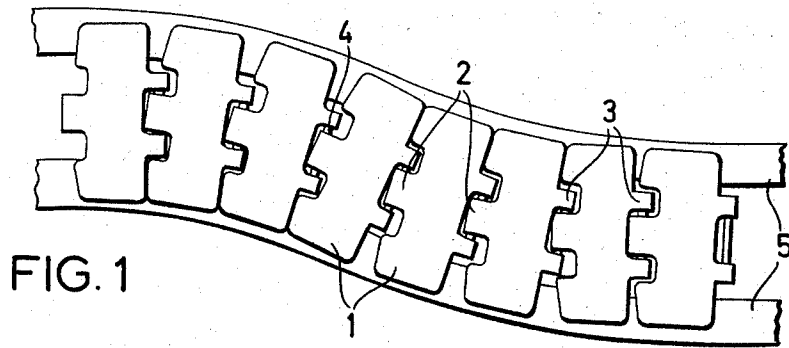


FIG. 4

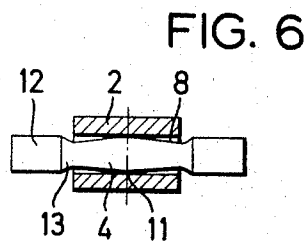
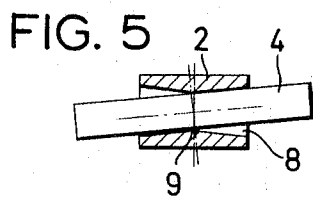


FIG. 6

FIG. 7

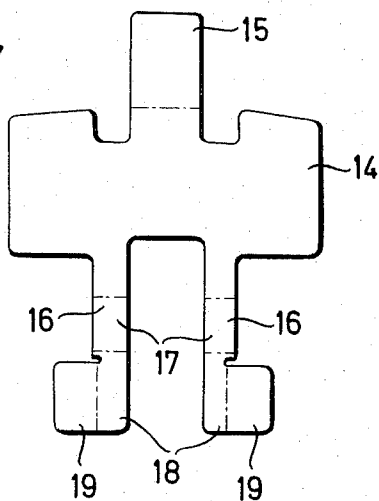


FIG. 8

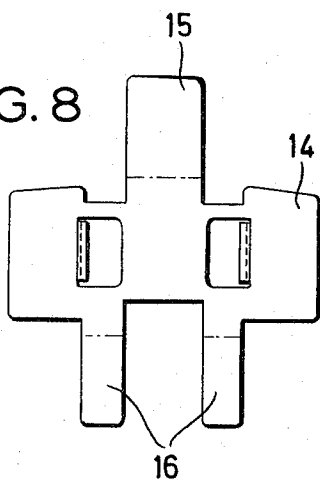


FIG. 9

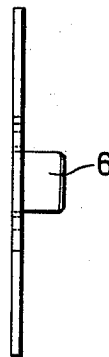
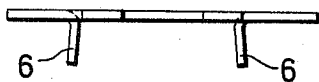


FIG. 10



## LINK CONVEYOR

## SUMMARY OF THE INVENTION

This invention relates to link conveyors comprising a series of metal plate links which are hinged to one another by hinge pins which extend through interengaging hinge eyelets on the adjacent edges of adjacent links, each link also having a guide member projecting from it for guiding it along guide rails.

Such link conveyors are used in industry for various purposes, for example for conveying goods made of glass, paper, metal and plastics, particularly bottles and cans. Due to their articulated arrangement such link conveyors also can be guided along a curved path. The lateral guidance required in this case is effected by the guide members. In existing conveyors the guide members consist of essentially C-shaped, mutually spaced webs welded to the undersides of the plate links. As the guide member consists of parts initially separate from the remainder of the link, the manufacture of the plate links is very costly, particularly as the C-shaped webs must be welded to the underside of the plate link in a separate very accurate operation. Similar disadvantages are found in link conveyors in which the guide member consists of a flat web and flanges arranged laterally thereof and bent at right angles, the web being rivetted to the underside of the plate link.

Plate links made of plastics material cannot in all cases withstand the occurring loads, and therefore their application is limited. Moreover they are manufactured of different materials because the hinge pins are still made of metal, so that the production of such link conveyors also meets with difficulties. The difference in the materials used adversely affects the relative mobility between the individual plate links as the plastics material is subject to greater wear. For such link conveyors consisting of hinged plate links a particular problem exists in the hinge construction if an accurate relative pivoting of the individual plate links is to be ensured.

It is the object of the invention to construct a link conveyor of the kind described above, in which a satisfactory pivotability of the individual plate links relative to each other is achieved while having a low-cost of construction.

To this end, according to this invention, each link and its guide member are formed integrally of sheet metal.

This construction in one piece allows the manufacture of the complete plate link in a single, continuous operation so that no separate operating steps are required for the fixing of the guide member. Moreover, due to the one-piece construction, a very high rigidity of the plate link is achieved so that the guide member can easily accommodate lateral forces exerted by the traction on the link conveyor, particularly along a curved path.

Preferably, each guide member comprises flanges projecting substantially at right angles from the underside of the link. The flanges may be punched out of the flat plate link itself providing that this can give the necessary rigidity. The flanges are, however, preferably secured to the hinge eyelets. Thus the flanges may be joined to webs which extend parallel to the underside of the plate link from hinge eyelets at one of the edges of the plate link.

A further contributory factor to a satisfactory operational efficiency, in particular satisfactory pivotability

of the links relative to each other is provided if a central hinge eyelet on one edge of a plate link is arranged between two spaced-apart hinge eyelets on the adjacent edge of the adjacent plate link and the central eyelet has a bearing aperture of cambered profile and is fitted with a cylindrical hinge pin, or has a cylindrical bearing aperture and is fitted with a barrel-shaped hinge pin.

In a particularly advantageous embodiment of the invention, each plate link is formed from a blank of flat sheet metal strip. Preferably, the blank has an essentially rectangular plate portion, a tongue projecting from the central portion of one edge of the plate portion, and two strips projecting from the opposite edge of the plate portion, the strips being separated by a distance which is slightly greater than the width of the tongue and the free end portions of the strips being provided with tabs extending laterally outwards for forming the flanges.

Each plate link is expediently formed from its blank in a continuous process by first rolling the tongue and the central portions of the strips downwards and inwards, then free end portions of the strips are pressed flat against the underside of the plate portion and after this the tabs are bent substantially at right angles away from the plate portion.

## BRIEF DESCRIPTION OF THE DRAWING

An example together with some modifications of a conveyor in accordance with the invention are illustrated somewhat diagrammatically in the accompanying drawings, in which:

FIG. 1 is a plan view of a number of links of the conveyor;

FIG. 2 is an underneath plan view of a single link to an enlarged scale;

FIG. 3 is a side view of the link shown in FIG. 2;

FIG. 4 is a section of the link along the line IV—IV in FIG. 2;

FIG. 5 is a detail of a hinge connection;

FIG. 6 is a detail of a modified hinge connection;

FIG. 7 is a plan view of a sheet metal blank for the production of the plate link shown in FIGS. 2 to 4;

FIG. 8 is a plan view of a modified sheet metal strip blank; and,

FIGS. 9 and 10 are side and end views respectively of the modified sheet metal strip blank shown in FIG. 8.

## DETAILED DESCRIPTION OF THE INVENTION

The link conveyor comprises a series of identical plate links 1, each of which has at one of its end edges a central hinge eyelet 2, and at its opposite end edge two hinge eyelets 3 spaced apart such that the central hinge eyelet of the adjacent plate link can be engaged between them. The hinge connections of the individual plate links to one another are each effected by a hinge pin 4 which is inserted through the hinge eyelets. The hinge connections of the individual plate links 1 to one another results in an articulated link conveyor which, by traction means not shown in detail, is moved along a path which in this example is bounded by guide rails 5.

As can be seen from FIGS. 2 to 4, each plate link 1 has flanges 6 bent downwards substantially at right angles, which serve for the lateral guiding of the link on the guide rails 5. The flanges 6 are joined to webs 7

which extend parallel to the underside of the plate link, and which themselves are joined at the two hinge eyelets 3 of the plate link 1. From the foregoing it follows that the plate member 1, the flanges 6, which form the guide member, and the hinge eyelets 2 and 3 are all integral, being made from a single sheet metal strip blank.

In order that the link conveyor may follow a curved path, special attention must be paid to the hinge connections between the individual plate links 1. As can be seen from FIG. 5, the hinge pin 4 has a cylindrical shape while the bearing aperture 8 of the hinge eyelet 2 has a cambered profile. The cambering of the profile of the bearing aperture 8 is shaped so that it has the geometrical shape of a double truncated cone having a minimum diameter substantially equal to that of the hinge pin.

In the modification of the hinge connection shown in FIG. 6, the bearing aperture 8 of the hinge eyelet 2 is cylindrical and the hinge pin 4 is barrel-shaped. In its barrel-shaped region it has the geometrical shape of a double truncated cone having a central diameter substantially equal to that of the cylindrical bearing aperture. The outer ends 12 of the hinge pin 4 are cylindrical. Between the outer ends 12 and the barrel-shaped region of the hinge pin 4 are conical transition portions 13 to give the hinge pin 4 the greatest possible stiffness.

As already mentioned, the plate link is made from a single sheet metal strip blank, such as is shown for example in FIG. 7. The blank consists of an essentially rectangular plate portion 14, in the central part of which a tongue 15 extends from one of its edges. This tongue later forms the central hinge eyelet 2. The opposite edge of the plate portion 14 is joined to two strips 16, the distance between which is slightly larger than the width of the tongue 15. From central parts 17 of the strips 16, the hinge eyelets 3 are formed, while the end portions 18 of the strips 16 form the webs 7, and finally outwardly extending tabs 19 form the guiding flanges 6. The dotted lines on the blank in FIG. 7 indicate the bending lines which result in the production of the plate link.

In the production of a plate link, after punching the blank out of a metal strip, first the tongue 15 is rolled downwards and inwards whereby the hinge eyelet 2 is formed. Then the strips 16 are similarly rolled downwards and inwards, and the free end portions 18 are pressed flat against the underside of the plate portion 14. Finally, the tabs 19 are bent downwards at right angles to form the flanges 6 in the position required for guiding. Subsequently, all that is needed is to effect the hinge connections between the individual plate links by means of the hinge pins 4.

In the modification shown in FIGS. 8 to 10, the flanges 6 are punched directly out of the portion 14 and the strips 16 form just the eyelets 3. As in the example shown in FIG. 7, the tongue 15 forms the eyelet 2.

As modifications of these examples it is possible to provide two hinge eyelets on one edge of the plate portion and three eyelets on the opposite edge. It is also possible to arrange the flanges 6, i.e., the tabs 19, on the tongue 15. In this case the flanges 6 can also readily be brought into the desired positions.

We claim:

1. A link conveyor including a series of metal plate links, hinge eyelets projecting from opposite edges of each of said links, said hinge eyelets projecting from

adjacent edges of adjacent links interengaging with each other, hinge pins extending through said interengaging hinge eyelets to hinge adjacent plate links to each other, a guide member formed integrally with each of said plate links, said guide members comprising flanges projecting substantially at right angles from the underside of said link, webs extending parallel to the underside of each of said plate links, said webs joining said flanges integrally to said hinge eyelets projecting from one of said opposite edges of said link, each of said plate links and guide members being formed of sheet metal, and said guide member being operative to guide said links along guide rails.

2. A conveyor as claimed in claim 1, wherein said flanges are punched downwards out of said plate link.

3. A conveyor as claimed in claim 1, wherein there is a single one of said hinge eyelets projecting from end of each of said plate links and two of said eyelets spaced apart from each other projecting from the adjacent edge of the adjacent plate link, said single eyelet engaging between said two eyelets and said single eyelet having a bearing aperture of cambered profile and said hinge pin being cylindrical.

4. A conveyor as claimed in claim 3, wherein said bearing aperture with said cambered profile has the geometrical shape of a double truncated cone having a minimum diameter substantially equal to that of said cylindrical hinge pin.

5. A conveyor as claimed in claim 1, wherein there is a single one of said hinge eyelets on one edge of each of said plate links and two of said hinge eyelets spaced apart from each other projecting from the adjacent edge of the adjacent plate link, said single eyelet engaging between said two eyelets and said single eyelet having a cylindrical bearing aperture and said hinge pin being barrel-shaped.

6. A conveyor as claimed in claim 5, wherein said barrel-shaped hinge pin has the geometrical shape of a double truncated cone having a central diameter substantially equal to that of said cylindrical bearing aperture.

7. A conveyor as claimed in claim 1, wherein each of said plate links is formed from a blank of sheet metal strip.

8. A conveyor as claimed in claim 7, wherein said blank includes an essentially rectangular plate portion a tongue projecting from one edge of said rectangular plate portion, two strips projecting from an opposite edge of said rectangular plate portion, said strips being separated by a distance which is slightly greater than the width of said tongue, and a tab projecting laterally outwards from a free end portion of each of said strips, said tabs being arranged to form said flanges.

9. A method of making a metal plate link for a link conveyor, said link comprising a substantially rectangular body portion, hinge eyelets projecting from opposite edges of said body portion and guide flanges projecting from said body portion, said method comprising the steps of punching a blank out of flat metal strip, said blank including said body portion, a tongue projecting from one edge of said body portion, two strips projecting from an opposite edge of said body portion, said strips being spaced apart by a distance which is slightly greater than the width of said tongue, and a tab extending laterally outwards from a free end portion of each of said strips, rolling said tongue downwards and inwards to form a first hinge eyelet on one edge of said

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body portion, rolling said strips downwards and inwards to form two hinge eyelets on said opposite edge of said body portion, pressing said free end portions of said strips flat against the underside of said body por-

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tion and finally bending said tabs substantially at right angles away from said body portion to form said flanges.

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