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Ziegler et al.

[11] **3,765,458**

[45] **Oct. 16, 1973**

[54] **GRIPPER SHUTTLE CARRIER**

[75] Inventors: **Georg Ziegler**, Solothurn; **Erwin Pfarrwaller**, Winterthur, both of Switzerland

[73] Assignee: **Sulzer Brothers Limited**, Winterthur, Switzerland

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[52] **U.S. Cl.** **139/126,** 198/189

[51] **Int. Cl.** **D03d 47/24**

[58] **Field of Search** ..... 139/12, 125, 126; 198/176, 189 X

[56] **References Cited**

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Primary Examiner—Henry S. Jaudon
Attorney—Dean S. Edmonds et al.

[57] **ABSTRACT**

For the return of gripper shuttles from the catching to the picking side of a loom, with the help of endless roller chain, gripper shuttle carriers detachably affixable to the chain include a web and a pair of flanges which resiliently engage with side bars, rollers or pins of the chain and without the removal of any links from the chain.

2 Claims, 10 Drawing Figures

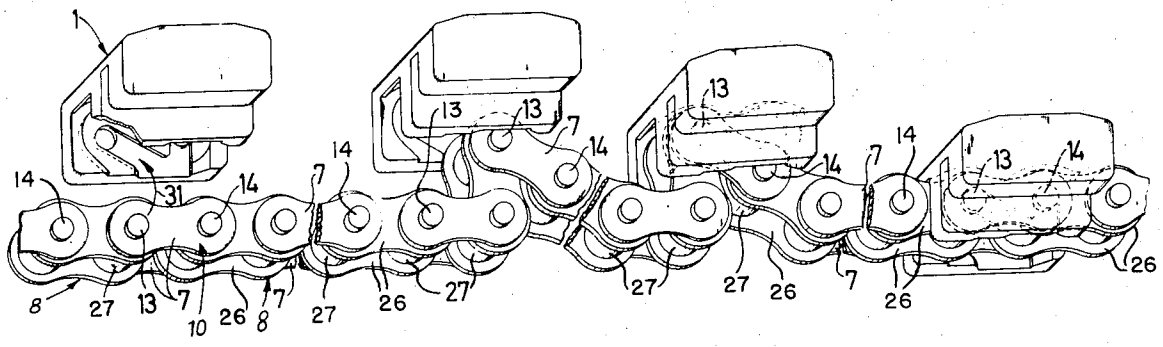
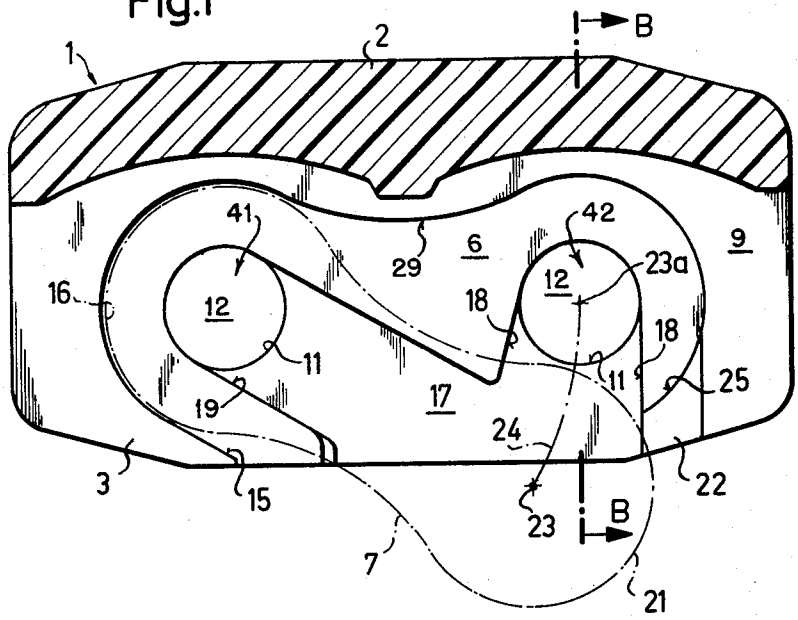


Fig.1


1
2
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42
29
6
9
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12
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15
22
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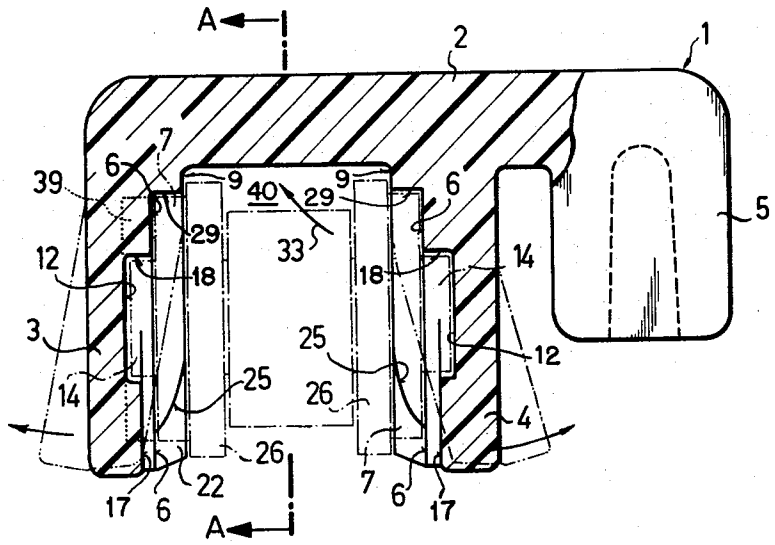
B
7
21

Fig.2


A
2
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6
A

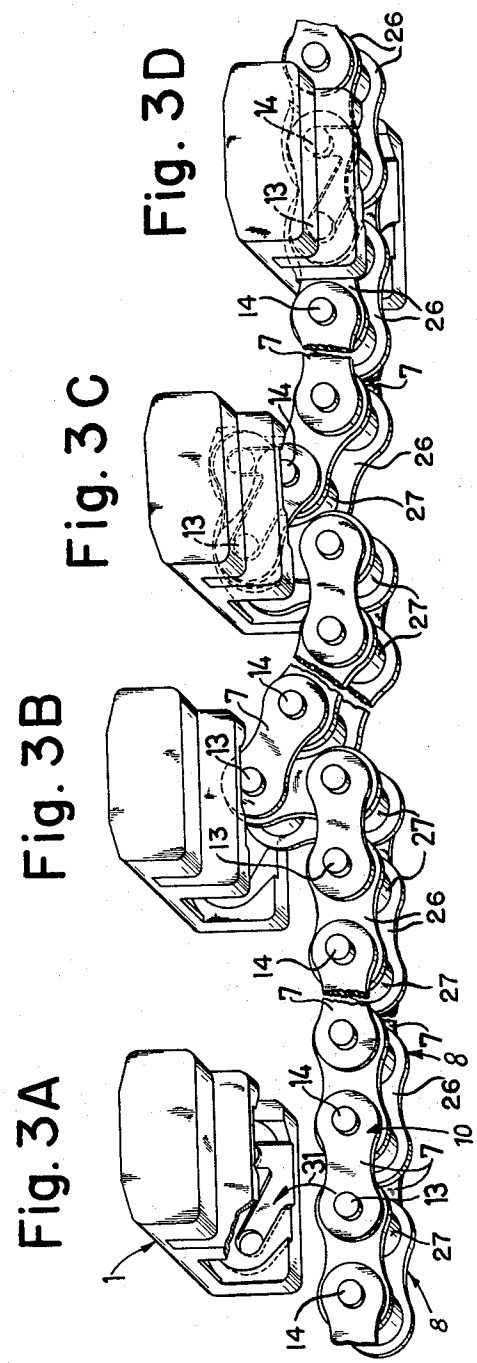
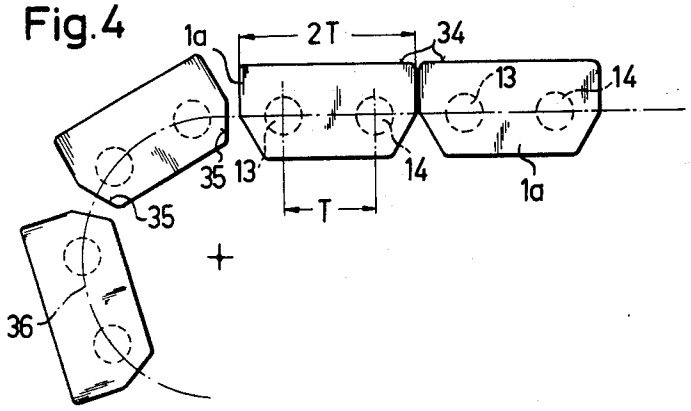


Fig. 3A
Fig. 3B
Fig. 3C
Fig. 3D
1
7
8
10
13
14
26
27
31

Fig.4



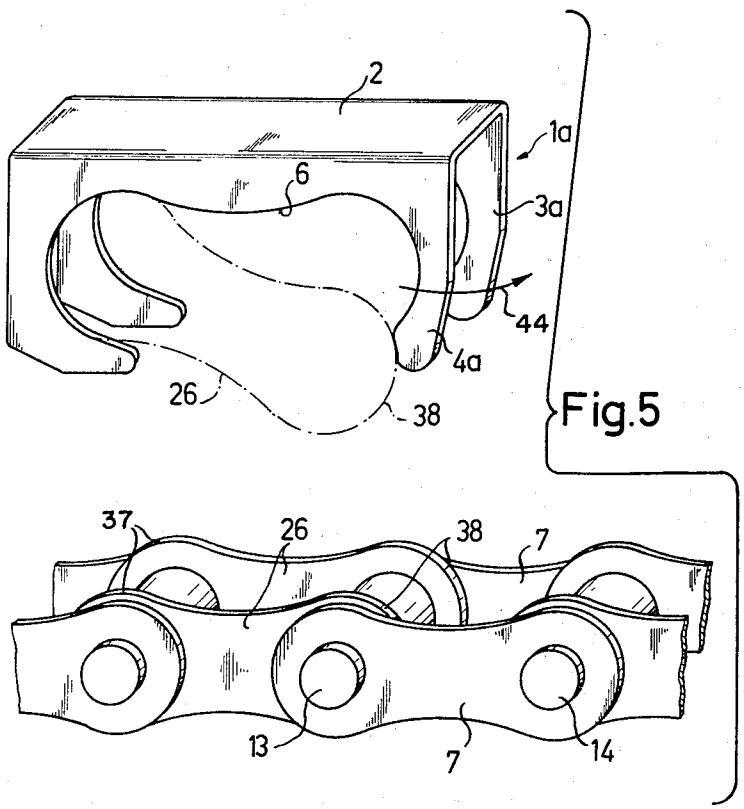


Fig.5

Fig.6

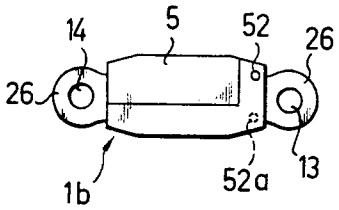
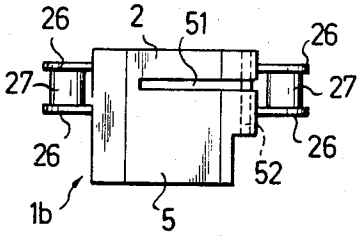


Fig.7



GRIPPER SHUTTLE CARRIER

The present invention pertains to carriers for the return of gripper shuttles from the catching to the picking side of a loom with the help of an endless chain.

In gripper shuttle looms a succession of pirnless shuttles is shot through the shed from the picking to the catching side of the loom where they are received in a catcher. Each shuttle pulls a weft thread through the shed. From the catcher the shuttles are returned by a carrier mechanism to the picking side of the loom, where they return to the working cycle. The carrier mechanism may include an endless roller chain by means of which the shuttles are so returned. Such chains typically include a pair of outer side bars in one link, a pair of inner side bars in the adjacent link, a pair of outer side bars in the third link, and so on.

In mechanisms of this type heretofore proposed, each shuttle carrier has been inserted into the chain in place of a link therein, and more particularly in place of a link including two such outer side bars. Thus to insert the carrier into the chain, the pins or rivets at the end of each link to be so replaced must be removed along with the side bars, the pins then being replaced when the carrier element has been inserted in place of those side bars. The carrier consequently bears the tensile stress in the chain.

In another construction heretofore proposed, each carrier is inserted into the gap between the side bars of a link and hence between two adjacent rollers of the chain. This means, however, that the teeth of the sprocket wheels which drive the chain cannot enter between such adjacent rollers and can engage instead only those gaps not occupied by shuttle carriers. With such a construction therefore the chain drive must be altered, with the substitution of different sprocket wheels. For example the number of teeth may have to be reduced by half, which would require each tooth to carry twice the stress.

It is an object of the invention to improve gripper shuttle return mechanism.

In accordance with the invention, the carriers are affixed each to one link in the chain by means of either positive coupling or non-positive coupling, such as elastic coupling. Such a construction makes it possible to affix the carriers to the chain without disassembling the chain, and in particular without removing pins and side bars from the chain. For this reason likewise the carrier of the invention is not subjected to the tensile stress in the chain. The tensile stress continues to be borne by the side bars of the chain itself. Moreover, there is no necessity for changing the sprocket wheels to wheels with an altered number of teeth or an altered shape therefor.

Since the shuttle carrier of the invention is not required to bear the tensile stress in the chain, it can be of lighter construction and its dimensions need only be sufficient for it to bear the stress inposed upon it by the shuttle being carried.

If one carrier is damaged it can readily be removed from the chain and replaced by another one. It is necessary only to release the positive or nonpositive coupling of the carrier to the chain. For example by means of a screw driver, the carrier to be removed is sprung out of engagement and then withdrawn.

The fact that the carrier of the invention needs to be dimensioned only for the stress encountered by it in carrying the shuttle entails an additional advantage,

namely that the carrier may be made of synthetic material such as the polyamides or tetrofluoroethylene. Either positive or nonpositive coupling of the carrier to the chain is easily achieved with such synthetic materials.

The carrier of the invention need incorporate no particular elements such as screws or rivets for its fastening to the chain. In particular cases as hereinbelow described for example with references to FIGS. **6** and **7**, supplementary fastening means such as screws and rivets may however be provided.

BRIEF DESCRIPTION OF THE DRAWINGS

the invention will now be described in further detail and in terms of a number of presently preferred exemplary embodiments with reference to the accompanying drawings in which:

FIG. **1** is a sectional view through a shuttle carrier in accordance with the invention taken on the section line A—A of FIG. **2**;

FIG. **2** is a sectional view taken on the line B—B of FIG. **1**;

FIGS. **3A**, **3B**, **3C** and **3D** are perspective views illustrating successive phases in the application to a chain of a carrier according to FIGS. **1** and **2**;

FIG. **4** illustrates another form of carrier according to the invention;

FIG. **5** illustrates in perspective still another carrier according to the invention, shown in proximity to a chain to which it can be removably affixed;

FIG. **6** is a view in elevation of still another carrier according to the invention; and

FIG. **7** is a plan view of the carrier of FIG. **6**.

Referring to FIGS. **1** and **2**, the shuttle carrier generally indicated at reference character **1** may be made of a suitable synthetic material such as an acetyl resin, for example the resin sold under the trademark DELRIN. The carrier includes an upper web portion **2** and flanges **3** and **4**, together with an extension **5** (FIG. **2**) for carriage of a gripper shuttle.

The flanges **3** and **4** may be elastically displaced from their full-line to their chain-line positions in FIG. **2**, and when released will return to their full-line positions. There thus exists between the two flanges an open slot or channel, as indicated at **40** in FIG. **2**.

Each of the flanges **3** and **4** is inwardly bounded by an innermost plane surface **9** (FIGS. **1** and **2**), i.e. a surface near-est the opposite one of those flanges and hence nearest the reader in FIG. **1**. Surface **9** is parallel to the plane of FIG. **1**. When the carrier is in place on the chain, the two faces **9** are parallel to each other and perpendicular to the plane of FIG. **2**. Those portions of the surface **9** at the longitudinal ends of the carrier, i.e. at the left and right ends thereof in FIG. **1**, accommodate, with suitable clearance, the exterior faces of the inner side bars **26** belonging to two roller links generally in-dicated at **8** in FIG. **3A**. These two roller links are separated by a pin link generally indicated at **10**, in FIG. **3A**, having outer side bars **7**. It is over such a pin link and to such a pin link that the carrier is fastened by snap action, i.e. by detent action. See FIGS. **2** and **3D**.

Below the surface **9** each flange is provided with a first recess, bounded by a plane surface **6** (parallel to the plane of FIG. **1**) and by a curvilinear cylindrical edge **29** perpendicular to the plane of FIG. **1**. The edge **29** includes end portions **15** and **25** behind which (i.e.

on the side toward the top of the sheet in FIG. 1) is held, on each of flanges 3 and 4, one of the outer side bars 7 of the pin link to which the carrier is affixed, once that link has been snapped into the slot 40 between the two flanges 3 and 4. The first recess, bounded by the plane surface 6 and by the cylindrical edge 29 with its end portions 15 and 25, thus constitutes a recess into which the ends and a major fraction of the periphery of an outer side bar 7 of a pin link 10 may be received.

Below the surface 6 each flange is provided with a second recess, bounded by a plane surface 17 parallel to the surfaces 6 and 9 and by a curvilinear cylindrical edge 18 perpendicular to the plane of FIG. 1.

Below the surface 17 each flange is provided with third and fourth recesses of circularly cylindrical shape, generally indicated at 41 and 42 in FIG. 1, and bounded each by a plane surface 12 parallel to surface 9 and by a circularly cylindrical edge surface 11 perpendicular to the plane of FIG. 1. The recesses 41 and 42 are spaced on centers, and are of the proper diameter, to accommodate the ends of the two pins or rivets 13 and 14 of a link in the chain, as indicated in FIG. 3D.

An oblique surface 22, functioning as an inclined plane and oblique to the plane of FIG. 1, extends approximately from the plane 6 at the lowermost limit of the flange in FIG. 1, approximately to plane 9 in the vicinity of the portion 25 of edge 29.

The two flanges 3 and 4 may thus be mirror images of each other in the section plane A—A of FIG. 2.

The carrier is shown in perspective in FIG. 3A above a pin link 10 of the chain having outer side bars 7, to which link the carrier is to be affixed. The link comprises side bars 7 and pins 13 and 14 with their rollers 27. To apply the carrier to the chain, the chain is advantageously folded as in FIG. 3B, and the pin 13 at one end of the outer side bar link to which the carrier is to be fastened is engaged between the facing surfaces 17 of the two flanges, the flanges being spring apart for this purpose. Pin 13 is then forced up the channels defined by the surfaces 17 and their edges 18 and 19 until the pin snaps into the circular recesses 41. The resultant state of affairs is illustrated in FIG. 3C, the flanges having returned to the unstressed, full-line position shown therefor in FIG. 2.

The outer surfaces of the side bars 7 now lie, so far as they are within the slot 40 between the two flanges, against the opposed surfaces 6, as indicated by the phantom, chain-line showing of a side bar 7 in FIG. 1. Pin 14 at the other end of the link on which the carrier is now partly engaged is thereupon similarly forced up between the opposing surfaces 17, the righthand ends (21, in FIG. 1) of the side bars 7 riding in the process over the facing oblique surfaces 22 until those ends 21 snap into the recesses defined by surfaces 6 and edges 29, i.e. inwardly of portion 25 of edge 29 on each flange, pin 14 simultaneously snapping into recesses 42. The flanges thereupon again return to the full-line position shown therefor in FIG. 2.

The foregoing processes occur simultaneously at flanges 3 and 4 with the result that the carrier becomes completely seated on the chain, as indicated in FIG. 3D.

The carrier is thus positively coupled to the chain. Any desired number of carriers can be so fastened to the chain.

To remove the carriers, the reverse procedure is followed. By means of a screw driver inserted in the direction indicated by the arrow 33 in FIG. 2, the right-hand ends 21 of the links 7 are snapped out and the left-hand ends 16 are then similarly snapped out.

Folding of the chain for application of the carrier thereto is not absolutely necessary. Upon a sufficient spreading of the flanges 3 and 4 the carrier can be snapped directly over the chain, so that it is not necessary to relieve the chain of the tensile stress therein even for the purpose of applying the carriers thereto or removing them therefrom.

In the embodiment illustrated in FIG. 4, the spacing on centers of the pins 13 and 14 is denoted T whereas the length of each carrier at the upper surface thereof, outside of the chain, is denoted 2T. In straight runs of the chain therefore the carriers provide a smooth and continuous surface which can be used for load carrying purposes. The carriers are beveled as indicated at 35 so that they can negotiate the curved portions of the chain path.

If the carriers are made of sufficiently elastic material, or if the flanges 3 and 4 are thick enough, the sockets 41 and 42 for the pins 13 and 14 may be made large enough as to accommodate the side bars 7.

This is illustrated by the dash-line indication 39 in FIG. 2 which is without the stepped shape resulting from the presence of surfaces 6, 18 and 17. That is, each flange will be provided with a single recess having the depth of the surfaces 12 in FIG. 1 and bounded by a curvilinear edge as indicated at 19, 29 and 25.

In another embodiment the flanges 3 and 4 are made relatively stiff, but are provided on the interior thereof (i.e. on the faces of the flanges facing the slot 40) with inserts of elastic material. These are shaped as hereinabove described to conform to the bars 7 and pins 13 and 14, so as to provide a positive as distinguished from a nonpositive or merely frictional coupling of the carrier to the chain. The elasticity of these inserts will permit the deformation thereof required for application of the carrier to the chain and its removal therefrom.

The carrier may also possess stiff flanges and be provided with recesses as indicated at 6, 29, and at 41 and 42 for positive coupling. In such an embodiment the surface 17 will be of the depth of the surfaces 12, the oblique surface 22 being retained but formed on an elastic insert.

In still another embodiment according to the invention illustrated in FIG. 5, the carriers are coupled over one of the inner pair of side bars 26. In such an embodiment the carrier 1a is made to be elastic lengthwise of the chain as indicated by arrow 44 in FIG. 5. The carrier is thus hooked under the inner side bars 26 of one link of the chain at one end 37 of those side bars, and sprung over the other end 38 of those side bars. The flanges 3a and 4a of the carrier should in such an embodiment have only the thickness of the inner side bars 26 to avoid interference with the sprockets.

In the embodiment of FIGS. 6 and 7 the carrier 1b is provided in the upper portion thereof with a slit 51 parallel to the long dimension of the chain. With such a construction, the carrier may be lighter in section so as to be more readily spread. After application of the carrier to the chain, a rivet 52 may be inserted as indicated in FIG. 6, outside the center line of the chain so as to provide positive coupling of the carrier to the chain. With such an embodiment however, removal of the

carriers customarily requires destruction of such rivets.

Screws may be employed in place of such rivets **52**, to permit tightening of the carrier to the chain and to permit its non-destructive removal therefrom. Additional such rivets or screws may be provided, for example as shown at **52***a* in FIG. **6**.

The carriers may also be affixed to two side-by-side chains moving together, forming bridging elements between them.

The invention thus provides a gripper shuttle carrier comprising a body of elastic material re-entrantly-shaped for detachably resilient engagement with a link of a chain. The carrier comprises a web and two flanges which face each other across an open slot. The flanges are engageable with a link of the chain, the flanges being preferably recessed, for example as indicated at **12** in FIGS. **1** and **2**, to lock into engagement with the chain by detent action after flexure to bring the carrier flanges into position with the link or elements thereof in the slot between those flanges. The carrier may be susceptible of flexure crosswise of the chain, as in the embodiment of FIGS. **1** and **2**, for resilient engagement with side bars of the chain, or it may, as in the embodiment of FIG. **5**, be susceptible of flexure lengthwise of the chain for resilient engagement with two successive of the pins or rollers of the chain.

The flanges face each other across an open slot which, in the embodiment of FIGS. **1** and **2**, extends lengthwise of the chain to permit flexure of the carrier transversely of the chain, whereas in the embodiment of FIG. **5**, the slot may be regarded as extending crosswise of the chain, the flanges being regarded in that embodiment as including one the two hooked-shaped portions at the left of the carrier and the other the two hook-shaped portions at the right of the carrier.

While the invention has been described hereinabove in terms of a number of presently preferred embodiments the invention itself is not limited thereto, but rather comprehends all modifications of and departures from those embodiments properly falling within the spirit and scope of the appended claims.

We claim:

1. A gripper shuttle carrier removably affixable to a roller chain made up of roller links comprising inner side bars and of pin links comprising outer side bars, said carrier com-prising a web and two flanges facing each other across an open slot, each of said flanges having a length greater than that of said outer side bars and having formed therein, below the surface thereof facing said slot, a recess for the reception of the ends and of a major fraction of the periphery of an outer side bar of a pin link of the chain.

2. A carrier according to claim **1** wherein said flanges further have formed therein at opposite positions across said slot and within said first-named recesses, deeper recesses for the reception of the pins of a pin link of the chain.

* * * * *