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Guiding device for objects such as printed circuit boards.

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Description

The invention relates to a device comprising a frame, two endless chain conveyors having active parts spaced apart and in parallel relationship to each other, and leaf-like spring members connected to the links of the conveyor, the free bottom end of these members being adapted to grip the side edge of an object, the end of the leaf spring is extended with a reaction arm part, means for holding said reaction arm and providing connection of said leaf spring member to said conveyor, said holder having an edge situated generally parallel to the direction of transporting said object by said conveyor and at which the transition portion between said reaction arm and leaf spring is situate generally in order that said leaf spring member is supported tiltable on said holder, and further comprising a means for retaining said reaction arm part resiliently against the holder.

Such a guiding device of the type described in the preamble is disclosed in NL-A-8600324, and is generally used with soldering machines for soldering components on the boards. These boards have a determined width to which the interval between the active parts of the conveyor belts are adjusted, which width can however vary within determined margins. For this purpose the leaf springs are necessary to accommodate these differences in tolerance, wherein account also has to be taken of heat expansion and the like as this occurs in the case of soldering machines wherein the objects are guided over a heat-radiating pre-drying zone and a solder bath.

The invention has for its object to improve the guiding device, and in particular the construction of the leaf spring members, such that the above stated requirements are fulfilled and the construction, particularly the interchangeability thereof, is improved, the number of components is reduced and the cost price is therefore lower.

The device according to the invention is distinguished in that said holder comprises a recessed portion into which said reaction arm is generally conformable in order that movement of said leaf spring member in the transporting direction is prevented.

According to a further development the press-on member is embodied as a resilient strip fixed onto the holder and extending above the recessed portion.

Through the use of this resilient strip the flexibility of the leaf spring member relative to the holder is considerably enlarged. The selection of the desired materials, temperature resistance, spring action and shape can moreover be adapted to the various functions, whereby an optimally operating spring system results.

In order to use the resilient strip also as fixing means for the leaf spring member, the resilient strip has to extend according to the invention over at least three wall surfaces of the holder.

Above mentioned and other features will be further elucidated in the figure description following below of an embodiment.

In the drawing:

Figure 1 shows a perspective top view of a guiding device for objects according to the invention, figure 2 is a perspective view of a detail of the guiding device provided with a leaf spring member according to the invention on an enlarged scale, figure 3 shows a section along the line III-III in figure 2.

The guiding device according to the invention shown in figure 1 consists of two endless conveyor elements 1, here in the form of a link chain which is trained about a gear wheel 2 and wherein the other gear wheel, which is not shown, lies at a determined interval.

The reversing wheels for the chain 1 are placed such that the active parts 3 of each endless chain element lie parallel to and at an interval from each other. In the embodiment shown each link 4 of the chain has lengthened hinge pins 5 such that these extend far above the surface of the gear wheel 2. It is also conceivable that the pins 5 extend on the underside of the chain. Arranged on these lengthened hinge pins 5 are holders 6 which are disposed in a guide rail (not shown) and which serve for mounting of leaf-form spring members 7, the bottom portion 8 of which takes a fork-shaped form, wherein each tooth of the fork is bent into a V-shape in order to be suitable for grasping the side edge of an object V, for instance a printed circuit board, onto which must be soldered elements for an electronic circuit. Transporting of the printed circuit board takes place in the direction of the arrow P1 and it can be carried for example past different stations, which are not shown, but which may for instance be a soldering station. It is known that quite great temperature differences have to be withstood in such soldering devices, so that the chain 1 having leaf spring members 7 arranged thereon or thereunder have to be able to withstand these temperature differences.

There now follows a description of the leaf spring members according to the invention with reference to figures 2 and 3.

According to the invention the leaf-form spring member 7 is lengthened on the side 9 remote from the free end 8 with a reaction arm part 10. In the embodiment shown this reaction arm part 10 encloses a determined angle, for example 90°, with the leaf spring member 7. The reaction arm part 10 has a determined width and a determined length and fits precisely in form-fitting manner into a cut-away part 11 in the form of a recessed portion in the upper surface of the holder 6. The upper surface of the recessed portion 11 runs sloping to the vertical but it will be apparent that this can have any other position that is suitable for the
desired operation of the leaf spring member 7.

The leaf spring member has a partial incision at 12, which incision falls around the edge portion 13 of the recess 11 of the holder 6, which becomes possible as a result of an incision 14 likewise arranged in that edge portion 13, this incision or cut-away portion lying in the centre of the recessed portion 11. The depth of the cut-away portion 14 is at least equal to the thickness of the leaf spring member 7.

With the embodiment shown it will be apparent that the reaction arm part 10 is received form-fittingly into the recess 11 of the holder 6, that is, it no longer shifts in the conveying direction P1 relative to the holder 6 and is locked in upward and downward sense by the cut-away portion 12 and the upper surface of the recess 11.

In order to prevent the possibility of the leaf spring 7 shifting out of the recess 11 in the direction of the arrow P3, see figure 3, a fixing member, here taking the form of a leaf spring strip 15 that has a substantially U-shaped form, serves to fix the leaf spring member 7 on the holder 6. The short leg 16 of the leaf spring strip falls into an opening 17 in the reaction arm part 10 of the leaf spring member 7, the body portion of the leaf spring strip falls into a narrow recess 18 of the holder 6 communicating with the recess 11, while the long leg 19 of the leaf spring strip extends along the rear wall of the holder 6 in a recess 20 conforming with the recess 18. The long leg 19 is provided at 21 with a lip 22 which falls into a cut-away portion 23 of the holder 6.

It will be apparent from the above that the fitting of the leaf-form spring member 7 is restricted to the placing of the reaction arm part 10 in the recess 11, arranging the short leg 16 in the opening 17 of the reaction arm part 10 and subsequently snapping the lip 22 fixedly into the opening 23 of the holder 6. With the leaf spring strip 15 shown it is possible for the leaf spring 7 to have every freedom of movement in the direction of arrow P4 so that the device is fully adapted to grasp hold of the object V along the side edge, which can take place within determined tolerances, wherein possible changes of dimension as a consequence of temperature changes can be accommodated without hindrance.

The invention is not limited to the above described embodiment, wherein a particular matter for consideration is the form of the leaf spring strip 15, which can extend above the recess 11 in a manner other than shown. Conceivable here is a leaf spring spanning the side edges adjacent to the recess 11 for pressing down the reaction arm part 10 into the recess 11.

Claims

1. A device comprising a frame, two endless chain conveyors (1) having active parts (3) spaced apart and in parallel relationship to each other, and leaf-like spring members (7) connected to the links (4) of the conveyor, the free bottom end (8) of these members (7) being adapted to grip the side edge of an object, the end of the leaf spring is extended with a reaction arm part (10), means (6) for holding said reaction arm and providing connection of said leaf spring member (7) to said conveyor (1), said holder having an edge (13) situated generally parallel to the direction of transporting said object by said conveyor and at which the transition portion between said reaction arm and leaf spring is situateable generally in order that said leaf spring member is supported resiliently against the holder (6), characterized in that said holder (6) comprises a recessed portion (11) into which said reaction arm (10) is generally conformable in order that movement of said leaf spring member in the transporting direction is prevented.

2. A device as claimed in claim 1, characterized in that said edge (13) of the holder is provided with an incision (14), whereas the leaf spring is provided with cut away portions (12) generally at said transition for taking up the remaining edge portions (13), in order to restrict movement of said leaf spring member (7) relative to said conveyor (1) in directions generally perpendicular to said transporting direction.

3. A device as claimed in claim 1 or 2, characterized in that said retaining means comprises: at least one resilient strip attached to said holder and extending into engagement with said reaction arm (10).

4. A device as claimed in claim 3, characterized in that said resilient strip (19) extends about at least three wall surfaces of said holder (6).

5. A device as claimed in claim 4, characterized in that an aperture (17) is provided in said reaction arm part (10) of said leaf spring member (7), and a leg portion (15) of said resilient strip (19) is engageable in said aperture in order to limit movement of said reaction arm part (10) generally along the bottom surface of said recessed portion (11) of said holder (6).

Patentansprüche

1. Vorrichtung mit
   - einem Rahmen,
- zwei endlosen Kettenförderern (1) mit einem Abstand parallel zueinander angeordneten wirksamen Teilen (3) sowie mit blattähnlichen Federelementen (7), die mit den Gliedern (4) des Förderers verbunden sind, wobei das freie untere Ende (8) dieser Elemente (7) so ausgebildet ist, daß es die Seitenkante eines Gegenstandes festhält, und sich am Ende der Blattfeder ein Verbin dungssarmabschnitt (10) befindet,

- Mitteln (6) zum Halten dieses Verbindungssarms und zum Herstellen einer Verbindung zwischen dem Blattfederelement (7) und dem Förderer (1), wobei dieser Halter eine Kante (13) aufweist, die im wesentlichen parallel verläuft zu der Richtung, in der der genannte Gegenstand von diesem Förderer transportiert wird, und an der der Übergangsabschnitt zwischen diesem Verbindungssarm und dieser Blattfeder im wesentlichen so angeordnet werden kann, daß dieses Blattfederelement schwenkbar an dem genannten Halter angebracht werden kann, sowie

- einem Mittel zum federnden Andrücken des Verbindungssarmabschnitts (10) gegen den Halter (6), dadurch gekennzeichnet, daß der Halter (6) einen ausgespannten Abschnitt (11) aufweist, in den der Verbindungssarm (10) im wesentlichen eingepaßt werden kann, so daß eine Bewegung des Blattfederelements in Transportrichtung verhindert wird.

2. Vorrichtung nach Anspruch 1, dadurch gekennzeichnet, daß die Kante (13) des Halter mit einem Einschnitt (14) versehen ist, und die Blattfeder im wesentlichen an dem genannten Übergangsabschnitt mit Aussparungen (12) zur Aufnahme der verbleibenden Kantenabschnitte (13) versehen ist, um eine Bewegung des Blattfederelements (7) in bezug auf den Förderer (1) in einer im wesentlichen zur Transportrichtung senkrechtigen Richtung einzuschränken.

3. Vorrichtung nach Anspruch 1 oder 2, dadurch gekennzeichnet, daß das genannte Haltemittel mindestens einen federnden Streifen umfaßt, der an dem genannten Halter angebracht ist und sich so erstreckt, daß er sich mit dem Verbindungssarm (10) in Eingriff befindet.

4. Vorrichtung nach Anspruch 3, dadurch gekennzeichnet, daß der genannte federnde Streifen (19) um mindestens drei Flächen des Halters (6) herum verläuft.

5. Vorrichtung nach Anspruch 4, dadurch gekennzeichnet, daß in dem Verbindungssarmabschnitt (10) des Blattfederelements (7) eine Öffnung (17) vorgesehen ist, und daß in dieser Öffnung ein Schenkelschnitt (15) des federnden Streifens (19) eingreifen kann, um im wesentlichen eine Bewegung des Verbindungssarmabschnitts (10) entlang der Unterseite des ausgespannten Abschnitts (11) des Halters (6) einzuschränken.

Revendications

1. Dispositif comportant un cadre, deux convoyeurs à chaîne sans fin (1) ayant des parties actives (3) espacées et parallèles entre elles, et des éléments formant ressort à lame (7) reliés aux mailons (4) du convoyeur, l'extrémité inférieure libre (8) de ces éléments (7) étant apte à saisir le bord latéral d'un objet, l'extrémité du ressort à lame étant prolongée par une partie formant bras de réaction (10), des moyens (6) pour maintenir ledit bras de réaction et assurer la liaison dudit élément formant ressort à lame (7) audit convoyeur (1), ledit dispositif de maintien possédant un bord (13) sensiblement parallèle à la direction de transport dudit objet par ledit convoyeur et sur lequel la portion de transition entre ledit bras de réaction et le ressort à lame peut être située globalement de telle sorte que ledit élément formant ressort à lame soit supporté de manière basculante sur ledit dispositif de maintien, et comportant en outre un moyen pour retenir ledit bras de réaction (10) de façon élastique contre le dispositif de maintien (6), caractérisé en ce que ledit dispositif de maintien (6) comporte une partie en creux (11) dans laquelle ledit bras de réaction (10) est sensiblement adaptable afin d'empêcher le mouvement dudit élément formant ressort à lame dans le sens du transport.

2. Dispositif selon la revendication 1, caractérisé en ce que ledit bord (13) du dispositif de maintien est pourvu d'une incision (14), alors que le ressort à lame est pourvu de parties découpées (12) sensiblement sur ladite transition pour recevoir les parties de bord (13) restantes, afin de limiter le mouvement dudit élément formant ressort à lame (7) par rapport audit convoyeur (1) dans des directions sensiblement perpendiculaires à ladite direction de transport.

3. Dispositif selon la revendication 1 ou 2, caractérisé en ce que ledit moyen pour retenir comprend au moins une bande élastique fixée audit dispositif de maintien et se mettant en prise avec ledit bras de réaction (10).

4. Dispositif selon la revendication 3, caractérisé en
ce que ladite bande élastique (19) s'étend sur au moins trois surfaces de paroi dudit dispositif de maintien (6).

5. Dispositif selon la revendication 4, caractérisé en ce qu'une ouverture (17) est prévue dans ladite partie formant bras de réaction (10) dudit élément formant ressort à lame (7), et une partie formant bras (15) de ladite bande élastique (19) peut s'engager dans ladite ouverture afin de limiter le mouvement de ladite partie formant bras de réaction (10) sensiblement le long de la surface inférieure de ladite partie en creux (11) dudit dispositif de maintien (6).